49th Annual Meeting of the

Diabetic Pregnancy Study Group

EASD

Nyborg, Denmark
September 7th – 10th, 2017

Thursday, September 7th	Friday, September 8th	Saturday, September 9th
A R R I V A L	08.15-8.30 **Welcome – Angela Napoli** 08.30-09.00 **Keynote Lecture: Chittaranjan Yajnik** *The Game of GDM* Chairs: Gernot Desoye & Annuziata Lapolla 09.00-10.30 **Oral Presentations Session 1: (6)** Chairs: M. Pilar Ramos Alvarez & Helen Murphy	08.30-09.00 **Keynote Lecture: Boyd Metzger** *HAPO follow-up* Chairs: Peter Damm & David McCance 9.00-10.30 **Oral Presentations 3: (6)** Chairs: Mary Loeken & Marina Ivanisevic
	10.30-11.00 **COFFEE BREAK**	10.30-11.00 **COFFEE BREAK**
	11.00-13.00 – **Group 1 Poster Presentations** ***Theme 1***: **Gestational weight gain (6)** Chairs: Harold de Valk & Martina Persson ***Theme 2***: **Outcome/Long-term consequences (12)** Chairs: Tine Dalsgaard Clausen & Sander Galjaard ***Theme 3***: **GDM-1 (9)** Chairs: Louise Kelstrup & Rosa Corcoy	11.00-13.00 – **Group 2 Poster Presentations** ***Theme 4*: Biomarkers (3)** Chairs: David Hill & Jeannet Lauenborg ***Theme 5*: Pre-gestational diabetes (13)** Chairs: Lene Ringholm & Adam Tabák ***Theme 6*: GDM-2 (8)** Chairs: Kristina Renault & Fidelma Dunne
14.00-19.00 **Registration – Sinatur Hotel Storebælt, Nyborg** 16.00-17.30 **DPSG Board Meeting**	13.00-14.15 **LUNCH BREAK**	13.00-14.15 **LUNCH BREAK**
19:00-22:00 **WELCOME** Dorte Møller Jensen and Mayor of Nyborg RECEPTION DINNER & DEBATE Travel Awards: ***The DPSG Young Investigators Travelling Fellowship***	14.15-15.15 **Keynote Lecture: Hubert Preissl** *Maternal glucose levels and human fetal brain activity* **Keynote Lecture: Patricia Iozzo** *Maternal feeding and offspring's cognition and brain metabolism* Chairs: Ute Schaefer-Graf & David McIntyre	14.15-16:00 **Oral Presentations 4: (7)** Chairs: Michael Maresh & Marta Viana
Debate (45 min): **Can we prevent Gestational Diabetes Mellitus?** **Pro**: Christina Vinter **Con**: Aoife Egan Chair: Per Ovesen	15.15-15.45 **COFFEE BREAK**	16.00-16.30 **COFFEE BREAK**
	15.45-17.45 **Oral Presentations 2: (8)** Chairs: Anne Vambergue & Elisabeth R Mathiesen 17.45-18.15 **JOSEPH HOET RESEARCH AWARD LECTURE** **Eleanor Scott** *It's all in the timing: Lessons learnt about 24-hour glucose control* Chair: M. Pilar Ramos Alvarez 18:15-19.30 **DPSG Annual Business Meeting** Chair: Angela Napoli	16:30-16:45 Chair: Angela Napoli **JOHN STOWERS POSTER AWARDS** Recipients for 1st, 2nd, and 3rd highest scored abstracts **Judges**: Ulf Eriksen, Josip Djelmis, Christopher Nolan, Maria Grazia Dalfra 16.45-17:30 **JORGEN PEDERSEN LECTURE** **Parri Wentzel** *Diabetic pregnancy and embryonic dysmorphogenesis* 17.30-17.45 **Acknowledgements & Adjournment** 20.30 **DINNER**
	20.00-23.00 **DINNER**	**Departure:** **Sunday, September 10th**

CONTENT

Organizing Committee

The Board of the Diabetic Pregnancy Study Group of EASD

Angela Napoli (Italy), Chair
Ute Schaefer-Graz (Germany), Past Chair
Gernot Desoye, (Austria), Treasurer
M. Pilar Ramos Alvarez, Spain
Dorte Møller Jensen, Denmark

Local Organizing Committee

Christina Vinter
Dorte Møller Jensen
Elisabeth R. Mathiesen
Jeannet Lauenborg
Kristina Renault
Lene Ringholm
Lise Lotte Torvin Andersen
Louise Kelstrup
Mette Tanvig
Per Ovesen
Peter Damm
Tine Dalsgaard Clausen

Welcome to Nyborg and the 49th Annual Meeting of the DPSG

September 2017

Dear DPSG members and Colleagues,

We are pleased to welcome you to the 49th Annual Meeting of the DPSG, which takes place from 7th to 10th September 2017 in Nyborg, Denmark.
The venue for the meeting is Sinatur Hotel "Storebaelt", meaning "the Great Belt" – a unique and bright venue located on the outskirts of Nyborg overlooking the Great Belt, an offshore wind farm and the Great Belt Bridge. We welcome you to enjoy the Nordic light, colors and cuisine during the meeting and hope that you will have the opportunity for a walk along the breathtaking Great Belt Coastline.
You will find the program in the following pages. This year's program features keynote lectures on GDM as well as maternal glucose regulation and fetal brain activity. The program provides the widest possible space for participants to present and discuss their science during oral and poster presentations. We hope that the program nurtures lively and friendly discussions during the meeting.

We acknowledge the kind support and cooperation of the Board of the DPSG, Odense University Hospital and sponsors: Novo Nordisk A/S and Lilly.

We have looked forward to welcoming you to Nyborg in September.

The Danish Organizing Committee of the DPSG 2017

Christina Vinter Dorte Møller Jensen Elisabeth R. Mathiesen Kristina Renault
Jeannet Lauenborg Lene Ringholm Lise Lotte Torvin Andersen
Louise Kelstrup Mette Tanvig Per Ovesen Peter Damm Tine Dalsgaard Clausen

Dear Friends,

This year the DPSG to be held in Nyborg takes on the colors of the North Sea.
These colors form the backdrop for the various 'key-note lectures' focusing on the most up-to-date topics in prevention, pathophysiology, and clinics.

The meeting also devotes the widest possible space to oral presentations, as well as offering major poster areas, so as to favor a lively and friendly exchange of views.
This year again, the DPSG has awarded younger members travel grants to make it easier for them to take part and breathe new life into the group.

Let me take this opportunity to thank the board, Sheila Fleming and all the DPSG members for having constantly supported and stimulated me.

Will look forward also to seeing you in Rome in 2018 for the 50th DPSG anniversary.

Yours
Angela Napoli

Chair of DPSG

Industrial sponsors of 49th Annual Meeting of the DPSG:

This activity is supported by an educational grant from Novo Nordisk. For further information concerning Novo Nordisk visit www.novonordisk.com.

This activity is supported by an educational grant from Lilly. For further information concerning Lilly grant funding visit www.lillygrantoffice.com.

Financial administration and support:

Odense University Hospital http://en.ouh.dk/

General information

Congress Venue

Signatur Hotel Storebaelt
Østerøvej 121, DK-5800 Nyborg, Denmark
http://www.sinatur.dk/hoteller/hotel-storebaelt/
Phone: 0045 65 31 40 02

Congress secretariat and registration

Registration takes place in the hall next to the reception of the Hotel Sinatur. Registration hours: Thursday, September 7th, 14:00-19:00 and Friday, September 8th 7:00-9:00. The hotel reception will be open day and night for any questions during the congress.

Meeting rooms

Locations for the sessions are displayed on screens at the congress hotel. Please see map of venue below.

Conference documents and badges

Conference documents and badges should be collected on-site, at the registration desk. Name badges must be worn during sessions and events.

Languages

The official conference language is English

Online program book

The full program book will be available on the DPSG website.

Presentations

The presentations should be saved on a USB in a version compatible with PowerPoint version 10. Presentations must be uploaded to the PC of the venue before the session starts. Local assistants will be present. Adaptors for own laptops may be available. In case of doubt, contact a local assistant.

Internet Service

Free Wifi is available for congress participants during the venue. Log in is provided at the Hotel reception.

Mobile phones

All mobile phones must be on silent mode during sessions.

Meals

First meal to be served is at the Welcome Reception and Dinner Friday evening at 19:00 in the Restaurant. The meeting ends after breakfast Sunday morning.

The dinner Saturday evening will be in Main Conference Hall (Flintholm/Sandholm)

Coffee breaks and lunches will be served to congress participants in the coffee areas and the restaurant.

DPSG Annual Business Meeting

Friday, September 8th 18.15-19.30 at Meeting Rooms *Helleholm/Musholm/Egholm*

Smoking

Smoking is allowed at outdoor areas only.

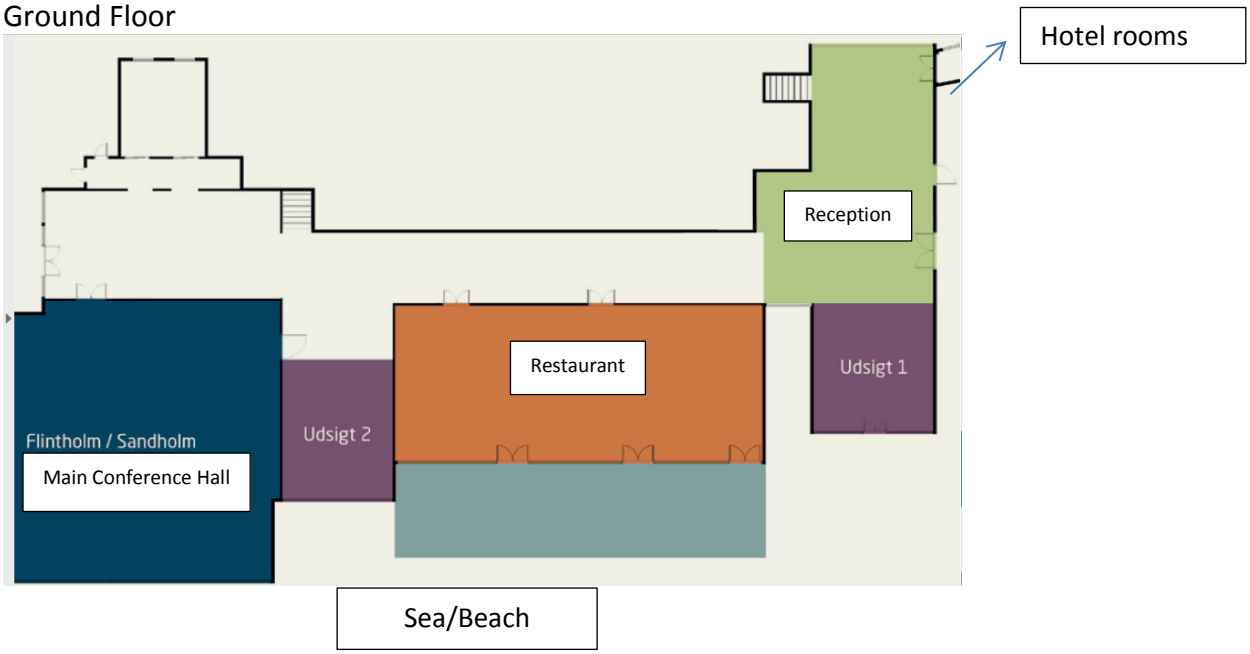
Safety and security

Please do not leave bags or suitcases unattended at any time at the venue.

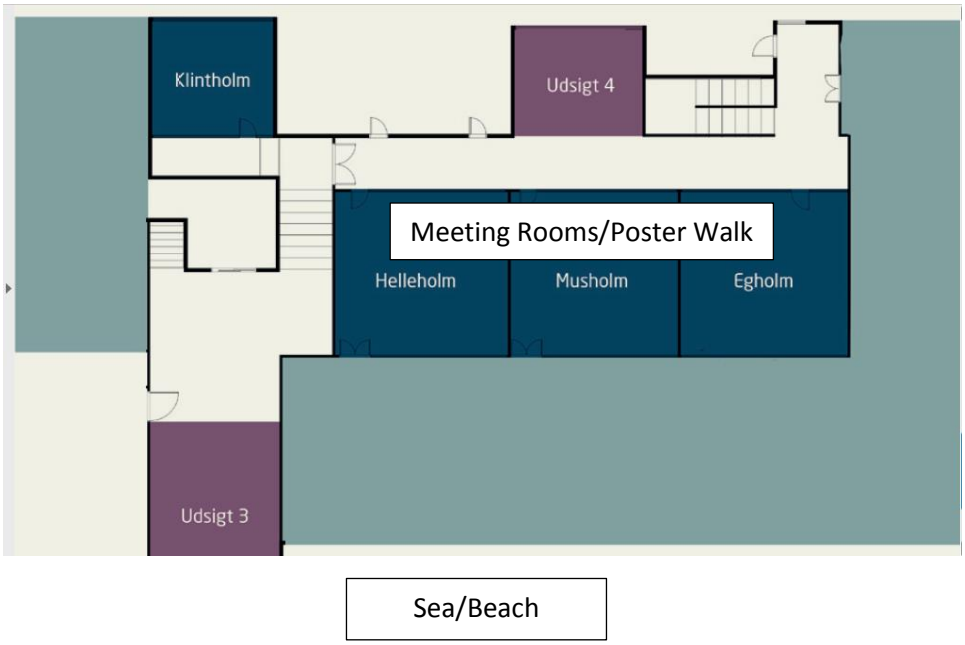
Cover photo is from a Danish location taken by Jeannet Lauenborg

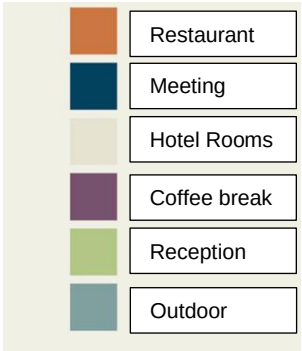
Map of congress hotel

Ground Floor



1st Floor





PROGRAM

THURSDAY, SEPTEMBER 7

14.00-19.00 Registration

16.00-17.30 DPSG Board Meeting

19.00-22.00 WELCOME – Dorte Møller Jensen and Mayor of Nyborg
RECEPTION DINNER AND DEBATE
Chair: Angela Napoli

Recognition – The DPSG Young Investigator Travelling Fellowship

DEBATE – Chairperson: Per Ovesen
CAN WE PREVENT GESTATIONAL DIABETES MELLITUS?
Pro: Christina Vinter
Con: Aoife Egan

FRIDAY, SEPTEMBER 8

08.15-8.30 Welcome – Angela Napoli

08.30-09.00 KEYNOTE LECTURE

Chairs: Gernot Desoye & Annuziata Lapolla

CHITTARANJAN YAJNIK

"The Game of GDM"

09.00-10.30 Oral Session 1

Chairs: M. Pilar Ramos Alvarez & Helen Murphy

OP 01

Increased mortality and morbidity in mothers with type 1 diabetes: impact of HbA_{1c} and level of albuminuria in early pregnancy. A register-based prospective cohort study (The EPICOM Study)

Knorr S, Juud S, Bytoft B, Lohse Z, Clausen TD, Jensen RB, Damm P, Beck-Nielsen H, Mathiesen ER, Jensen DM, and Gravholt CH

OP 02

Fetal programming of gestational diabetes in mouse: A failure to adaptively increase β-cell mass during pregnancy

Szlapinski S and Hill DJ

OP 03

Effects of a lifestyle intervention during pregnancy and first postpartum year – 1-year follow-up of the RADIEL study

Huvinen E, Koivusalo SB, Kautiainen H, and Eriksson JG

OP 04

Adiposity, dysmetabolic traits and earlier onset of female puberty in adolescent offspring of women with gestational diabetes mellitus: a clinical study within the Danish National Birth Cohort

Grunnet LG, Hansen NS, Hjort L, Madsen CM, Kampmann FB, Thuesen ACB, Granstrøm C, Strøm M, Maslova E, Frikke-Schmidt R, Damm P, Chavarro JE, Frank BH, Olsen SF, and Vaag A

OP 05

The fetal genome is an important contributor to the fetal metabolome

Lowe WL, Kuang A, Bain JR, Lin F, Nodzenski M, Muehlbauer MJ, Stevens RD, Ilkayeva OR, Lowe LP, Metzger BE, Hayes MG, Newgard CB, and Scholtens DM

OP 06

Metabolite profiles and anthropometric measures in obese women with GDM across pregnancy: Observations from the UPBEAT study

White SL, Pasupathy D, Begum S, Sattar N, Nelson SM, Lawlor DA, and Poston L on behalf of the UPBEAT consortium

10.30-11.00 COFFEE BREAK

11.00-13.00 PRESENTATIONS – GROUP 1 POSTERS

Theme 1: Gestational Weight Gain
Chairs: Harold De Valk & Martina Persson

PP 01

Fetal growth trajectory in pregnancies complicated by diabetes is primarily dependent on second trimester glycaemic control

Formoy E, Maresh M, Bernatavicius G, and Myers J

PP 02

Association of trimester-specific and total gestational weight gain on pregnancy outcomes and children's anthropometrics in women diagnosed in first and second trimester of pregnancy with Gestational Diabetes

Lages AS, Ruas L, Paiva S, Marta E, Almeida MC, Oliveira D, Martins D, Oliveira P, and Carrilho F

PP 03

Weight gain during pregnancy in women with diabetes: The pattern differs by diabetes type

García-Patterson A, Morilla A, Gil P, Chico A, Pujol I, Adelantado JM, de Leiva A, and Corcoy R

PP 04

The impact of maternal BMI and excessive weight gain on pregnancy outcomes in women with IADPSG-diagnosed GDM treated with insulin compared to those receiving medical nutritional therapy only

Bogdanet D, Egan AM, Kirwan B, Carmody L, and Dunne FP

PP 05

Body mass index and pregnancy outcome

Djelmis J and Ivanisevic M

PP 06

Obstetrical outcomes after bariatric surgery; a systematic review and meta-analysis: Are the harms worth the benefits?

Kwong W, Tomlinson G, and Feig DS

Theme 2: Outcome/Long-term Consequences
Chairs: Tine Dalsgaard Clausen & Sander Galjaard

PP 07

Pregnancy after bariatric surgery: Time to improve awareness!

Caretto A, Dozio N, Frigerio F, Saibene A, Burini A, Marchi M, Vedani P, Socci C, Gazzetta PG, Bissolati M, Paganelli M, and Scavini M

PP 08

Endoplasmic reticulum stress in obsess pregnant rats

Alcalá M, Garcia-Castro R, Rodriguez E, Bolado VE, Calderón-Dominguez M, Sánchez-Vera I, Ramos MP, and Viana M

PP 09

Higher risk for overweight during school age in children born to women with GDM

Shafaeizadeh S, Muhardi L, and Van Der Beek EM

PP 10

Newborn bone health is affected by maternal bariatric surgery

Carlsen EM, Renault KM, KanijoMøller B, Nørgaard SK, Nilas L, Bech Jensen JE, Lauenborg J, Cortes D, and Pryds O

PP 11

Newborn body composition is affected by maternal bariatric surgery
Carlsen EM, Renault KM, KanijoMøller B, Nørgaard SK, Nilas L, Bech Jensen JE, Lauenborg J, Cortes D, and Pryds O

PP 12
The risk stratification of adverse neonatal outcomes in women with gestational diabetes (STRONG) study
Pintaudi B, Fresa R, Sciacca L, Dalfrà MG, Dodesini AR, Tumminia A, Lencioni C, Marcone T, Vitacolonna E, Bonomo M, and Napoli A

PP 13
Growth characteristics of offspring born to women with gestational diabetes: Narrative review of literature
Shafaeizadeh S, Muhardi L, and Van Der Beek EM

PP 14
Preventing progression to Type 2 Diabetes in women who had gestational diabetes – The lessons learnt from mothers after gestational diabetes in Australia (MAGDA) study
Boyle DIR, O'Reilly SL, Versace V, Shih S, Janus ED, Dunbar JA, and Oats JJN

PP15
What is the postpartum experience of Danish women following gestational diabetes? A qualitative exploration
Svensson L, Kragelund Nielsen K, and Maindal HT

PP 16
SGA is an important independent risk factor for postpartum dysglycaemia after gestational diabetes pregnancy
Meek CL, Murphy HR, and Simmons D

PP 17
Are pregnancy outcomes different in women with IADPSG-diagnosed GDM treated with insulin compared to those receiving medical nutritional therapy only
Bogdanet D, Egan AM, Kirwan B, Carmody L, and Dunne FP

PP 18
The impact of high-fat diet in pregnancy on fetal outcome in rats
Wentzel P, Eriksson UJ, and Herrera E

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Chairs: Louise Kelstrup & Rosa Corcoy

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Barriers and facilitators to gestational diabetes mellitus treatment in South India: A qualitative study
Nielsen KK, Rheinländer T, Damm P, Bygbjerg IC, and Kapur A

PP 20
Diagnosing gestational diabetes in low-resource settings: Could the IADPSG criteria be simplified?
Meek CL, Murphy HR, and Simmons D

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Health literacy levels in women at risk of gestational diabetes mellitus
Finn Y, Carmody L, and Dunne FP

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Prenatal attachment in a sample of GDM patients

Bitterman O, Canzonetta V, Sarubbi S, Rogante E, Napoli PL, Festa C, Napoli A, Erbuto D, and Pompili M

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Screening and treatment for early-onset gestational diabetes mellitus: A systematic review and meta-analysis

Immanuel J and Simmons D

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Comparison of obstetric and perinatal outcomes of in vitro fertilization versus spontaneous conceived pregnancies complicated with gestational diabetes mellitus. The role of early screening and proper management

Thomakos P, Kepaptsoglou O, Taraoune I, Barreto C, Korantzis A, Trouvas D, and Zoupas CS

PP 25

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Grotenfelt NE, Eriksson JG, Rönö K, Valkama A, Meinilä J, Kautiainen H, and Koivusalo SB

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BMI and physical activity during pregnancy: A cohort study in Denmark

Andersen MB, Fuglsang J, Ostenfeld EB, and Ovesen PG

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Adherence to guidelines for screening for gestational diabetes in women who gave birth in 2016 at the IRCCS San Raffaele Hospital in Milan

Molinari C, Di Carlo G, Dozio N, Castiglioni MT, Rinaldi S, Cavalleri L, Bolla AM, and Scavini M

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14.15-15.15 KEYNOTE LECTURES

Chairs: Ute Schaefer-Graf & David McIntyre

HUBERT PREISSL

Maternal glucose levels and human fetal brain activity

PATRICIA IOZZO

Maternal feeding and offspring's cognition and brain metabolism

15.15-15.45 COFFEE BREAK

15.45-17.45 Oral Session 2

Chairs: Anne Vambergue & Elisabeth R Mathiesen

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High prevalence of diabetes pre-disposing variants in GCK, HNF1A, HNF4A, HNF1B and INS among Danish women with gestational diabetes mellitus

Gjesing AP, Rui G, Lauenborg J, Have CT, Hollensted M, Andersson E, Grarup N, Sun J, Quan S, Brandslund I, Damm P, Pedersen O, Wang J, and Hansen T

OP 08

Vitamin D levels in obese women during and after pregnancy are affected by lifestyle intervention – results from a randomized controlled trial
Tanvig M, Jensen DM, Jørgensen JS, Ovesen PG, and Vinter CA

OP 09
Continuous glucose monitoring reveals the temporal glucose profile associated with having a large for gestational age infant, in women treated for gestational diabetes (GDM)
Cartland SJ, Alnaji A, Alrefaii L, Jennings PE, Gilbey SG, Murphy HR, Law GR, and Scott EM

OP 10
Increased expression of microRNA-15a and microRNA-15b in skeletal muscle from adult offspring of women with diabetes in pregnancy
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OP 11
DALI CGM Sub-study: Maternal CGM glucose and maternal & paternal characteristics explain a relevant part of fetal ultrasound biometries
Medina MC, Trilla C, Tundidor D, Adelantado JM, Parra J, Zawiejska A, Wender-Ozegowska E, Mantaj U, Gich I, de Leiva A, Mathiesen ER, Damm P, and Corcoy R, on behalf of DALI Core investigator Group

OP 12
Adverse outcome in pregnancies with pre-existing diabetes – HBA1C at different stages of pregnancy
Hauffe F, Sedlazek L, Fauzan R, Schohe A, Scholle D, and Schaefer-Graf U

OP 13
Type 1 and 2 diabetes in pregnancy: Tracking change over 15 years of Scottish perinatal outcomes 1998-2013
Mackin S, Nelson SM , Wood R, Kerssens J, Wild S, and Lindsay RS on behalf of the SDRN epidemiology group

OP 14
Altered angiomir expression in human feto-placental endothelial cells contributes to endothelial dysfunction in gestational diabetes mellitus
Strutz J, Diaz-Perez FI, Koolwijk P, Desoye G, and Hiden U

17.45-18.15 JOSEPH HOET RESEARCH AWARD LECTURE
Chair: M. Pilar Ramos Alvarez

ELEANOR SCOTT
It's all in the timing: Lessons learnt about 24-hour glucose control

18.15-19.30 DPSG Annual Business Meeting
Chair: Angela Napoli

20.00-23.00 DINNER

SATURDAY, SEPTEMBER 9

08.30-09.00 KEYNOTE LECTURE

Chairs: Peter Damm & David McCance

BOYD METZGER: HAPO FOLLOW-UP

09.00-10.30 Oral Session 3

Chairs: Mary Loeken & Marina Ivanisevic

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Shorter telomere length in 9- to 15-year-old children exposed to Gestational Diabetes in utero

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Fornes D, White V, Capobianco E, and Jawerbaum A

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Waters T, Presley L, Hauguel-deMouzon S, and Catalano P

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11.00-13.00 PRESENTATIONS – GROUP 2 POSTER PRESENTATIONS

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Quantitative proteomics-based identification of novel serum markers for first-trimester prediction of Gestational Diabetes Mellitus
Ravnsborg T, Larsen MR, Andersen LLT, Jensen DM, and Overgaard M

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Predictive factors for glucose intolerance after delivery in patients with gestational diabetes
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Gutaj P, Mantaj U, Zawiejska A, and Wender- Ożegowska E

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Law GR, Gilthorpe MS, Secher AL, Temple R, Bilous R, Mathiesen ER, Murphy HR, and Scott EM

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The CONCEPTT-Diet Study: An analysis of diet and glycaemia in UK Women with Type 1 diabetes before and during pregnancy

Neoh S, Grisoni J, Stewart ZA, Feig DS, and Murphy HR

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Bitterman O, Iafusco D, Festa C, Mammì C, and Napoli A

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Prevalence and progression of diabetic retinopathy in 499 Type 1 diabetic pregnancies

Vambergue A, Bourry J, Courteville H, Merlen E, Baudoux F, Labreuche J, and Deruelle P

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Awareness of pregnancy related issues and knowledge of disease in women of childbearing age with type 1 diabetes: What has changed in two decades?

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PP 43

Characteristics and pregnancy outcomes of women with pre-gestational diabetes who delivered in Lombardy in 2012-2014: The SWEET BABY Study

Dozio N and Scavini M, Dodesini AR, Ciucci A, Lovati E, Resi V, Rocca L, Romano C, and Severgnini SC, for the SWEET BABY Collaborative Study Group

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Scavini M, Rossi MC, Scardapane M, Manicardi V, Russo G, Di Bartolo P, Giorda C, Musacchio N, Ceriello A, Genovese S, Molinari C, Dozio N, and the AMD-Annals Study Group

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Chairs: Kristina Renault & Fidelma Dunne

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Ottanelli S, Rambaldi MP, Serena C, Simeone S, Turrini I, Mello G, and Mecacci F

PP 48

In the DALI study OGIS displays a good association with Hyperglycemia in Pregnancy in different periods of pregnancy but its association with clinical factors is poor

Mendoza LC, Harreiter J, Simmons D, Desoye G, Chico A, Adelantado JM, Hill DJ, Lapolla A, Dalfrà MG, Bertolotto A, Gich I, Van Poppel M, Kautzky-Willer A, Wender-Ozegowska E, Zawiejska A, Devlieger R, Van Assche A, Galjaard S, Jelsma J, Damm P, Mathiesen ER, Jensen DM, Andersen LT, Dunne FP, and Corcoy R & DALI Core Investigator group

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PP 50

Pregnancy outcomes of women with gestational diabetes based on the WHO 2013 and the NICE 2015 diagnostic criteria

Tabák AG, Tornóczky J, Sudár Z, Kerényi Z, and Kun A

PP 51

Evaluation of screening methods for Gestational Diabetes Mellitus in Sweden

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PP 52

Effect of gestation on the 2h 75g oral glucose tolerance test

Klemetti MM, Stach-Lempinen B, Jokelainen M, Kautiainen H, Hämäläinen E, Nenonen A, and Teramo K

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Relationship of objectively measured sleep duration to glucose control in women treated for gestational diabetes

Alnaji A, Alrefaii L, Ellison GTH, Law GR, and Scott EM

PP 54

Changing the certificate of delivery assistance to identify pregnancies complicated by diabetes: a pilot study

Molinari C, Dozio N, Castiglioni MT, Rosa S, Caretto A, Di Carlo G, Rinaldi S, Bombardieri P, Cavalleri L, and Scavini M

13.00-14.15 LUNCH

14.15-16.00 Oral Session 4

Chairpersons: Michael Maresh & Marta Viana

OP 21

Study of the maternal-fetal interface in women with obesity and gestational diabetes as a potential mirror of fetal programming

Parrettini S, Montanucci P, Pescara T, Basta G, Calafiore R, and Torlone E

OP 22

Glucose tolerance and neonatal adiposity in women enrolled in a randomized diet and lifestyle clinical trial to prevent excess gestational weight gain

Josefson JL, Peaceman AM, Kwasny MJ, and Van Horn L

OP 23

Effects of obesity on mitochondria in the at term myometrium

Gam CMBF, Larsen LH, Mortensen OH, Mathiesen ER, Engelbrechtsen L, Poulsen SS, Qvortrup K, Damm P, and Quistorff B

OP 24

Implementing a reminder system to stimulate postpartum screening for glucose intolerance in women with gestational diabetes: the 'sweet pregnancy' project

Benhalima K, Verstraete S, Muylle F, Decochez K, Devlieger R, Van Crombrugge P, Verhaegen A, Wens J, and Mathieu C

OP 25

Trends in pregnancy outcomes for women with gestational diabetes in Sweden 1998-2012: A nationwide cohort study

Hildén K, Simmons D, Hanson U, Magnuson A, and Fadl H

OP 26

Relationship between changes in insulin sensitivity/insulin response and changes in body weight/body composition in women with normal glucose tolerance and gestational diabetes throughout pregnancy

Alvarado F, O'Tierney-Ginn P, and Catalano P

OP 27

Early pregnancy clinical risk factors for preeclampsia in women with Type 1 and Type 2 diabetes

Nørgaard SK, Vestgaard M, Asbjornsdóttir B, Ringholm L, Damm P, and Mathiesen ER

16.00-16.30 COFFEE BREAK

16.30-16.45 **JOHN STOWERS POSTER AWARDS**

Judges: Ulf Erikssen, Josip Djelmis, Christopher Nolan, Maria Grazia Dalfra

Recipients for 1st, 2nd and 3rd highest scored abstracts

16.45-17.30 **2015 JORGEN PEDERSEN LECTURE – PARRI WENTZEL**

"Diabetic pregnancy and embryonic dysmorphogenesis"

Chair: Angela Napoli

17.30-17.45 **Acknowledgements and Adjournment**

20.30 **DINNER**

Oral Session 1

OP 01

Increased mortality and morbidity in mothers with type 1 diabetes: impact of HbA_{1c} and level of albuminuria in early pregnancy. A register-based prospective cohort study (The EPICOM Study)

Sine Knorr[1], PhD, Svend Juul[2], MD, Birgitte Bytoft[3], MD, Zuzana Lohse[4], PhD, Tine D. Clausen[5], PhD, Rikke B. Jensen[6], PhD, Peter Damm[3], DMSc, Henning Beck-Nielsen[4], DMSc, Elisabeth R. Mathiesen[7], DMSc, Dorte M. Jensen[4], PhD, and Claus Højbjerg Gravholt[1], DMSc. [1]

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Background: For mothers with type 1 diabetes (T1DM), the long-term mortality and morbidity are unclear, both overall and according to the level of albuminuria and HbA_{1c}.
Methods: A prospective combined clinical and register-based cohort study of mortality and hospital admissions in mothers with T1DM (n=986) giving birth between 1992 and 2000. Controls (n=91,441) were women from the background population matched according to age and year of childbirth. Age at follow-up was 32-66 years.
Findings: Overall mortality was increased for mothers with T1DM (Hazard Ratio (HR)=3.41, 95% confidence interval (CI)=2.42-4.81; P<0.0001), and increased with pregestational level of albuminuria; normoalbuminuria HR=2.17, microalbuminuria HR=3.36, and macroalbuminuria HR=12.94. It also increased with the level of HbA_{1c} in early pregnancy; HbA_{1c}<9% HR=2.15 and HbA_{1c}>9% HR=7.45.
For mothers with T1DM the overall incidence of hospital admissions was increased (Incidence Rate Ratio (IRR)=2.69, CI=2.59-2.80; P<0.0001), as was admissions with diagnoses from 14 out of 19 ICD-10 chapters. The incidence of hospital admissions increased with increasing levels of albuminuria from IRR=2.62; (normoalbuminuria) to IRR=3.18; (macroalbuminuria) and with HbA_{1c} (HbA_{1c}<9% HR=2.48, HbA_{1c}>9% HR=3.31).
Among mothers with T1DM, mortality and incidence of hospital admissions increased with HbA_{1c} and for mortality also with albuminuria.
Conclusion: Mothers with T1DM have a clinically significant increase in mortality and morbidity during their offsprings childhood and levels of albuminuria and HbA_{1c} around conception are risk factors.

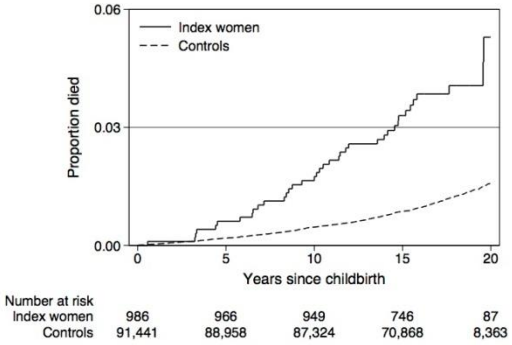

Figure 1: Kaplan-Meier plot displays overall mortality among mothers with T1DM and matched controls.

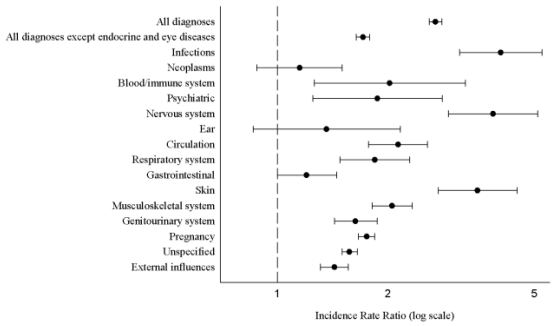

Figure 2: Forest-plot displaying incidence rate ratios for hospital admissions, by primary diagnosis for mothers with pregestational T1DM compared with matched control mothers.

OP 02

Fetal programming of gestational diabetes in mouse: A failure to adaptively increase β-cell mass during pregnancy.

Sandra Szlapinski and David J Hill

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Pathological studies have linked a failure to adaptively increase maternal β-cell mass in pregnancy to the development of gestational diabetes mellitus (GDM). In the mouse, increases in β-cell mass during pregnancy derive from both proliferation within islets and neogenesis from insulin-expressing, Glut 2-negative progenitors located in small, extra-islet β-cell aggregates (BCA). Our objective was to develop a mouse model of GDM, to identify if this included changes to adaptive β-cell mass, and if so to identify the mechanisms responsible.

Pregnant mice were fed a low protein (8%, LP) or control (20%, C) diet during gestation and lactation, and offspring weaned onto C diet on postnatal day 21. At 6-8 weeks age the female offspring (F1) of LP or C-fed mothers were mated with C-fed males and given C diet throughout pregnancy. Glucose tolerance tests was performed on gestational days (GD) 9, 12, 18 and on postnatal day (PP) 7, and pancreata were removed for fluorescence immunohistochemistry.

In F1 females previously exposed to LP diet glucose tolerance was relatively impaired during pregnancy and at PP7. F1 females previously exposed to C diet increased β-cell mass three-fold during pregnancy (0.5±0.2 mg to 1.7±0.4 mg on GD 18, $p<0.001$), but those exposed to LP diet had a lower β-cell mass at GD 18 (1.2±0.3 mg, $p<0.05$). The percentage of insulin immunopositive cells per islet did not differ in pancreas from LP-exposed F1 dams, although relative β-cell hypertrophy was seen in late gestation. However, the percent BCA was reduced at GD12 in LP-exposed mice (LP 12±3% vs. C 22±2%, $p<0.05$) as was the abundance of $Ins^{+}Glut2^{-}$ cells.

Pregnant mice previously exposed to LP diet demonstrated impaired glucose tolerance with a reduced ability to adaptively increase β-cell mass. This was associated with a decreased expansion of β-cell progenitors. This model may serve to further explore mechanisms underlying β-cell deficiencies leading to GDM.

OP 03

Effects of a lifestyle intervention during pregnancy and first postpartum year – 1-year follow-up of the RADIEL study

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Aims: To assess the effects of a lifestyle intervention during pregnancy and first postpartum year on glucose regulation, weight retention, and metabolic characteristics.

Methods: This is a 1-year follow-up of the women recruited in early pregnancy in the gestational diabetes (GDM) prevention study (RADIEL) in Finland. In total 269 women with a previous history of GDM and/or a pre-pregnancy

BMI ≥ 30 kg/m^2, were enrolled before 20 weeks of gestation and allocated to either a control or an intervention group. Lifestyle counseling provided by study nurses and dietitians was carried out in each trimester of pregnancy and 6 weeks, 6 months, and 12 months postpartum. This study includes the 200 participants who attended study visits 6 weeks and/or 12 months after delivery. The main outcome was incidence of impaired glucose regulation (impaired fasting glucose, impaired glucose tolerance, or type 2 diabetes).

Results: At six weeks postpartum impaired glucose regulation was diagnosed in 7.2% of the study participants in the control group and in 1.0% in the intervention group [OR 0.13 (95% CI 0.02, 0.99) *p*=0.050]. At twelve months postpartum the corresponding results were 9.5% and 2.4% respectively [OR 0.23 (95% CI 0.05, 1.09) *p*=0.064]. Over time postpartum impaired glucose regulation was present in 13.3% of the participants in the control group and in 2.7% in the intervention group [crude OR 0.18 (95% CI 0.05, 0.69), *p*=0.012]. There were no differences between the groups in weight retention, physical activity, or diet quality index at one year postpartum.

Conclusions: A lifestyle intervention during pregnancy and the first postpartum year was successful in reducing the incidence of postpartum impairment in glucose regulation by 82%. This may also have positive long-term effects on future risk of type 2 diabetes.

OP 04

Adiposity, Dysmetabolic Traits and Earlier Onset of Female Puberty in Adolescent Offspring of Women with Gestational Diabetes Mellitus: A clinical study within the Danish National Birth Cohort.

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[8] *Department of Clinical Biochemistry, Rigshospitalet, Copenhagen Denmark*
[9]*Center for Pregnant Women with Diabetes, Department of Obstetrics, Rigshospitalet, University of Copenhagen, Copenhagen, Denmark*
[10]*Departments of Nutrition and Epidemiology, Harvard TH Chan School of Public Health &Channing Division of Network Medicine, Department of Medicine, Brigham and Women's Hospital and Harvard Medical School*
[11] *Departments of Nutrition and Epidemiology, Harvard T.H. Chan School of Public Health, Boston, MA, USA.*
[12] *Astrazeneca, Sweden*
Key terms: Gestational diabetes, Offspring, Metabolic health, maternal pre-pregnancy BMI, hyperglycemia

Offspring of pregnancies affected by gestational diabetes mellitus (GDM) are at increased risk of developing type 2 diabetes. However, the extent to which these dysmetabolic traits may be due to offspring and/or maternal adiposity is unknown.
Objective: We examined body composition and associated cardio-metabolic traits in 561 9-16 year old offspring of GDM and 597 control offspring.
Research Design and Methods: We measured anthropometrics, puberty status, blood pressure, fasting glucose, insulin, C-peptide and lipids levels and dual energy X-ray (DEXA) scan in a subset of the cohort. Differences in the outcomes between GDM offspring and controls were examined using linear and logistic regression models.
Results: After adjustment for age and gender, GDM offspring displayed higher weight, BMI, WHR, systolic blood pressure and resting heart rate and lower height. GDM offspring had higher total and abdominal fat percentages and lower muscle mass percentages, but these differences disappeared after correction for offspring BMI. GDM offspring displayed higher fasting plasma glucose, insulin, C-peptide, HOMA-IR and plasma triglycerides, whereas fasting plasma HDL-cholesterol levels were decreased. Female GDM offspring had an earlier onset of puberty than control offspring. GDM offspring had significantly higher BMI, WHR, fasting glucose and HOMA-IR after adjustment for maternal pre-pregnancy BMI, and glucose and HOMA-IR remained elevated in GDM offspring after correction for both maternal and offspring BMI.
Conclusions: In summary, adolescent offspring of GDM women show increased adiposity, an adverse cardio-metabolic profile and earlier onset of puberty among girls. Increased fasting glucose and HOMA-IR among GDM offspring may be explained by programming effects of hyperglycemia in pregnancy

OP 05

The Fetal Genome is an Important Contributor to the Fetal Metabolome

William L. Lowe, Jr., Alan Kuang, James R. Bain, Frederick Lin, Michael Nodzenski, Michael J. Muehlbauer, Robert D. Stevens, Olga R. Ilkayeva, Lynn P. Lowe, Boyd E. Metzger, M. Geoffrey Hayes, Christopher B. Newgard, Denise M. Scholtens

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The intrauterine environment impacts both short- and long-term metabolic and anthropometric outcomes of the developing fetus. The collective impact of maternal phenotype and environment is reflected in the fetal metabolome which, in turn, affects fetal phenotype. However, the fetal metabolome is determined not only by transplacental transfer of metabolites but also by fetal synthesis

and metabolism of metabolites. As genetic variation is associated with metabolite levels in non-pregnant adults, it is likely that the fetal metabolome is also influenced by the fetal genome. Given that, we examined the hypothesis that fetal genetic variation is associated with the level of fetal metabolites. To address this hypothesis, we performed genomewide association studies in 1329 newborns from 4 ancestry groups (European, Afro-Caribbean, Thai, and Mexican-American) who participated in the HAPO Study and on whom targeted metabolomic analyses had been performed. Genotyping was performed on Illumina platforms and imputed using 1000 Genomes cosmopolitan reference population data. Cord blood triglycerides (TG), glycerol, non-esterified fatty acids (NEFA), 3-hydroxybutyrate, lactate, amino acids and acetylcarnitines, byproducts of fatty acid oxidation and amino acid metabolism, were measured on a Beckman-Coulter Unicell DxC 600 clinical analyzer or by tandem mass spectrometry using targeted metabolomics platforms. Single nucleotide polymorphisms (SNPs) associated with metabolite levels were determined using random effects meta-analysis across the 4 populations, adjusting for ancestry, maternal glucose and other pregnancy and anthropometric covariates. SNPs at 31 genetic loci demonstrated genome wide significant association ($p < 5 \times 10^{-8}$) with 14 different metabolites. Some associations of interest included: (1) 16p12.3 near *ACSM5* (member of acyl-CoA synthase family) with 3-hydroxybutyrate, (2) 6q21 near *REVL3* and *SLC16A10* (aromatic amino acid transporter) with NEFA, (3) 6p21.31 near *ANKS1A* (associated with fasting insulin and BMI in adults) with TG; (4) 2q34 near *ACADL* (long chain acyl-CoA dehydrogenase, associated with a medium chain acylcarnitine in adults) with 3-hydroxy-cis-5-octenoyl carnitine (C8:1-DC), (5) 14q24.3 near *HEATR4* (HEAT repeat containing 4 associated with an uncharacterized metabolite in adults) with 3-hydroxy-eicosanoyl carnitine (C20-OH), (6) 12q24.31 near *ACADS* (short chain acyl-CoA dehydrogenase, associated with butyryl carnitine in adults) with butyryl carnitine (a branched chain amino acid metabolite). Together, these data demonstrate that fetal genetic variation impacts fetal metabolite levels and suggest that, in addition to transplacental transfer, endogenous synthesis and/or metabolism is an important contributor to metabolite levels in the developing fetus.

OP 06

Metabolite profiles and anthropometric measures in obese women with GDM across pregnancy: observations from the UPBEAT study

S L White[1], D Pasupathy[1], S Begum[1], N Sattar[2], S M Nelson[3], D A Lawlor[4,5] and L Poston[1] on behalf of the UPBEAT consortium

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Background and aims: Pre-existing insulin resistance in obese women is implicated in gestational diabetes (GDM) risk, yet not all obese women develop the disorder. Altered metabolic profiles differentiating GDM from non-GDM have not previously been characterized in obese women. Moreover, despite obesity being recognized as a major risk factor for GDM, gestational weight gain and associated changes in adiposity in obese women may lead to cumulative risk. The aims of these parallel studies were to 1) describe altered biomarker patterns of GDM in an obese cohort at two pregnancy time-points and 2) assess clinical anthropometric measurements at two pregnancy time-points to determine if baseline values and/or gestational change in these variables influenced the risk of GDM.
Methods: These were secondary analyses using data from the UPBEAT trial in obese pregnant women (ISRCTN89971375). Clinical factors and biochemical analytes were measured at time-point 1 (mean 17+0 weeks') and time-point 2 (time of OGTT, mean 27^{+5} weeks'). As complete data was used (either clinical or biomarker), diverse cohorts were utilized for each parallel study (biomarkers: 646 women, median BMI 35.2kg/m^2; anthropometry: 1117 women, median BMI 35.0kg/m^2). 163 metabolites reflecting insulin resistance pathways were measured at both time-points, including 147 from a targeted nuclear

magnetic resonance (NMR) metabolome and 16 candidate biomarkers. Anthropometry was assessed at each time-point, and rate of change calculated. Multivariable analyses, adjusting for confounders, were performed to compare obese GDM women with obese non-GDM women for both studies.
Results: Patterns of GDM-associated metabolites demonstrated multiple significant differences compared with non-GDM women (FDR corrected p-values <0.05). These included raised lipids and lipoprotein constituents in different sized VLDL subclasses, triglyceride enrichment across lipoprotein particles, different patterns of amino and fatty acids, ketone bodies, adipokines, liver and inflammatory markers. Similar differential patterns were evident prior to and at the time of disease diagnosis. Multiple anthropometric risk factors were associated with GDM at time-point 1 including skinfold thicknesses (sum of triceps, biceps, subscapular, suprailiac; OR 1.02, 95%CI 1.01-1.02), circumferences (waist; 1.07; 1.03-1.05, mid-arm; 1.07; 1.04-1.11, neck; 1.18; 1.11-1.25). Association was very similar at time-point 2, however there was no association with rate of change between time-points: gestational weight gain, g/week (0.91; 0.55 – 1.53), sum of skinfolds, mm/week (1.00; 0.94–1.07) and circumferences, cm/week (waist, 0.99; 0.78–1.25, mid-arm 1.58; 0.73–3.42 and neck 0.82; 0.33–2.04).
Conclusions: A complex altered metabolic profile associated with GDM is evident in affected obese women and predates GDM diagnosis by at least 10 weeks. Furthermore, weight gain or change in adiposity during pregnancy was of lesser importance than early pregnancy adiposity in the determination of GDM risk.

OP 07

High Prevalence of Diabetes Pre-Disposing Variants in GCK, HNF1A, HNF4A, HNF1B and INS Among Danish Women with Gestational Diabetes Mellitus

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Background and aim: Gestational diabetes mellitus (GDM), defined as any degree of glucose intolerance with first recognition during pregnancy, is a heterogeneous form of diabetes characterized by various degrees of beta cell dysfunction. We aimed to estimate the prevalence of mutations in the maturity-onset diabetes of the young (MODY) genes GCK, HNF1A, HNF4A, HNF1B and INS among women with GDM. Furthermore, we aimed to examine the glucose tolerance status in mutation carriers versus non-mutation carriers ten years after the index pregnancy.
Design, setting and patients: We sequenced the coding regions and intron/exon boundaries of GCK, HNF1A, HNF4A, HNF1B and INS using targeted region capture and next generation sequencing in 354 Danish women with diet-treated GDM. Glucose tolerance status was examined at follow-up 10 years after the index pregnancy. Main Outcome Measures: The prevalence of rare variants in GCK, HNF1A, HNF4A, HNF1B and INS was estimated and differences in anthropometric traits, hsCRP and traits related to glucose metabolism were measured.
Results: At baseline, 17 likely disease causing variants were found in 21 women, revealing a combined GCK, HNF1A, HNF4A, HNF1B and INS mutation prevalence of 5.9% (95% CI:3.5% - 8.4%). At follow-up, 15 out of 135 women with diabetes (11%) were GCK, HNF1A, HNF4A, HNF1B or INS -mutation carriers.
Conclusions: Almost 6% of Danish women with diet-treated GDM have mutations in GCK, HNF1A, HNF4A, HNF1B or INS. These women are at high risk of developing diabetes after pregnancy. Thus, screening for GCK, HNF1A, HNF4A, HNF1B and INS mutations should be considered among women with GDM.

OP 08

Vitamin D levels in obese women during and after pregnancy are affected by lifestyle intervention – results from a randomized controlled trial

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Introduction: Vitamin D deficiency is common in pregnancy, and obese women are particularly at risk. Lifestyle intervention is likely to increase quality of diet, adherence to vitamin D supplementation and sun exposure due to out-door activities. We aimed to study the effect of lifestyle intervention during pregnancy on serum levels of 25-hydroxyvitamin D (25(OH)D) in obese women during pregnancy and 6 months postpartum. Secondly we aimed to explore possible effects of vitamin D levels on measures of glucose homeostasis

Material and Methods: 360 women were randomized before gestational age (GA) 14 weeks to lifestyle intervention (diet and exercise) or routine management during pregnancy. Both groups were offered free vitamin supplementation during pregnancy including 400 IE vitamin D. Clinical outcomes and levels of 25(OH)D were determined twice during pregnancy: GA 12-15 weeks (baseline), GA 28-30 weeks and 6 months postpartum.

Results: A total of 304 women (84%) completed the study until delivery, and 238 (66%) attended postpartum follow-up. Vitamin D levels were similar in the two groups at baseline. At GA 28-30 weeks and 6 months post partum women in the intervention group had significantly higher levels of 25(OH)D compared to controls (77.4 *vs* 69.3 nmol/L) and (52.7 *vs* 45.1 nmol/L), respectively. The presence of vitamin D deficiency (25(OH)D < 50 nmol/l) in the total study population was 30% at baseline, 20% at GA 28-30 weeks and 53% 6 months postpartum. Levels of 25(OH)D were negatively associated with BMI (baseline and postpartum) and insulin sensitivity (postpartum HOMA-IR) whereas no associations were found between 25(OH)D and other measurements of glucose homeostasis, parity, smoking, age, gestational weight gain, postpartum weight retention or breastfeeding

Conclusions: Obese women undergoing a lifestyle intervention program during pregnancy had higher levels of vitamin D in late pregnancy and postpartum compared to obese controls. Vitamin D levels were negatively associated with BMI, but except from a modest negative association with postpartum insulin sensitivity, 25(OH)D levels were not shown to affect glucose metabolism. In both groups, vitamin D deficiency was common, especially postpartum. This study illustrates the necessity of improving vitamin D intake during pregnancy and postpartum in obese women. Studies involving detailed information on diet are warranted in order to further explore the effect of lifestyle intervention on vitamin D status.

OP 9

Continuous glucose monitoring reveals the temporal glucose profile associated with having a large for gestational age infant, in women treated for gestational diabetes (GDM)

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Aim: Women with GDM continue to have an increased risk of giving birth to infants large-for gestational age (LGA), despite being actively treated. Our aim was to determine whether a period of continuous glucose monitoring (CGM) at 32 weeks gestation provided information about glucose control that was relevant to LGA.

Methods: A prospective cohort study of 162 multi-ethnic women diagnosed with GDM (by 75g OGTT) at 24-28 weeks gestation. All women were treated to achieve tight capillary glucose targets according to NICE guidelines. A week of masked CGM was performed at 32 weeks gestation. The study received ethical approval and all women gave written informed consent. LGA was determined as the infants birthweight >90th centile, adjusted for gestational age, sex, maternal BMI, parity, ethnicity using GROW. Functional data analysis with linear regression was performed to examine for temporal patterns of glucose across the 24 hour day associated with LGA.
Results: Sufficient CGM data was obtained from 143 women. The participant characteristics (mean ± SD) were: Age 33±5 years; BMI 30±6 kg/m2; Parity 1.1±1.2; Birthweight 3227.5 ± 493.2g; gestation at delivery 38.8 ± 1.1 weeks. The mean glucose was 5.9 ±0.7 mmol/l. The mean glucose in those women who had a LGA infant was 6.2 ± 0.6 mmol/l. For every 1 mmol/l increase in glucose the OR (95%CI) of having an LGA infant was 2.11 (0.99-4.51). Functional data analysis revealed the times of day responsible for the higher mean glucose with significantly higher glucose for 6 hours overnight (between 01.00-07.00) ($p<0.05$) in those mothers that went on to have an LGA infant.
Conclusion: Despite active management to achieve tight glucose targets, women with GDM who gave birth to an LGA infant ran a significantly higher glucose overnight than those who had a normal weight infant. Overnight glucose control is not routinely examined in women with GDM. Our data suggest that a period of CGM at 32 weeks gestation may help to detect those women at risk of LGA, and enable targeted intervention of overnight glucose control.

OP 10

Increased expression of microRNA-15a and microRNA-15b in skeletal muscle from adult offspring of women with diabetes in pregnancy

Principal author: Azadeh Houshmand-Oeregaard[1,2,3,4],

Azadeh Houshmand-Oeregaard[1,2,3,4], Maren Schrölkamp[2], Louise Kelstrup[1,3], Ninna S. Hansen[2,3], Line Hjort[2,3,5], Christa Broholm[2], Elisabeth R. Mathiesen[3,6], Tine D. Clausen[3,7], Allan Vaag[2,3,8], and Peter Damm[1,3]

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Background: Offspring of women with diabetes in pregnancy exhibit skeletal muscle insulin resistance and are at increased risk of developing type 2 diabetes (T2DM), potentially mediated by epigenetic mechanisms including changes in the expression of small non-coding microRNAs (miRNAs). Members of the miR-15 family can alter the expression or function of important proteins in the insulin signaling

pathway, and may affect insulin sensitivity and secretion in offspring of women with diabetes in pregnancy.
Methods: In this observational follow-up study, we measured the expression of miR-15a and miR-15b in skeletal muscle of 26-35 year old offspring of women with either gestational diabetes (O-GDM) or type 1 diabetes (O-T1DM) in pregnancy, compared to a control group of offspring from the background population (O-BP).
Results: We found increased expression of miR-15a and -15b in skeletal muscle obtained from O-GDM (both $p<0.001$) and O-T1DM ($p=0.024$, $p=0.005$, respectively) compared to O-BP, and the changes remained statistically significant after adjustment for potential confounders and mediators. Interestingly, maternal 2-hour post OGTT glucose levels were positively associated with miR-15a expression ($p=0.041$) in O-GDM after adjustment for confounders and mediators.
Conclusion: Fetal exposure to maternal gestational diabetes and type 1 diabetes is associated with increased skeletal muscle expression of miR-15a and -15b and this may contribute to development of metabolic disease in these subjects.

OP 11

DALI CGM Sub-study: Maternal CGM glucose and maternal & paternal characteristics explain a relevant part of fetal ultrasound biometries

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Background and aims: To study the association of continuous glucose monitoring (CGM), lipid profile and maternal and paternal characteristics with fetal ultrasound biometries in the 3rd trimester.
Materials and methods: Study subjects: 58 pregnant women participating in the CGM ancillary study of the DALI trial at 35-37 weeks (BMI ≥29 kg/m^2 among inclusion criteria). Outcome variables were the fetal ultrasound measurements: usual biometries (BPD, HC, AC, FL), fat and lean mass area in humerus (FMH, LMH), and femur (FMF, LMF), subscapular fat thickness (SFT), abdominal fat thickness (AFT), liver length (LL) and estimated fetal weight (EFW). We assessed six groups of data as potential independent variables: different CGM summary measures (iPro2 device®, 3 days), maternal history, anthropometrics, lipid profile, current pregnancy data, and paternal characteristics.
Statistics. First step: bivariate analysis. Second step: multiple linear regression analysis (forward method) for each group of data using variables with a $p<0.10$ in the first step. Third step: global multiple linear regression analysis (forward method) with significant variables ($p<0.05$) in the second step.
Results: Explained variance after R^2 were in descending order 0.419 for AC, 0.399 for SFT, 0.397 for FMH, 0.343 for EFW, 0.333 for FMF, 0.298 for LMF, 0,264 for LMH, 0.260 for HC, 0.24 for AFT, 0.209 for FL, 0.194 for BPD, 0.187 for LL.
Independent variables for AC were: average maternal glucose at 03-04 am (+), maternal non-European descent (+), non-employment (+), LDL-cholesterol at enrolment (-) and autumn (-); for SFT were: average maternal glucose at 08-09 am (+), DM in a first degree relative (+), prior GDM (+) and **Δ** weight at enrolment (+); for FMH were: average maternal glucose at 02-03 am (+), % meals where premeal value was reached at 3h (+) and **Δ** BMI at 24-28 weeks (+).
Conclusions: In this group of women with prepregnancy BMI ≥29 kg/m^2, CGM summary measures and maternal and paternal features explain a relevant part of the variance of fetal biometries at 35-37 weeks, mainly of AC, SFT and FMH. No single CGM summary measure can be advised. Relevant measures of maternal anthropometry are those at enrolment and at 24-28 weeks.

OP 12

Adverse outcome in pregnancies with pre-existing diabetes – HBA1C at different stages of pregnancy

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Aim: Poor glucose control is associated with complications and adverse outcome in pregnancies with preexisting diabetes. However, optimizing of glucose control is a major challenge and can often not be achieved during the whole pregnancy. We investigated if the level of glucose control at different stages of pregnancy has different impact on pregnancy outcome.
Methods: Retrospective data collection from 206 women with type 1 DM and 100 women with type 2 DM who delivered between 2010-2016. HbA1c was determined preconceptionally, in 1st, 2nd and 3rd trimester.
Results: Mean age was 32.6 ± 5.3 years with parity of 1.7, BMI 27.05 ± 6.1 kg/m^2 and a duration of diabetes of 11.8 ± 8.9 years. HbA1c decreased with 7.18 % preconceptional, then 6.6 %, 6.09 % and 6.08 % during pregnancy. HbA1 preconceptional and 1st trim. was not different in women with accelerated fetal growth represented by fetal AC > 90th percentile at 20-24 wks. However fetal, AC > 90th perc. at 28-32 wks , 32-36 wks and 36-40 wks was associated with higher HbA1c at any trimester but not preconceptional.

Outcome No vs yes	**Preeclampsia n= 26, (8,5%)**	**LGA n= 102 (33,3%)**	**Neonatale Hypoglycemia n=87 (29%)**	**Stillbirth (n=6)**
Preconceptional	7.2 vs 7.4, p=0.5	7.1 vs 7.4, p=0.68	7.1 vs 7.4 , p=0.05	7.2 vs 7.4, p=0.7
1st trimester (%)	6,6 vs 6,8 p=0.5	6,5 vs 6,9 p=0.007	6.5 vs 6.8, p=0.007	6.6 vs 7.7, p=0.03
2nd trimester (%)	6.1 vs 6,3 p=0.4	6,0 vs 6.4, p<0.001	6.0 vs 6.4, p< 0.001	6.1 vs 6.6, p= 0.01
3rd trimester (%)	6.1 vs 6,2, p=0.5	5.9 vs 6,4, p<0.001	5.9 vs 6.4, p< 0.001	6.1 vs 6.8, p=0.02

HbA1c	**Term delivery n=255 (83,3%)**	**Preterm < 37 wks n= 41 (13,4%)**	**Preterm < 34 wks n=10 (3,4%)**	**P**
Preconceptional (%)	7.1	7,5	8.4	0.01
1st trimester (%)	6.5	6,9	7,7)	0.027
2nd trimester (%)	6,0	6,4	7.2	<0.001
3rd trimester (%)	6.0	6.3	6.8	0,19

Conclusion: The impact of glucose control on the occurrence of preeclampsia seemed to be limited. Preconceptional control influenced only preterm delivery. Glucose control through out all trimesters determines fetal growth during pregnancy, LGA, neonatal hypoglycemia and stillbirth. HbA1c levels preconceptional and in early pregnancy had an impressive impact on preterm delivery which is a major contributor to neonatal morbidity. For presentation at DPSG 200 cases will be added and thresholds for increased risk for preterm delivery and LGA will be calculated.

OP 13

Type 1 and 2 diabetes in pregnancy: tracking change over 15 years of Scottish perinatal outcomes 1998-2013

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Aim:. Rates of stillbirth in pregnancy complicated by diabetes show recent improvements in some countries. We examined whether national perinatal outcomes were improving for mothers with type 1 (T1DM) and type 2 diabetes (T2DM) in Scotland.
Methods: Data was collected retrospectively from the Scottish Morbidity Record 02 (SMR02), a national dataset that includes episode level data on all obstetric inpatient events. It includes information on mother and baby characteristics, delivery details and pregnancy outcome. We included all events that resulted in a delivery (live or stillbirth) between 1998-2013 and cross referenced to our national diabetes database, Scottish Care Information Diabetes, to identify mothers with pre-existing T1DM and T2DM. We compared perinatal outcomes for 3229 mothers with T1DM, 1454 with T2DM and 808,845 mothers without diabetes.
Results: Absolute and relative numbers of pregnancies complicated by diabetes increased across the 15 years to rates of 1 in 210 deliveries for T1DM and 1 in 504 deliveries for T2DM. Maternal age at delivery increased by 0.6 years in mothers with T1DM and by 1.6 years in mothers with T2DM (from 32.4 to 34 years on average). Delivery occurred at earlier gestation in women with diabetes, and fell slightly from 36.7 weeks in 1998/99 to 36.4 weeks in 2012/13 for T1DM, and 38 weeks to 37.1 weeks in T2DM. The proportion of women delivering pre-term (under 37 weeks) increased for both T1 and T2DM and was on average 36% of deliveries to mothers with T1DM and 23% of T2DM. Despite this, mean birthweight was 1.31 SD above the general population for T1DM and 0.9 SD for T2DM, and increased over time in women withT1DM (from 1.22 to 1.45). This was also reflected in increasing proportions of large for gestational age (LGA) infants in T1DM from 47.1% in 1998/99 to 55.6% in 2012/13. Proportion of deliveries by elective caesarean section increased by 8% in both groups of women with diabetes over the study period to just over 30% . Emergency caesarean section rates were stable in women with T1DM but very high at 41% across the time period. The proportion of deliveries by emergency caesarean section increased from 18.6% in 1998/99 to 38.1% in 2012/13 in women with T2DM . Stillbirth rates showed no trend over time and were 3-fold higher than the background population in T1DM (15.9 per 1,000 births [11.8-20.9]) and 4 fold higher in T2DM (23.7 per 1,000 births [16.6-33.0]).
Conclusions: The population of women with diabetes in pregnancy in Scotland is changing. Mothers are older and more often have T2DM. Obstetric intervention with earlier and operative delivery are also increasing. Despite this, stillbirth rates appear unchanged.

OP 14

Altered angiomir expression in human feto-placental endothelial cells contributes to endothelial dysfunction in gestational diabetes mellitus

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Background: Gestational diabetes mellitus (GDM) alters the vascular structure of the placenta as reflected by thickening of endothelial basement membrane and increase of capillary surface area. Angiogenesis is a major factor of endothelial function. On molecular level angiogenesis is regulated by a group of microRNAs termed “angiomiRs”. We hypothesize that GDM alters angiomiR expression in feto-placental endothelial cells (fpEC) thereby contributing to endothelial dysfunction.
Methods: Isolated primary arterial human fpEC from healthy control (n=11) and GDM (n=11) placenta were isolated. The expression of a subset of 15 different angiomiRs was determined by miRNA-specific RT-qPCR. AngiomiRs that revealed a significantly different expression in GDM fpEC compared to control fpEC were either mimicked or inhibited in control fpEC in the course of a 3D fibrin tube formation assay. Affected target genes of angiomiR transfection experiments were validated by RT-qPCR.
Results: AngiomiR expression analysis revealed higher expression of miR-181b-5p (1.7 fold, $p<0.05$), miR-222-3p (1.7 fold, $p<0.05$) miR-296-5p (1.7 fold, $p<0.05$) in GDM fpEC when compared to control fpEC. Mimics of miR-181b-5p, miR-222-3p and miR-296-5p inhibited tube formation ($p<0.05$). Overexpression of miR-31-5p did not affect tube formation but resulted in a significant decrease of *EFNB1* mRNA level (0.7 fold). Inhibition of miR-20a-5p slightly promoted control fpEC sprouting by upregulation of *NR4A3* mRNA expression (1.8 fold, $p<0.05$). Analysis of target genes for miR-222-3p confirmed significant downregulation of *KIT* oncogene (0.2 fold, $p<0.01$) and cell cycle inhibitor *CDKN1B* (0.8 fold, $p<0.05$).
Conclusion: AngiomiRs are differently expressed in GDM fpEC, alter tube formation *in vitro* and thus indicate endothelial dysfunction in GDM. These data provide evidence that angiomiRs are involved in placental vascularization and are deregulated by maternal GDM.

OP 15

Fetal microsatellite in the *HMOX-1* promoter is associated with severe and early-onset pre-eclampsia

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Introduction: Pre-eclampsia (PE) is a vascular pregnancy disorder that often involves impaired placental development. Cardiovascular disease risk factors such as chronic hypertension, renal disease, and obesity predispose to PE suggesting pre-existing vascular or endothelial dysfunction as a possible factor in the development of the disease. Heme oxygenase-1 (HO-1, encoded by *HMOX-1*) is a stress response enzyme crucial for endothelial function and placental development. HO-1 mediates antioxidant, anti-inflammatory, vasodilatory, and angiogenic functions. It has also been linked to insulin signaling, cardiometabolic disorders, as well as some pregnancy disorders such as gestational diabetes mellitus and recurrent miscarriage. The promoter region of the *HMOX-1* gene contains a guanine-thymine (GT) microsatellite repeat, the short version of which is associated with higher *HMOX-1* expression compared with the long version. We have previously found the long maternal repeat (>25 repeats) to be associated with late-onset, less severe PE (Kaartokallio T et al. Hypertension 2014;64:172-177).
Aim: Our aim was to study whether the length of fetal repeat is associated with mother’s PE, and whether maternal serum HO-1 level is altered in PE.
Methods: We genotyped the repeat in the cord blood of 609 pre-eclamptic and 745 non-pre-eclamptic neonates. Maternal serum HO-1 was measured in the first (222 cases/243 controls) and third (176 cases/53 controls) pregnancy trimester samples using ELISA.
Results: The long fetal GT_n allele was associated with PE and early-onset PE and the long fetal genotype with PE and severe PE (additive/dominant models), as well as with early-onset PE (additive model).

Interaction analysis suggested the maternal and fetal effects to be independent. The first or third trimester maternal serum HO-1 levels were not altered in PE, but were lower in the carriers of the long maternal GT_n repeat. HO-1 concentration decreased towards the end of gestation, and also BMI, smoking, age and birth weight were related to HO-1 level.
Conclusions: The long fetal GT_n repeat may increase mother's risk of especially severe and early-onset PE, and the maternal and fetal risk alleles likely predispose to different disease subtypes. The results support the hypotheses that the long repeat predisposes women to pregnancy-induced endothelial dysfunction via decrease in HO-1 inducibility. Our observations also suggest that the genetic predisposition may be exacerbated through other mechanisms (e.g. obesity) that reduce HO-1 levels and/or impair endothelial function during pregnancy, making a pregnant woman less capable of responding to pregnancy-induced metabolic stress. A combination of less-inducible allele and preexisting risk factors could increase risk for late-onset, less severe PE, a condition which is often called metabolic or maternal PE.

OP 16

Shorter telomere length in 9- to 15-year-old children exposed to Gestational Diabetes in utero

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Background: Shortened telomere length is a marker of cell damage and is associated with oxidative stress, chronic inflammation and metabolic disease. Gestational diabetes mellitus (GDM) is an inflammatory condition representing an adverse intrauterine environment that may affect offspring long-term health including telomere length.
Methods: We investigated telomere length in 438 GDM and 469 control offspring, aged 9 to 15 years, recruited from the Danish National Birth Cohort. Relative telomere length was measured in peripheral blood DNA using a quantitative PCR approach. Multivariate regression analysis was used to investigate the association between GDM status and offspring telomere length.
Results*:* Female offspring had longer telomeres relative to males. Offspring of women with GDM had significantly shorter telomere length than controls; however this difference was only observed in females. There was a negative association between GDM exposure and telomere length (~7.5% shorter telomeres, β: -153, CI: -282, -24, p=0.02) and a borderline significant association between maternal pre-pregnancy BMI and telomere length (~0.2% shorter telomeres, β: -12, CI: -25, 0.7, p=0.06) after adjustment for offspring sex and age. Maternal age, smoking, gestational age, birthweight and offspring metabolic and anthropometric characteristics were not associated to telomere length (p≥0.1).
Conclusions: *In utero* exposure to GDM is associated with shortened offspring telomere length in adolescent girls independent of the offspring metabolic and anthropometric phenotype. Shortened telomere length among offspring of women with GDM may contribute to increased risk of non-

communicable and inflammatory diseases later in life independent of body composition and insulin resistance.

OP 17

Perinatal Outcomes in Pregnancies of Women with Type 1 Diabetes Mellitus - Denmark 1994 to 2010

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Background: In 1989 the St. Vincent declaration set a five-year goal of achieving equality in pregnancy outcomes of mothers with type 1 diabetes and the background population. We evaluated pregnancy outcomes in women with type 1 diabetes compared to the background population in Denmark from 1994 to 2010, as well as time-trends regarding pregnancy outcomes among women with type 1 diabetes.
Material and methods: A nationwide register study of all live births in Denmark from 1994 to 2010 (n = 1,165,267). Difference between groups was evaluated by a T- or chi-squared test. The time-trend for each outcome was calculated using linear regression (ß and 95% CI).
Results: The number of deliveries among women with type 1 diabetes have significantly increased from 0.25% (n=181) of all live births in 1994 to 0.43% (n=288) in 2010 (p<0.001). In 1994 as well as 2010, pregnancies in women with type 1 diabetes exhibited a significantly higher prevalence of preterm delivery <37 weeks, caesarean delivery, preeclampsia and large for gestational age infants, furthermore the offspring had a higher birth weight for gestational age z-score and the women a higher body mass index compared with the background population. No difference was observed in either year regarding very preterm delivery or birth weight >4000g. When evaluating time-trends for pregnancy outcomes from 1994 to 2010 among women with type 1 diabetes, we found a significant decrease regarding preterm births <37 weeks, birth weight >4000g, birth weight for gestational age z-score and large for gestational age infants, some of which were approaching background population levels. The incidence of preeclampsia and maternal body mass index as well as maternal age increased significantly in both groups, whereas the prevalence of very preterm delivery and caesarean delivery remained essentially unchanged during the period.
Conclusion: When evaluating time-trends for pregnancy outcomes from 1994 to 2010 among women with type 1 diabetes, we found a clinically significant decrease in birth weight for gestational age z-score with a reduction in excessive grown infants and a decline in preterm birth. Increasing maternal BMI and preeclampsia among women with type 1 diabetes need further attention.

	Outcome in 1994		Outcome in 2010		Time-trend(1994-2010)
	T1D[1] during pregnancy (n=181)	*Background population (n=69,444)*	*T1D[1] during pregnancy (n=280)*	*Background population (n=63464)*	*T1D[1] pregnancies ß (95% CI)*
Preterm delivery before 37 weeks (%)	38.7%	5.5% ***	27.9%	6.2% ***	-0.89 (-1.25; -0.61) **
Very preterm delivery before 34 weeks (%)	1.7%	0.9%	2.1%	1.0%	-0.04 (-0.24; 0.02)
Emergency caesarean delivery (%)	20.4%	7.3% ***	20.0%	9.8% ***	-0.04 (-0.41; 0.22)
Planned caesarean delivery (%)	36.5%	6.2% ***	37.1%	12.2% ***	0.48 (0.03; 0.88)*
Birth weight > 4000g (%)	20.4%	15.7%	19.3%	16.1%	-0.33 (-0.54; -0.15) *
Birth weight for gestational age z-score [2]	1.40	-0.04 ***	1.10	-0.08 ***	-0.043 (-0.06; -0.03)**
LGA by 90th Percentile (%)[2]	55.1%	10.2% ***	46.1%	9.3% ***	-0,79 (-1.12; -0.46)*
Extremely LGA by 2SD (%)[2]	34.2%	3.4%***	28.5%	2.8%***	-1.03 (-1.28; -0.77)***
Maternal age at delivery (years)	29.1	29.1	32.0	30.9**	0.15 (0.13; 0.17)*
Maternal BMI (kg/m^2)[3]	25.1	24.1 **	25.8	24.4 ***	0.18 (0.17; 0.25)**
Preeclampsia (%)	16.6%	3.4% ***	17.5%	4.3% ***	0.41 (0.16; 0.56) *

Abbreviations - T1D: Type 1 diabetes mellitus, LGA: large for gestational age, CI: Confidence interval. [1] Type 1 diabetes mellitus defined as the women receiving a type 1 diabetes related diagnosis-code (ICD10 E10) before delivery. [2] Only from 1997 to 2010. [3] Only from 2004 to 2010.* P<0.05, ** P<0.005, ***P<0.0001

OP 18

Gut Microbiota & Gestational Diabetes Mellitus (GDM): a pilot study

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Aims: A specific composition of gut microbiota can increase insulin resistance, already present in normal pregnancy, but pathological in most cases of GDM. The aim of the study was to evaluate the presence of differences between women with GDM and controls in pregnancy in terms of gut microbiota composition during the 3rd trimester. Secondary aim was to assess if possible differences could be related to clinical-anthropometric characteristics of patients and to maternal-fetal outcomes.
Materials&methods: This preliminary study was carried out in 31 patients, 16 with GDM (IADPSG critreria) (Age 35.2±4.7 years; BMI 24.3±4.5 Kg/m2) and 15 controls (Age 32.3±3,0 years; BMI 22.0±2.9 Kg/m2) at the 3rd trimester of pregnancy. Exclusion criteria: antibiotics/probiotics/symbiotics use during gestation, twin pregnancy, Inflammatory Bowel Disease. Two major phyla, Bacteroidetes and Firmicutes, were detected by DNA extraction, spectrophotometer analysis and Real time PCR. Analysis of genera and species are in progress. Statistical analysis was performed using SPSS.**Results:** There were no differences in main characteristics and maternal-fetal outcome between groups except for lower weight gain (10,1±3,0 vs 17,1±6,2 Kg; p=0.01) and earlier delivery in GDM women (38,4±0.9 vs 40,1±1.1 gestational week g.w.; p=0.0043), even though all after 37th g.w.. With regard of the primary aim we did not find any difference in Firmicutes and Bacteroidetes DNA concentration between groups in fecal samples collected at 34-36th g.w., even thought Bacteroidetes DNA concentration was slightly higher in the control group (controls vs GDM: B 1,02 (0,11-6,2)vs 0.53 (0.22-1.2) p=0.053; F 1,56 (0,54-136,1) vs 1.94 (0.88-11.2)ns; abundance of bacteria 2.8 (0.9-142.3) vs 2.7 (1.4-11.9)ns; B/F ratio 0.43 (0.05-0.95)vs 0.24 (0.06-0.74)ns). Results are expressed as median (min-max) and stated the quantity of DNA deriving from 25 nmol/µl of total fecal DNA adjusted for the quantity of related general DNA. About secondary aim, logarithmic regression identified an inverse relation between B/F ratio and ponderal index (p<0.0001), likewise the abundance of Bacteroidetes is linked to AGA newborns(p=0.04). Women with or without GDM who reported almost 1 stillbirth in anamnesis showed lower concentration of total bacterial DNA (p=0.04). Regression tests did not provide any relation between microbiota and BMI, age,

fasting and post-prandial blood glycemia and weight gain. However, when weight gain was expressed as excessive or not (according to IOM recommendations), a significant difference emerged in terms of higher Bacteroidetes concentration (p=0.03) and abundance of bacteria (p=0.014). **Conclusions:** Waiting for genera and species specific results, the composition of gut microbiota in terms of DNA concentration of Bacteroidetes and Firmicutes, B/F ratio and abundance of bacteria did not differ between GDM and control women, even thought Bacteroidetes DNA concentration was slightly higher in the controls. Gut microbiota seems to be linked to weight gain of mother and ponderal index of newborn. The recognition of an intestinal flora "GDM-related" could lead to symbiotics/probiotics formula for GDM prevention/treatment

OP 19

Changes in microRNAs that target PPARs and lipid accretion is sex-dependent in the fetal liver of rats with GDM

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GDM is a prevalent disease that impairs fetal metabolism and development and programs metabolic alterations in the offspring. PPARs are nuclear receptors crucial in development and metabolic regulation. We have previously characterized a GDM diabetic rat model induced by developmental programming. In this model, diabetes is spontaneously induced during pregnancy when the offspring of mild diabetic rats are mated with control males. Aiming to address putative alterations in the liver of fetuses of GDM rats, we analyzed lipid content, PPAR levels and microRNAs that target PPARs in a sex-dependent manner. GDM was spontaneously induced in the offspring (F1) of rats with mild diabetes (induced by neonatal streptozotocin administration in F0). Male and female fetuses were evaluated on day 21 of pregnancy. Male fetuses showed increased levels of triglycerides and cholesterol in their livers ($p<0.05$) while, oppositely, female fetuses showed decreased levels of triglycerides, cholesterol and phospholipids and free fatty acids in their livers ($p<0.05$). PPARα levels were unchanged in both male and female fetal livers compared to their respective controls. GDM led to an increase in PPARγ in the liver of male fetuses (65%, $p<0.05$), a change that occurred in parallel to a reduction in the expression of miR-130 (49%, $p<0.05$), a microRNA that targets PPARγ. Differently, there were no changes in PPARγ and miR-130 in livers of female fetuses of GDM rats compared to controls. PPARδ was increased in livers of female fetuses of GDM rats compared to controls (77%, $p<0.001$), a change that occurred in parallel to a reduction in the expression of miR-9 (69%, $p<0.001$), a microRNA that targets PPARδ and was unchanged in the liver of male fetuses of GDM compared to controls. In conclusion, changes in lipid accretion in the fetal liver of GDM rats are sex-dependent and occur in relationship to changes in PPARs and microRNAs that target these nuclear receptors. These sex-dependent alterations may in turn lead to different adaptive responses or metabolic alterations in the offspring´s later life.

OP 20

When does post-delivery glucose metabolism improve in GDM and does it relate to changes in cytokines/adipokines or lipids?

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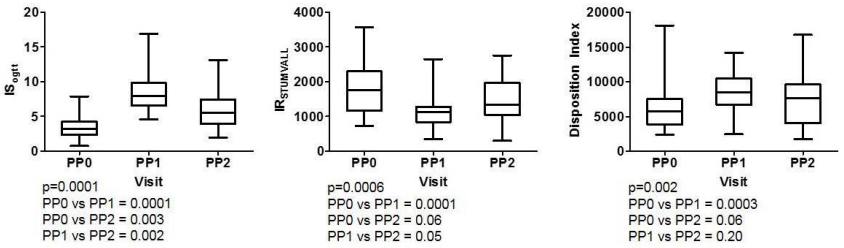
Significant literature exists on the changes in gestational diabetes mellitus (GDM) glucose metabolism during pregnancy, however, there is little data regarding timing of improvement postpartum (PP). The purpose was to determine when in PP (relative to late pregnancy) is there an improvement in measures of glucose metabolism and potential mitigating factors in women with GDM.
This was a prospective observational study of 27 women with GDM (Carpenter and Coustan criteria) at 34-37 gestational weeks (PP 0), 1-5 days postpartum (PP 1) and 6-12 weeks postpartum (PP 2). A 2 hour 75 g OGTT was used to measure insulin sensitivity (IS, ISogtt), insulin response (IR, Stumvoll) and Disposition index (DI, IS X IR) at each of these time points. Basal lipids (Cholesterol, LDL, VLDL, HDL and Triglycerides) and cytokines/adoipokines (IL6, IL8, CRP, TNFα, Adiponectin, and Leptin) were measured at each visit. The IS, IR and DI were compared at PP0, PP1 and PP2 using non-parametric testing. The correlation between changes in IS, IR and DI and lipid/cytokine measures were made at PP0 vs. PP1 and PP0 vs. PP2.
The changes in IS, IR and DI over time and between time points are shown in the Figure. There was a significant decrease in Cholesterol, Triglycerides, HDL, ($p<0.009$-0.0001) but no significant change in TNFα, Adiponectin, and Leptin over time. IL6, IL8, and CRP all increased significantly from PP0 to PP1 ($P<0.0005$-0.0001) but no significant change from PP0 to PP2. There was negative correlation between the changes IR and Leptin from PP0 to PP1 ($r=-0.38$, $p=0.05$) and changes IS and Triglyceride from PP0 to PP2 ($r=-0.38$, $p=0.05$).
There is a significant improvement in IS and DI and decrease in IR immediately PP. The changes in glucose metabolism are independent of changes in lipids and cytokines and maternal weight. Therefore, the placental factors relating to changes in glucose metabolism in GDM pregnancy remain largely unknown. CDC, Battelle Memorial Institute (200-2008-27956, Task Order 23) and CTSC at Case Western Reserve University.



OP 21

Study of the maternal-fetal interface in women with obesity and gestational diabetes as a potential mirror of fetal programming.

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Pre-gestational obesity and GDM impair fetal development and enhance adverse outcomes for both, mothers and newborns, by affecting the uterine milieu and fetal programming. hUCMS, located at the maternal-fetal interface, hold immunomodulatory properties by production of humoral factors (TGFβ, IDO, NO, IL6, PGE2, HGF, VEGF) and expression of immune molecules (HLA E-F-G), and may mirror fetal effects induced by maternal metabolic alterations. We assessed how pre-gestational obesity and GDM,

in accurately and intensive managed patients, may influence hUCMS at the maternal-fetal interface. We studied 628 pregnant women, that were classified by pre-gestational BMI (normal b.w, overweight, obesity), and presence of GDM or overt diabetes (OGTT 75 g. at 16-18th or 24-28th week of gestation), and monitored throughout the third trimester of pregnancy. Glycometabolic control (by HbA1c, fasting and 1 hr post-prandial BG, plasma total/HDL cholesterol, triglycerides) and anthropometric parameters (gestational weight gain) including nutritional or drug (ie, insulin) prescriptions were assessed at third trimester. Fetal parameters (metabolic, birth weight, birth complications or hypoglycemia) were assayed and, in a representative sample, maternal systemic inflammatory parameters (plasma cytokines) were tested. We also compared hUCMS stemness and immunoregulatory properties of diabetic and obese (n=20) vs. normal weight and euglycemic (n=10) mothers, well monitored during pregnancy. In particular, mesenchymal (CD90, SCF, CD117, vimentin E/N-cadherins, nestin), and stemness (Oct4A, Oct4B, Sox2, Nanog, ABCG2) markers, as well as hUCMS capability to differentiate into osteogenic (osteopontin), adipogenic (FABP4, PPARγ), neural (Map2ab, TUBβ3, Nestin), endocrine (MAFB/A, NEUROD, PDX1, NKX6.1), and definitive endoderm (SOX17, CXCR4, FOXA2) cell phenotypes were evaluated. Immunomodulatory molecules (IDO, iNOS, HLAG1, IL6, IL10, PGE2, TGFβ1 – in basal and after exposure to peripheral blood mononuclear cells in alginate beads) were also examined. Cytokines from isolated hUCMS were evaluated. The mothers ranked by pre-gestational b.w. and of GDM or T2D under intensive monitoring, terminated pregnancy under optimal metabolic conditions, with final incremental body weight on target (compared to pre-gestational b.w.) and glucose control similar between BMI classes. An optimized metabolic control during pregnancy translates into tangible benefits of neonatal outcomes. However, hUCMS plasticity was different in obese/diabetic vs. normal glucose tolerant mothers, in terms of differentiation potential, expression of pro-inflammatory cytokines and immunoregulatory markers, all these reflecting an inflammatory “milieu”, in obese/diabetic vs. normal mothers. We preliminarily showed that the obesity/DM-induced inflammatory environment, at the maternal/fetal interface, is mirrored by hUCMS, as a possible marker for fetal programming.

OP 22

Glucose Tolerance and Neonatal Adiposity in Women Enrolled in a Randomized Diet and Lifestyle Clinical Trial to Prevent Excess Gestational Weight Gain.

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Excessive neonatal adiposity is a risk factor for childhood obesity. Maternal hyperglycemia, obesity, and excessive gestational weight gain (GWG) are associated with increased neonatal adiposity. This study aimed to limit GWG in overweight and obese women to achieve Institute of Medicine Guidelines through a diet and lifestyle intervention. We compared adiposity among neonates born to women randomized to intervention versus usual care. Women with BMI 25-40 kg/m^2 were recruited before 16 weeks gestation and randomized to a dietitian delivered, diet and physical activity intervention, or usual care. Obstetric providers and data collectors were not aware of patient group assignment. Neonatal adiposity was measured by air displacement plethysmography and skinfold thickness with calipers at 24-72 hours of life. Of 281 women randomized, 28 had abnormal glucose levels (12 intervention, 16 usual care, p=0.4) on diabetes testing. Women included in this analysis, 118 Intervention and 104 Usual Care had normal blood glucose results on either 1-hr 50g glucose challenge test or 2-hr 75g fasting OGTT, and their neonates had available anthropometrics. Maternal age, race, enrollment BMI, type of glucose testing, neonatal gestational age and sex did not differ between groups. Intervention women had lower mean glucose levels on the 50-g test (100.6 vs. 107.6 mg/dl, p=0.037) and OGTT (fasting: 75.0 vs. 81.9 mg/dl, p=0.004). Rate of GWG was significantly lower in Intervention women versus Usual Care (0.89 vs. 1.05 lbs/wk, p=0.017) but birthweight, fat mass, %body fat, and sum of skinfolds of neonates did not differ between the 2 groups. Adjustment for maternal race, gestational age, and rate of GWG did not change significance. In summary, diet and lifestyle intervention resulted in improved glucose tolerance

and less GWG, yet no difference in birth weight or neonatal adiposity. Whether future adiposity differences emerge requires further follow-up.

OP 23

Effects of obesity on mitochondria in the at term myometrium

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Background and aim: Obesity is associated with a raised risk of inefficient uterine contractility in labouring women and the pathophysiological mechanisms are poorly understood, but impaired mitochondrial function might be involved. We aimed to examine mitochondrial function in the at term myometrium of obese women, as a defect energy transduction could impair uterine contractility during labour.
Method: Thirty-six women who delivered at term at Rigshospitalet by an elective caesarean section (CS) prior to onset of delivery were included. Myometrial biopsies were obtained at CS and blood samples collected on the same day before the CS. Seventeen women were obese (OB) and 19 were normal-weight (NW) according to their pre-pregnancy BMI: none had diabetes, pre-eclampsia or hypertensive disorders. Respiratory measurements of isolated mitochondria, as well as selected biochemical analysis, protein expressions and histological imaging were performed.
Results: Examination of the oxidative capacity of isolated mitochondria from the myometrium showed no difference between groups in state 4, state 3 or VO_2^{max} respiration, however the respiratory control ratio (RCR), a measure of mitochondrial function, was on average 20% lower in the OB group compared with the NW group regardless of the substrate used (for pyruvate: 2.5 ± 0.2 vs. 3.1 ± 0.2 and for palmitoyl carnitine: 2.0 ± 0.2 vs. 2.5 ± 0.2 nmol O2 (min mg protein)$^{-1}$, p=0.004). None of the complexes of the respiratory chain examined by Western blot differed between groups. Triglyceride content in the myometrium was significantly higher in the OB women (2.39 ± 0.26 vs. 1.56 ± 0.20 mM, p = 0.024). The stained area for nuclei (HE) and glycogen (PAS) was significantly smaller in the OB women (respectively 1.79 ± 0.13 vs. 2.17 ± 0.12 %, p=0.024 and 4.12 ± 0.32 vs. 4.80 ± 0.23 %, p=0.049) and there was a trend towards a smaller stained area for collagen (Sirius red) (respectively 33.08 ± 1.36 vs. 36.35 ± 1.20 %, p=0.076). No difference was detected between groups in the stained area for mitochondria (COX IV). Fasting venous insulin levels were in average almost twice as high in OB women (128 ± 13 vs. 68 ± 10 pmol L^{-1}), accordingly HOMA-IR was also twice as high (3.92 ± 0.38 vs. 2.03 ± 0.43 mM mU L^{-1}), and fasting venous plasma FFA was significantly lower in OB women (0.28 ± 0.04 vs. 0.47 ± 0.04 mmol L^{-1}). There were no differences in fasting venous plasma glucose, cholesterol, HDL, LDL or triglycerides.
Conclusion: Our findings show that obesity in pregnant women decreases the RCR of myometrial mitochondria, suggesting impairment in mitochondrial function, and leads to ectopic storage of triglycerides in the myometrium. Both elements would contribute independently and synergistically to reduce uterine contractility in labouring women.

OP 24

IMPLEMENTING A REMINDER SYSTEM TO STIMULATE POSTPARTUM SCREENING FOR GLUCOSE INTOLERANCE IN WOMEN WITH GESTATIONAL DIABETES:THE 'SWEET PREGNANCY' PROJECT

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Background and aims: Women with a history of gestational diabetes (GDM) are at increased risk to develop type 2 diabetes (T2DM). Timely detection of glucose intolerance postpartum is important since progression to T2DM can be prevented with 50% by lifestyle intervention. However, postpartum testing rates in routine clinical practice are often very low. We aimed therefore to evaluate the feasibility and efficacy of a GDM recall register on the long-term screening uptake postpartum and to evaluate the prevalence of (pre)diabetes postpartum.
Materials and methods: Evaluation of the registration and responses of women with a history of GDM in a recall register implemented in 66 obstetrical centers in the Northern part of Belgium from 2009-2016. Registrants receive yearly reminders (postal, email, SMS and/or telephone) to have a fasting plasma glucose (FPG) test in primary care to timely detect (pre)diabetes. The cumulative risk of diabetes was estimated using the Kaplan-Meier method, whereas for prediabetes, the estimation was based on the cumulative incidence function.
Results: Over a 7 year period, 7269 women have registered in the GDM recall register. Of all registrants, 84.4% (5465) responded to the letter sent three months after the delivery and 58.8% (3215) of responders indicated that they had received a screening test to detect glucose intolerance in early postpartum. The yearly response rates varied from 74.4% after the first year to 61.8% after the fifth year and the number of women who reported a screeningtest varied from 67.4% after the first year to 71.9% after the fifth year. Of all women who received a yearly follow-up letter (1157) and were 5 year in follow-up in the register, 75.0% (868) received at least once a screening test, 60.6% (701) received at least twice a screening test, 46.6% (539) received at least three times a screening test, 34.0% (393) received at least four times a screening test and 18.3% (212) of women received yearly a screening test over the 5 year period. Compared to women who responded at least once to a reminder, women who never responded were more often < 30 years (41.4% vs. 33.9%, p <0.001) and were more often obese (29.3% vs. 20.8%, p=<0.001). Over a period of 6 years, 27.4% (CI 23.9%-31.0%) developed impaired fasting glycaemia and 7.3% (CI 6.0%-8.4%) developed diabetes. Independent predictors for diabetes were age and BMI and for prediabetes independent predictors were age, BMI and waist circumference.
Conclusion: We show now the long-term feasibility and efficacy of a GDM recall register to stimulate screening postpartum. However, it remains challenging to stimulate women to get a yearly screening test since only 18.3% of women with 5 years of follow-up in the register, reported a screening test every year. On third of women developed (pre)diabetes within 6 years.

OP 25

Trends in pregnancy outcomes for women with gestational diabetes in Sweden 1998-2012: a nationwide cohort study.

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Introduction: The St Vincent declaration stated that we should achieve pregnancy outcomes in women with diabetes that approximate that of women without diabetes. We investigated in this study if this goal has been reached.
Methods: Register based cohort study using the Swedish Medical Birth Register including data on all births 1998-2012 in Sweden. The time period was divided into 5 section comprising 3 years each.1998-2000 as the reference period. Logistic regression was performed to evaluate trends both for women with and without GDM. Women with pre-existing diabetes were excluded. Outcomes studied were pregnancy induced hypertension, preeclampsia, cesarean section, large for gestational age (LGA), small for gestational age (SGA), perinatal mortality, Erb's palsy, birth trauma and hypoglycemia.
Results: We included 1.178.187 women in the study of which 14833 were diagnosed with GDM (1%). There was no statistically significant difference in trends of outcomes for women with and without GDM. Rate of LGA and birth trauma was decreasing during the time period. In women with GDM the rate of LGA decreased from 27.0% to 23.8%, OR per year 0.983(0.973-0.993). Birth trauma decreased from 2.0% to 0.9%, OR per year 0.926(0.894-0.959). Hypoglycemia in the offspring and SGA was increasing.
Conclusions: While some pregnancy outcomes have improved over time across all women, the gap between women with and without GDM remained relatively unchanged over 15 years. There was no difference in trend of outcomes for women with GDM and the background population. We have been able to improve outcomes with decreasing LGA and fewer birth traumas in all women studied. We need to find new ways to improve GDM outcomes to achieve the St Vincent's goals (e.g. earlier diagnosis, 'tighter' weight/glucose management).

OP 26

RELATIONSHIP BETWEEN CHANGES IN INSULIN SENSITIVITY/INSULIN RESPONSE AND CHANGES IN BODY WEIGHT/BODY COMPOSITION IN WOMEN WITH NORMAL GLUCOSE TOLERANCE AND GESTATIONAL DIABETES THROUGHOUT PREGNANCY

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Insulin sensitivity during a normal pregnancy has a significant progressive decline with advancing gestation. Gestational weight gain (GWG) has been associated with decreases in insulin sensitivity and increased risk of GDM, though these data have not been consistently reproducible. Further, the variability in GWG gain during pregnancy is attributed primarily to the variations in accrual of fat mass. Many clinicians recommend minimal weight gain in obese women during pregnancy to decrease the risk of GDM. However, we hypothesized that absolute change in insulin sensitivity (IS) or percent change in IS (%ΔIS) in pregnancy **is not associated** with the change in Fat Mass (ΔFM), %ΔFM or GWG during pregnancy. In order to test this hypothesis, thirty normal glucose tolerant (NGT) and seventeen gestational diabetes (GDM) women were evaluated before conception and at 34-36 weeks gestation. The change, both absolute and % change, from before conception to 34-36 weeks was calculated for study variables. These included the ΔIS, ΔFM, change in body weight (ΔBW), insulin response (ΔIR), during an intravenous glucose tolerance test, Disposition Index (ΔDI, ISxIR) and Leptin at 34-36 weeks. All data were normalized before analysis. Body composition was estimated using densitometry, hepatic glucose production using [6,6-$^{2}H_{2}$], and insulin sensitivity by euglycemic clamp (40mU/m^{2}/min). Because NGT and GDM were matched prior to conception, there were no significant differences in study variables between groups. Data are presented combined and separately as NGT and GDM. The associations between %ΔISI, %ΔIR, %ΔDI compared with %ΔBW and %ΔFM are shown in Table 1. These

associations were also estimated with the absolute change and the results were similar (data not shown). There was an association between %ΔIR and Leptin (coef=0.563, p=0.032), this association was stronger using the absolute change in IR (coef=0.499, p= 0.008). We conclude that the changes in glucose metabolism, i.e. ΔIS, ΔIR, ΔDI are not associated with ΔFM in both NGT and GDM. The association found between ΔIS and ΔBW is related to the glucose infusion rate during a clamp, which is normalized to fat free mass (FFM), i.e. (mg/kg.FFM/min^{-1}). The association between ΔIR and Leptin are interesting, and may relate to the independent effect of leptin on pancreatic β cell function during pregnancy. NICHH-22965-19

Table 1.

(percent) Δ	Insulin Sensitivity			Insulin Response			Disposition Index		
	Coef	*P value*	R^2	Coef	*P value*	R^2	Coef	*P value*	R^2
Body Weight									
ALL	**-0.443**	**0.001**	**0.20**	0.108	0.586	0.01	-0.039	0.799	0.00
NGT	**-0.397**	**0.002**	**0.26**	**0.771**	**0.002**	**0.48**	-0.089	0.548	0.04
GDM	-0.545	0.075	0.16	-0.397	0.096	0.14	-0.175	0.459	0.04
Fat Mass									
ALL	-0.244	0.088	0.06	-0.023	0.896	0.00	-0.038	0.749	0.00
NGT	-0.230	0.085	0.09	0.171	0.439	0.03	-0.025	0.812	0.00
GDM	-0.264	0.477	0.03	-0.433	0.108	0.13	-0.099	0.696	0.01
% Body Fat									
ALL	-0.135	0.354	0.02	-0.061	0.720	0.00	-0.028	0.806	0.00
NGT	-0.129	0.340	0.03	0.044	0.832	0.00	-0.051	0.956	0.00
GDM	-0.102	0.795	0.00	-0.382	0.187	0.10	-0.028	0.914	0.00

OP 27

EARLY PREGNANCY CLINICAL RISK FACTORS FOR PREECLAMPSIA IN WOMEN WITH TYPE 1 AND TYPE 2 DIABETES

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Aim: To assess the prevalence of pregnancy-induced hypertensive disorders and to identify early clinical, modifiable predictors of preeclampsia in women with type 1 and type 2 diabetes.
Methods: A population-based cohort study of 494 women with pre-existing diabetes (307 type 1 and 187 type 2 diabetes), included at their first antenatal visit at 11±6 gestational weeks (mean±SD) from 2012 to 2016. Predictors of preeclampsia present at first antenatal visit were sought identified.
Results: At the first antenatal visit HbA1c was 6.9±2.3 % (51±10 mmol/mol) vs. 6.8±2.6 % (49±14 mmol/mol) and blood pressure 120±12/76±8 mmHg vs. 122±14/79±10 mmHg, (p=0.16/p=0.001) in women with type 1 and type 2 diabetes, respectively. Preeclampsia developed in 40 women at 36±3 gestational weeks with delivery 8±9 days later. The prevalence of preeclampsia was 8% (9% vs. 7%) and gestational hypertension 8% (9% vs. 6%). Univariate analysis identified nulliparity, presence of retinopathy or diabetic nephropathy including microalbuminuria and increasing blood pressure as predictors of preeclampsia. At the first antenatal visit, presence of diabetic microangiopathy (nephropathy, microalbuminuria and/or retinopathy) and diastolic blood pressure, were independently,

positively associated with the development of preeclampsia, while neither diabetes type or HbA1c were associated with preeclampsia in this group of women with pre-existing diabetes and comparable good glycemic control.
Conclusion: At the first antenatal visit, diastolic blood pressure was the only independent, potentially modifiable risk factor for preeclampsia, in women with pre-existing diabetes regardless of diabetes type.

POSTER PRESENTATIONS

Theme 1: GWG

PP 01

Fetal growth trajectory in pregnancies complicated by diabetes is primarily dependent on second trimester glycaemic control

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Objectives: This study aimed to investigate the association between glycaemic control in the first and third trimester and fetal growth as the temporal relationship remains unclear.
Methods: 219 women with pre-gestational diabetes mellitus (DM) who delivered at a single UK tertiary centre between 2012-2015 had their first and third trimester HbA1C recorded, along with fetal scan biometry and maternal characteristics. Customized estimated fetal weight (EFW) centile from each scan was calculated. Mixed level time series regression was used to determine the relationship between HbA1C categories (first trimester: <42, 42-63 & >63mmol/mmol; third trimester: <48, ≥48mmol/mmol) and fetal growth trajectory.
Results: Over gestation, there was a significant gain in EFW centiles in women with the poorest control (1.12 [CI 0.39-1.92] per week; p=0.003). Following adjustment for 1st trimester HbA1C, AC (p=0.03), EFW (p=0.001) and EFW centile (p=0.01) increased across gestation in women with poor 3rd trimester glycaemic control; significant differences in all measurements were apparent by 28 weeks. Growth velocity between 20 and 26-28 weeks was also significantly greater in fetuses exposed to the worst glycaemic control (p<0.01).
Conclusion: Whilst 1st trimester glycaemic control was associated with accelerated growth, glycaemic control in the late second and early third trimester was more strongly associated with an abnormal fetal growth trajectory. Abnormalities in fetal growth trajectory were apparent by 28 weeks; further research is required to determine if fetal growth trajectory can be altered by more intensive glycaemic control in the late second trimester

PP 02

Association of trimester-specific and total gestational weight gain on pregnancy outcomes and children's anthropometrics in women diagnosed in first and second trimester of pregnancy with Gestational Diabetes.

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Context: Gestational weight gain (GWG) is an important factor related to adverse maternal and neonatal outcomes. However, the effect of GWG by each trimester on pregnancy's medical outcomes is unclear.
Methods: Cohort study of 87 women with gestational diabetes (DG) followed on Endocrinology-Obstetrics outpatient clinic from January to December 2015. Data were collected by retrospective review of medical records. GWG was calculated for each trimester: 1st – pre-conception weight until 14th week; 2nd until 27th week and 3rd trimester until delivery. Criteria of diagnose in 1st trimester was fasting glucose level ≥92mg/dL and in 2nd trimester was abnormal values in 75g oral glucose tolerance test (fasting≥92mg/dL; 1hour≥180mg/dL; 2hours≥153mg/dL).

Results: Our sample included 48 patients with GD diagnosed in the 1st trimester and 39 patients diagnosed at 2nd trimester of pregnancy. Women diagnosed in the 2nd trimester had higher weight gain on first (p<0.0001) and second trimesters (p=0.0003) as well as a higher total GWG (p=0.0456) compared with women diagnosed at the 1st trimester.
In the first group, we found significant higher number of patients under insulin therapy (n=34 (70.8%) *vs* 16 (59%), p=0.0085) and earlier institution of insulin therapy (20.4±5.7 weeks *vs* 31.4±3.6 weeks; p <0.0001) but no differences concerning number of injections and total daily dose of insulin was found (p>0.05). There were no significant differences between the groups regarding to age and pre-pregnancy weight and BMI (p>0.05). Time of delivery (38.55±0.99 *vs* 38.67±1.4 weeks), children's weight (3177±415.5g *vs* 3240±375.0g) and Apgar Score at 1' (8.32±1.36 *vs* 8.54±1.41) and 10' (9.88±0.49 *vs* 9.87±0.41) did not significantly differ between women selected by GD diagnose timing (p>0.05). A specific-trimester weight gain (TWG) was positively correlated to total GWG but more significantly specifically with second-trimester (p<0.0001; rho 0.62). We found a significant correlation between first-TWG and daily number of insulin injections (p= 0.003; rho 0.42) and third-TWG and total daily dose of insulin (p=0.034; rho 0.31). BMI was negatively correlated to second-TWG (p=0.05; rho -0.21). No correlation was found between specific TWG as well as total GWG and infant birth weight.
Conclusions: Specific TWG and total GWG was significantly higher in patients diagnosed on the 2nd trimester of pregnancy. More patients underwent insulin therapy and earlier in the pregnancy course when the diagnose was at the 1sttrimester. Specific 2nd-TWG was correlated to a higher total GWG and lower initial BMI and, 1st-TWG with higher number of insulin injections. A greater total daily dose of insulin was correlated to 3rd trimester specific weight gain. No significant association was found between TWG and children's anthropometrics and outcomes.

PP 03

WEIGHT GAIN DURING PREGNANCY IN WOMEN WITH DIABETES: THE PATTERN DIFFERS BY DIABETES TYPE

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Extremes of weight gain during pregnancy (WG) are associated with adverse pregnancy outcomes. Institute of Medicine (IOM) recommendations differ by prepregnancy body mass index (BMI).

Aim: To analyze WG according to IOM in women with gestational (GDM), type 2 (T2DM), and type 1 diabetes mellitus (T1DM).

Methods:

Subjects: Three cohorts of women with diabetes and singleton pregnancies (2770 GDM; 100 T2DM and 469 T1DM).

Maternal characteristics analyzed: Prepregnancy age, weight, height, BMI, insulin treatment during pregnancy and WG according to IOM.

Statistics: Descriptive statistics; Chi-square to compare WG categories.

Results:

Maternal characteristics in women with GDM, T2DM and T1DM were:

- GDM: age 33 years, height 160 cm, weight 60 kg, BMI 23.4 kg/m2, insulin treatment 47.4%
- T2DM: age 34 years, height 159 cm, weight 70 kg, BMI 28.0 kg/m2, insulin treatment 100%
- T1DM: age 30 years, height 161 cm, weight 60 kg, BMI 23.0 kg/m2, insulin treatment 100%

WG according to IOM in the three cohorts were:

- GDM: 52.5% insufficient, 31.4% adequate, 16.1% excessive
  p<0.001 *vs* recommendations, T2DM and T1DM

- T2DM: 29.8% insufficient, 25.5% adequate, 44.7% excessive p<0.001 *vs* recommendations and GDM, p<0.01 *vs* T1DM
- T1DM: 16.1% insufficient, 35.3% adequate, 48.6% excessive p<0.001 *vs* recommendations and GDM, p<0.01 *vs* T2DM

Conclusion:

WG distribution in the three cohorts differs markedly vs IOM recommendations and between them. We propose that differences are driven by diet restriction in GDM and by insulin treatment in women with T2DM and T1DM. The knowledge of the current patterns could be of help in clinical practice.

PP 04

The impact of maternal BMI and excessive weight gain on pregnancy outcomes in women with IADPSG-diagnosed GDM treated with insulin compared to those receiving medical nutritional therapy only.

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Introduction: Use of IADPSG diagnostic criteria for GDM diagnosis is now common in Europe. In Ireland, the prevalence of GDM using these criteria is 12.4%. The objective of this study was to examine the impact of maternal BMI and excessive weight gain (EWG) on pregnancy outcomes in women with GDM treated with insulin compared to those receiving medical nutritional therapy (MNT) only.

Materials and Methods: This retrospective cohort study included 752 GDM women on insulin (GDM-I) and 567 GDM women treated with MNT only (GDM-M). Maternal and fetal outcomes examined were pregnancy-induced hypertension (PIH), preeclampsia (PET), antepartum (APH) postpartum hemorrhage (PPH), polyhydramnios, cesarean delivery, shoulder dystocia (SD), malformations, hypoglycemia, prematurity, mortality, neonatal intensive care unit admission (NICU), macrosomia (>4kg), large and small for gestational age (LGA> 90thcentile, SGA < 10^{th} centile).

Results: GDM-I women were more obese (BMI>30kg/m^2) compared to GDM-M women (66.5% vs 49.2%; p<0.01). GDM-I women with appropriate weight gain (AWG) were more likely to be older than GDM-M women with AWG (p=0.05). GDM-I women with AWG were more likely to have a higher fasting blood glucose level than GDM-M women with AWG (p<0.01) while GDM-I women with EWG were more likely to have higher fasting and 2h blood glucose level than GDM-M women with EWG (p<0.01). Mean HbA1C levels were greater in GDM-I compared to GDM-M women in both AWG and EWG groups (P<0.01). GDM-I women with both AWG and EWG were more likely to have a higher BMI than GDM-M women (p<0.01). Women with a BMI ≥30 kg/m^2 had higher rates of macrosomia (26.5% vs 16.2%; p<0.01) and LGA (22.5% vs 15.1% p<0.01) in GDM-I compared to GDM-M women. As the maternal BMI increased, the rates of admission to NICU increased in both groups but was greater in the GDM-I group (p<0.01). GDM-I women with AWG were more likely to develop polyhydramnios compared to GDM-M women (11.8%Vs4.1%, p<0.01). There was no difference in the rates of polyhydramnios between GDM-I and GDM-M women with EWG. Infants of GDM-I women had a greater birth weight (p<0.01) and were more likely to be LGA (p<0.05) compared to GDM-M women in both AWG and EWG groups. PET, PIH, APH, PPH, mortality, shoulder dystocia, malformations, SGA, hypoglycemia and prematurity rates were not influenced by BMI or weight gain.

Conclusions: Obesity in GDM-I women is associated with higher rates of polyhydramnios, LGA and macrosomia compared to obesity in GDM-M women. EWG is associated with higher rates of cesarean delivery, NICU admissions, and LGA in GDM-I women compared to GDM-M women. These findings highlight the importance of pre-gestational BMI and EWG in GDM pregnancies especially in those receiving insulin therapy. Strategies to address these modifiable risk factors are urgently needed in clinical practice.

PP 05

BODY MASS INDEX AND PREGNANCY OUTCOME

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This retrospective study included 4646 pregnant women that underwent OGTT between 24th and 32nd week of gestation and gave birth to their children. There were 176 (3.8%) underweight, 3054 (66%) normal weight, 949 (20.4%) overweight and 467 (10.1%). obese women.
Results. The prevalence of GDM was 18.5% and 20.5% in normal weight and underweight women, respectively, *versus* 30.5% and 39.2% in overweight and obese women, respectively. Diabetes in pregnancy was recorded in 0.8%, 0.6% , 1.3% and 3% of normal weight, underweight, overweight and obese women, respectively. RR for GDM was 1.64 (95% CI 1.4-1.8) in overweight women and 2.1 (95% CI 1.8-2.4) in obese women (P<0.001 both). The prevalence of GDM increased with BMI increase. Gestational hypertension developed in 1.7%, 2.8%, 7.4% and 25.7% of underweight, normal weight, overweight and obese women, respectively. RR for gestational hypertension was 2.6 (95% CI 1.9-3.6) in normal weight women *versus* 8.9 (95% CI 6.9-11.6) in obese women (P<0.001 both). In comparison to normal weight women, the risk of macrosomia was greater in overweight women (RR=1.3; 95% CI 1.2-1.6; P<0.001) and obese women (RR=1.4; 95% CI 1.2-1.6; P<0.001). RR for CS was increased in underweight (RR=1.9; 95% CI 1.4-2.6; P<0.001), overweight (RR=1.3; 95% CI 1.1.1.6; P<0.01) and obese women (RR=2.1; 95% CI 1.8-2.5; P<0.001). The prevalence of macrosomic infants was 10.6%, 12.6% and 22.6% in women with GWG ≤8 kg, 9-15 kg and ≥16 kg, respectively (RR=1.9; 95% CI 1.7-2.2; P<0.001). The prevalence of hypotrophic newborns was 11.9% in underweight, 3.0% in normal weight, 3.1% in overweight and 1.7% in obese women. **Conclusion**. The risk of maternal and neonatal complications was increased in underweight, overweight and obese women, as well as in those with excess GWG.

PP 06

Obstetrical Outcomes After Bariatric Surgery; A Systematic Review and Meta-Analysis: Are the harms worth the benefits?

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Obesity during pregnancy has been associated with a number of adverse obstetrical outcomes including gestational diabetes, macrosomia and preeclampsia. There is increasing evidence that bariatric surgery may decrease some of these risks.
Objective*:* We conducted a systematic review and meta-analysis of observational studies to evaluate the effect of bariatric surgery on obstetrical outcomes**. Data Sources:** MEDLINE, Embase, Cochrane, Web of Science and PubMed up to December 12, 2016 with no restrictions on year. *Study Selection:* Studies were included if they evaluated patients who underwent bariatric surgery, with subsequent pregnancy post surgery. All abstracts were reviewed by two study authors and included according to pre-specified criteria. All potentially relevant studies were reviewed in full by two study authors. Discrepancies in article selection were resolved through consensus. **Data Extraction and Synthesis***:* Two reviewers extracted study outcomes and risk of bias was assessed using the Newcastle-Ottawa Quality Assessment Scale. Pooled odds ratios (OR) for each outcome were estimated using the Dersimonian and Laird random effects model. **Results***:*After reviewing 2616 abstracts, 20 cohort studies and approximately 2.8 million subjects (8,364 had bariatric surgery), were included in the meta-analysis. Compared with no surgery, bariatric surgery resulted in a reduction of gestational diabetes (OR 0.56, CI0.34-0.91), macrosomia (OR 0.37, CI 0.20-0.68), large for gestational age (OR 0.39, CI 0.27-0.56) preeclampsia (OR 0.55, CI 0.36-0.83), all hypertensive disorders combined (OR 0.50, CI 0.33-0.77) and postpartum hemorrhage (OR 0.57, CI 0.36-0.89). Bariatric surgery was associated with complications including pre-

term deliveries (OR 1.54, CI 1.37-1.74), small for gestational age (OR 2.09, CI1.71-2.56), intrauterine growth restriction (OR 2.64, CI 2.14-3.25), stillbirths (OR 1.47, CI1.06-2.03) and NICU admissions (OR 1.26, CI 1.02-1.55). Malabsorptive surgeries resulted in a greater increase in small for gestational age (p=0.0466), and a greater decrease in large for gestational age (p=0<0.0001) and macrosomia (p=0.01)], compared with restrictive surgeries. There were no differences in outcomes using administrative databases versus clinical charts.
Conclusions and Relevance*:* Although bariatric surgery is associated with a reduction in the risk of several obstetrical outcomes, there is an increased risk of other important outcomes that should be considered when discussing bariatric surgery with reproductive-age women.

Theme 2: Outcome/Long-term Consequences

PP 07

Pregnancy after bariatric surgery: time to improve awareness!

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Background. Obesity and surgical-induced weight loss after bariatric surgery have an impact on pregnancy.
Aim. We planned to document the awareness of women and health professionals about pregnancy after bariatric surgery.
Methods. Seventy-nine women aged 18 to 45 years underwent bariatric surgery (13 bioenterics intragastric balloon [BIB], 27 laparoscopic adjustable gastric band [LAGB], 27 sleeve gastrectomy) at the San Raffaele Scientific Institute from 01/02/2010 to 31/07/2016 and 67 of them completed a closed-answer questionnaire about awareness of pregnancy after bariatric surgery (response rate 84.8%). We enquired 37 accredited centres (4,817 women of childbearing age treated in 2013-2015) about the information on pregnancy after bariatric surgery provided to patients (response rate 29.7%).
Results. Although women were well aware (73% of responders) that obesity affects fertility and conception, the majority (≥85%) was unaware that obesity itself and bariatric surgery may have an impact on a pregnancy. Seventy-three percent of women reported receiving no information on the recommended waiting time to start a pregnancy after bariatric surgery and >85% were unaware of the need for nutritional counselling or nutritional supplements during pregnancy after bariatric surgery. The majority of centres reported to provide some counselling on pregnancy after bariatric surgery, although only one centre distributed a leaflet on this topic to patients.
Conclusions. In Italy the impact of obesity and surgical-induced weight loss on pregnancies after bariatric surgery are poorly acknowledged by both women of childbearing age and health care teams. There is a need to increase awareness of women on pregnancy after bariatric surgery and to include this topic in training programs for health professionals.

PP 08

Endoplasmic reticulum stress in obsess pregnant rats

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Introduction: In early pregnancy, obesity has deleterious consequences on the embryo development, being a risk factor for spontaneous and recurrent abortion, and is associated with a high risk of congenital anomalies, such as neural tube defects (NTD).
The mechanism underlying the increased risk of NTD is unknown, however, a number of theories have been proposed including, nutritional deficits, metabolic alterations and oxidative stress and more recently endoplasmic reticulum (ER) and hexosamine stress and disturbed autophagy. We have developed an obese pregnant animal model having an increased rate of embryo malformations with an increased oxidative stress condition.
Objective: To investigate the implication of ER stress in the obese mothers and their embryos.
Methods: Obesity was induced in Wistar rats by feeding with a high fat diet. The animals were divided in 3 groups: the control group (C) was fed with standard pellet diet, and the other was fed with cafeteria diet (O) for 3 months and another obese group supplemented with 150 mg/day of vitamin E (E). The animals were mated and sacrificed at day 11.5 of pregnancy, and the rate of macroscopic malformations was recorded. Blood and liver were collected and metabolic parameters and oxidative endoplasmic reticulum markers were analysed.
Results: The rate of embryo malformations in obese rats was higher compared with the C group, as well as increased oxidative stress. The O group doesn't show any difference on the ER stress markers compare with the control group. Only the cas3, apoptosis marker related to the Chop ER pathway was increased in the obese group compared with the C group. The administration of vitamin E restore the malformation rate and oxidative stress and apoptosis markers to control levels.
Conclusion: These results suggest that oxidative stress and ER stress could be a possible mechanism involved in the teratogenesis linked to obesity.

PP 09

Higher risk for overweight during school age in children born to women with GDM

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Background and aims: Globally, gestational diabetes mellitus (GDM) affects approximately one out of seven pregnancies amounting to approximately 8 million live births yearly. Children of GDM mothers (GDM-F1) are at increased risk of becoming overweight and developing metabolic disease in later life. We conducted a narrative review of the literature aiming to understand the growth characteristics of children born form GDM pregnancies after the adiposity rebound period to provide insights across childhood.
Methods: Medline was searched for articles published from 1995 to Feb 2016 with selected search terms related to growth of GDM offspring. We identified 877 articles of which 12 studies were included using a priori inclusion/exclusion criteria for eligibility based on longitudinal assessment of growth and data reporting in children older than 7 years of age.
Results: Three studies were conducted only among off-spring among GDM-F1, four studies compared GDM-F1 with non-GDM and the rest (n=5) compared GDM-F1 with other reference population which could include healthy, T1DM, T2DM (Table 1).Studies among GDM-F1 only (n=3) showed an increase in BMI z-score at 7 years of age. When compared to non- GDM offspring, 2 out of 5 the studies reported an increase in weight, height and BMI at 7 years of age among GDM-F1, while the rest reported no difference. Compared to other reference population, only boys were reported to have larger waist circumference at 7 and 9.5 years of age and that BMI was increased in GDM-F1 at 18 years. Increased BMI and waist circumference could be a proxy of increased risk for overweight/obesity.

Conclusions: Although information appeared to be limited, GDM-F1 seems to have a higher risk for overweight with higher BMI and larger waist circumferences at 7 years of age which could persist into adulthood.

PP 10

Newborn bone health is affected by maternal bariatric surgery

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Context: Bariatric surgery is known to affect subsequent pregnancies, by reducing fetal growth and lowering infant birth weight. The study aim was to examine how newborn infant bone health is affected by bariatric surgery.
Design: We consecutively recruited mother-newborn dyads, where the mothers had undergone Roux-en-Y gastric bypass bariatric surgery. Newborn bone health was assessed using dual-energy X-ray absorptiometry scanning (DXA). We compared offspring born after maternal bariatric surgery to controls. The control group consisted of a mix of pre-pregnancy normal weight and obese women with matching body mass index (BMI).
Setting: A University Hospital.
Patients: We included 25 mother-newborn dyads born after maternal bariatric surgery and they were compared to a control group of 311 mother-newborn dyads (table 1).
Main outcome measure: Newborn bone health.
Results: Offspring born after bariatric surgery had lower bone mineral content (BMC), 63.5g versus 74.8g ($p< 0.001$) and bone mineral density (BMD) 0.21g/cm^2 versus 0.23g/cm^2 ($p< 0.001$) when compared to the control group.
Conclusion: Offspring born at term, after maternal bariatric surgery, have lower BMC and BMD. Further studies are needed to examine if there are long term implications of these findings.

Table 1

Maternal characteristics	Bariatric surgery mothers n=25	Control group n = 311	p-value
Pre-pregnant BMI (kg/m²) [1]	28.8 (4.8)	30.9 (6.0)	N.S
Gestational weight gain (kg) [1]	13.2 (8.3)	11.4 (6.1)	N.S
Primipara (%)[2]	52	60	N.S
Placental weight (g)[1]	645 (91)	665 (151)	N.S
Newborn characteristics			
Birth weight (g) [1]	3284 (327)	3619 (523)	<0.001
Birth length (cm) [1]	51.0 (1.5)	52.2 (2.3)	0.01
Head circumference (cm) [1]	34.2 (1.6)	35.1 (1.6)	0.007
Male sex (%)	52	52	N.S
Gestational age at birth (days) [1]	277 (9)	280 (9)	N.S
Birth weight Z-score *[1]	-0.45 (1.0)	0.12 (1.10)	0.01

[1] Mean (±SD), Student's *t*-test
[2] Proportion, chi-square test

*Normalised birth weight adjusted for gestational age at birth and sex, according to Marsal et al. SGA (small for gestational age), AGA (appropriate for gestational age) and LGA (large for gestational age)

PP 11

Newborn body composition is affected by maternal bariatric surgery

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Context: Bariatric surgery is known to affect subsequent pregnancies, by reducing the risk of gestational diabetes and lowering infant birth weight. The study aim was to examine how newborn infant body composition is affected by bariatric surgery.
Design: We consecutively recruited mother-newborn dyads, where the mothers had undergone Roux-en-Y gastric bypass bariatric surgery. Neonatal body composition was assessed using dual-energy X-ray absorptiometry scanning (DXA). We compared offspring born after maternal bariatric surgery to controls. Analyses were made to estimate the effect of maternal weight loss before pregnancy and bariatric surgery respectively. Offspring were matched on maternal pre-surgery and pre-pregnancy BMI, gestational weight gain, parity, gestational age at birth and newborn sex.
Setting: A University Hospital.
Patients: We included 25 mother-newborn dyads born after maternal bariatric surgery and they were compared to a control group of 311 mother-newborn dyads.
Main outcome measure: Newborn body composition.
Results: Offspring born after bariatric surgery had lower birth weight (335g, p<0.001), fat-free mass (268g, p<0.001) and fat% (2.8%, p<0.001) compared to control group. 5.0% of the average reduction in newborn fat free mass could be attributed to maternal weight loss whereas bariatric surgery accounted for 95.0%, the numbers were 51.2% and 48.8% with regard to the reduction in fat mass when compared to matched controls.
Conclusion: Offspring born at term, after maternal bariatric surgery, have lower birth weight, fat-free mass and fat percentage when compared to controls. Bariatric surgery itself and not the pre-pregnancy weight loss seem to have the greatest effect on fetal growth.

PP 12

The Risk Stratification of Adverse Neonatal Outcomes in Women with Gestational Diabetes (STRONG) Study.

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Background and aims. The therapeutic process of women with gestational diabetes (GDM) may be differentiated on the basis of the degree of GDM "severity", not only understood as the degree of impaired glucose levels, but as the overall risk of adverse neonatal outcomes. The study aimed to assess the risk of adverse neonatal outcomes in women with GDM by identifying subgroups of women at higher risk in order to recognize the characteristics most associated with an excess of risk.
Materials and methods. This was an observational, retrospective, multicenter study involving women with pregnancy complicated by GDM cared for Italian diabetes centers with more than 30 cases of GDM/year in the period between January 2012 and June 2015.
Results. Overall, 2736 pregnancies (mean age 36.8 (33.1-40.1) years, pre-gestational BMI 24.8 (21.9-28.9) kg/m^2, 41.3% insulin treated) were analyzed. Six miscarriages, one neonatal death but no maternal death were recorded. Women with a composite adverse neonatal outcome (29.6%) had higher pre-gestational BMI, second and third trimester HbA1c levels, OGTT basal glucose levels at 16-18 gestational weeks and previous macrosomia rate when compared with women without adverse outcomes. The occurrence of the composite adverse outcome (OR 2.41 95%CI 1.54-3.78), large for gestational age (OR 3.94 95%CI 2.33-6.68), fetal malformation (OR 2.82 95%CI 1.03-7.66) and respiratory distress (OR 4.70 95%CI 1.42-15.57) was associated with previous macrosomia. Small for gestational age was associated with first trimester glucose levels (OR 2.12 95%CI 1.07-4.23). Neonatal hypoglycemia was associated with overweight (OR 1.53 95%CI 1.03-2.28) and obesity (OR 1.67 95%CI 1.08-2.60).
Conclusion. A deep investigation on the factors associated with adverse neonatal outcomes requires a risk stratification in order to identify subgroups of women at higher risk.

PP 13

Growth characteristics of offspring born to women with gestational diabetes: narrative review of literature

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Background and aims: Gestational diabetes mellitus (GDM) affects approximately one in seven pregnancies. Infants exposed to GDM in the womb (GDM-F1) are at increased risk of obesity in later life. We aimed to review the published literature to evaluate growth characteristics of GDM-F1 during early childhood and pre-and post-natal influencing factors linked to childhood obesity.
Methods: Medline was searched for articles published between 1995 to Feb 2016 with search terms related to growth in GDM offspring. Titles/abstracts and full text were screened based on a priori inclusion/exclusion criteria for eligibility including a minimum of one growth parameter that was measured at two time points.

Results: The search identified 877 articles of which 25 studies were included for evaluation (n=10 for GDM-F1 only and n=15 for GDM-F1 vs. normal glucose tolerance-offspring (NGT-F1). Weight gain was reported to be increased in 1 study while 3 studies reported no differences in weight gain in GDM-F1 VS NGT-F1. While 4 out 6 studies indicated higher skin fold thickness around 1 and 6 weeks, 1 and 5 years, only 3 out of 7 studies reported higher BMI at 6 months and 5yrs, among GDM-F1 vs NGT-F1. Pre- and post-natal factors reported to contribute to the increased risk of early childhood overweight/obesity included high pre-pregnancy BMI, 2hr post-prandial blood glucose and being born large for gestational age.
Conclusions: Based on limited published information, GDM-F1 showed age-specific differences in growth characteristics mostly occurring in very early life (< 6 mths) and in later childhood (around 5 y). Timely diagnosis of growth deviations and recognition of the pre-natal and post-natal factors is crucial to develop intervention strategies to reduce the risk of obesity in GDM offspring.

PP 14

Preventing progression to Type 2 Diabetes in women who had gestational diabetes – The lessons learnt from mothers after gestational diabetes in Australia (MAGDA) study

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Women who had GDM are seven times more likely to develop Type 2 Diabetes than women who remained normoglycaemic during pregnancy. Lifestyle modification programmes have been shown to reduce this progression in subjects with pre-diabetes. The MAGDA study was a 5 year systems approach to the prevention of progression to diabetes conducted in South Australia and Victoria between 2011-2015. Women with GDM were recruited during pregnancy for an RCT of group based lifestyle modification implemented postnatally or usual care. The intervention was one individual session, 5 group sessions and 2 telephone sessions. Primary outcomes were changes in diabetic risk factors – weight, waist circumference, fasting blood glucose. Secondary outcomes were achievement of lifestyle modification, depression scores and cardiovascular risk factors.
The only significant difference after 12 months was a reduction in weight of -0.23 kg in the intervention group compared with +0.95 kg in the usual care group.
Only 10% attended all sessions, 53% 1 session and at least 1 group session and 34% attended no sessions.
Lessons learnt were:
First year post birth main focus of most mothers is on the child not on herself
When women are still normoglycaemic, drive to modify behaviour is diminished
One of the original objectives was to establish GDM register to manage recall but the study coincided with National Government establishing such a register.
Key partnership is with the woman's family practitioner to reinforce need for annual retesting and monitor weight and lifestyle. Regardless of good registration rates, the impact of the National GDM Register on postnatal follow-up rates was negligible.
Interventions should only be offered to women with IFT/IGT or HbA1C in the pre-diabetes range.
Further efforts should be directed into understanding why uptake among women who had GDM is low and how this can be increased.

PP15

What is the postpartum experience of Danish women following gestational diabetes? A qualitative exploration

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Background: Women with gestational diabetes mellitus (GDM) receive acute but short-term care during pregnancy. There is less direct support during the postpartum period; women are offered general advice on how to follow a healthy lifestyle to avoid developing future type 2 diabetes. Observational studies suggest that a substantial proportion of women with prior GDM do not sustain recommended lifestyle changes postpartum. In a qualitative study, we examined how Danish women diagnosed with GDM experience the transition from a GDM-affected pregnancy to the postpartum period.

Methods: Semi-structured interviews with six women diagnosed with GDM. Data were analysed using qualitative content analysis.
Results: A GDM diagnosis was accompanied by worries about the health of the woman's baby. This was also the driving force behind the women's motivation to engage in lifestyle changes during pregnancy. The out-patient treatment was perceived to be strict and associated with various challenges. After the delivery, taking care of the baby became the women's dominant focus. Social and emotional support from partners (among others) was needed to maintain motivation and prioritise a healthy lifestyle. The women's experience of the healthcare system varied. However, in the postpartum period all the women perceived limited interaction and initiative from their healthcare providers in supporting them to engage in a healthy lifestyle.
Conclusions: This study identified barriers and facilitators to sustaining a healthy lifestyle postpartum. Efforts at multiple levels – including the individual, family and health system – are needed to facilitate and support a healthy lifestyle among women with prior GDM.

PP 16

SGA is an important independent risk factor for postpartum dysglycaemia after gestational diabetes pregnancy

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Rationale: Women diagnosed with Gestational Diabetes Mellitus (GDM) during pregnancy are at increased risk of type 2 diabetes and should be targeted for diabetes surveillance and preventative measures. However, appropriate targeting is difficult due to the high prevalence of GDM and related risk factors (obesity) and the unique challenges of lifestyle change in the postpartum period. We aimed to develop a risk calculator to identify women at highest risk of early postpartum dysglycaemia (diabetes, impaired fasting glucose or impaired glucose tolerance) after a GDM pregnancy.

Methods: Anonymised service data from 21779 consecutive singleton live-birth pregnancies in Cambridge (2004-2008) with maternal pre-pregnancy BMI information were included. Women received an OGTT if they had an abnormal random plasma glucose (RPG>7.7 mmol/l; 8-12 weeks) or 50g glucose challenge test (GCT>7.7mmol/l; 24-28 weeks). Women with GDM were offered a postpartum OGTT at 6-8 weeks (uptake 30-40%); Logistic regression was used to identify risk factors for postpartum dysglycaemia. There was 80% power (α 0.05) to detect a 50% difference in the odds ratio of postpartum dysglycaemia for each risk factor. Potential risk factors were assessed including glucose concentrations at 0hr, 1hr and 2hr post OGTT, age >30 years, non-white ethnicity, overweight/obese and pregnancy complications including pre-eclampsia, polyhydramnios, antepartum/ postpartum haemorrhage, large/small for gestational age LGA/SGA) and preterm delivery. Factors were included in the model when $p \leq 0.1$ and models were compared using ROC analysis.
Results: 3487 OGTTs yielded 1113 women with GDM. 450 postpartum OGTTs were performed; 14% had postpartum dysglycaemia. In women with GDM the strongest independent risk factors were non-white ethnicity (OR (95%CI): 2.46 (1.29 to 4.68), p<0.01), SGA in the current pregnancy (3.25; 1.29 to 8.07; p=0.01), and glucose related measurements from the antenatal OGTT. The best cut-offs from the antenatal OGTT were fasting ≥6.4mmol/l (10.76; 3.72 to 31.07; p<0.001), 1-hour ≥11.9 mmol/l (3.89; 2.11 to 7.16; p<0.001) and 2-hour ≥9.6 mmol/l (2.60; 1.44 to 4.71; p<0.01). Patients with GDM who had 0, 1, 2, 3 or 4 of these risk factors had 7, 14, 25, 35 and 78% risk of postpartum dysglycaemia

respectively. This calculator could be used to target the 25% of GDM patients who had at least 2 risk factors and a >25% risk of postpartum dysglycaemia.

PP 17

Are pregnancy outcomes different in women with IADPSG-diagnosed GDM treated with insulin compared to those receiving medical nutritional therapy only.

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Introduction: Use of IADPSG diagnostic criteria for GDM diagnosis is now common in Europe. In Ireland, the prevalence of GDM using these criteria is 12.4%. The objective was to assess if women with GDM diagnosed using IADPSG criteria treated with insulin have comparable pregnancy outcomes to those treated with medical nutritional therapy (MNT) only.
Materials and Methods: This retrospective cohort study included 752 GDM women on insulin (GDM-I) and 567 GDM women treated with MNT only (GDM-M).Maternal and fetal outcomes examined were pregnancy-induced hypertension (PIH), preeclampsia (PET), antepartum (APH) postpartum hemorrhage (PPH),polyhydramnios, cesarean delivery, shoulder dystocia (SD), malformations, hypoglycemia, prematurity, mortality, neonatal intensive care unit admission (NICU), macrosomia (>4kg), large for gestational age (LGA> 90thcentile) and small for gestational age (SGA < 10^{th} centile).
Results: GDM-I women were more obese compared to GDM-M women (66.5% vs 49.2%; p<0.01) and more likely to have a family history of type 2 diabetes (68.1% vs 61.3%p=0.01). Women with GDM-I had a greater risk of polyhydramnios (aOR 2.33, 95%CI 1.31-4.14) and were more likely to deliver by cesarean section (aOR 1.67, 95%CI 1.25-2.23). There was no difference between the groups in the rates of PET, PIH, APH, PPH, mortality, malformations and SGA. Rates of macrosomia (22.2% vs 12.7%; p<0.01) and LGA (19.7% vs 12.5%; p<0.01) were greater in GDM-I vs GDM-M but rates of SD and hypoglycemia were similar. GDM-I vs GDM-M mothers had a higher HbA1C level (5.6% vs 5.4%; p<0.01) despite treatment. Infants of GDM-I mothers were more likely to require NICU admission (aOR 4.88. 95%CI 3.54- 6.73).
On subgroup analysis, a BMI ≥30 kg/m^2 had a greater impact on rates of macrosomia (26.5% vs 16.2%; p<0.01) and LGA (22.5% vs 15.1% p<0.01) in GDM-I compared to GDM-M women. In addition, a BMI ≥ 25 kg/m^2 had a greater impact on rates of elective cesarean section (48.9% 31.6% p<0.01) in GDM-I compared to GDM-M women.
Conclusions: GDM-I and GDM-M mothers have similar rates of maternal medical morbidities. Despite this, the rate of delivery by CS remains greater driven by elective intervention in the GDM-I group. Infant morbidities are similar between groups but macrosomia and LGA continue to be greater. Perhaps in women with a higher baseline risk profile, blood glucose targets may need to be even tighter and this requires further investigation.

PP 18

The impact of high-fat diet in pregnancy on fetal outcome in rats

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Maternal obesity is associated with increased risks of poor pregnancy outcome. The mechanisms behind adverse pregnancy outcome in pregestational obesity are not known. The purpose of the present study was to investigate maternal metabolic state and fetal outcome in rats exposed to high fat diet (HFD) and in rats fed control diet (CD).

Furthermore, we wanted to investigate the impact of serum collected from HFD pregnant rats on CD embryonic development in whole embryo culture *in vitro.* In addition, we evaluated the expression of genes involved in oxidative stress and inflammation in embryos and maternal adipose tissue.
Three weeks old female rats were fed either HFD (34.9 g% fat) or CD (4.3 g% fat). The female rats were mated with CD males at 12-14 weeks of age, and the starting of pregnancy was confirmed by a positive vaginal smear and designated gestational day 0. The rats were fed their corresponding diets throughout pregnancy.
Plasma levels of triacylglycerides, cholesterol and of most polyunsaturated fatty acids (PUFA) were lower in HFD rats than in CD rats, whereas the concentration of the same components in liver were much higher in the HFD rats. However, in adipose tissue only stearic and oleic acids were higher in HFD rats compared to CD rats. In addition, α-linolenic acid was decreased in HFD vs. CD rats.
Furthermore, high concentrations of branched chain amino acids, 3-hydroxybutyrate and leptin were found in HFD serum compared to CD serum. The gene expression of CuZnSOD and MnSOD in day 10 embryos of HFD rats was decreased compared to embryos of CD rats, whereas the gene expression of CuZnSOD, resistin, IL6 and IL10 in maternal adipose tissue was higher in HFD rats compared to CD rats.
We found increased resorption (44% vs. 5%) and malformation (10% vs. 0%) rates in day-11 embryos of HFD rats compared to CD rats. In whole embryo culture we found increased morphologic score (8.2 vs 0.5), decreased somite number (20.2 vs. 27.4) and crown-rump length (2.7 vs. 3.4 mm) in embryos exposed to HFD serum compared to CD serum.
The most important finding in the present study was that HFD during pregnancy alters several maternal plasma/serum components and decreases the embryonic gene expression of CuZnSOD and MnSOD. These changes may be involved in the teratogenicity of pregestational obesity and contribute to occurrence of resorptions and congenital malformations *in vivo and in vitro*.

Theme 3: GDM-1

PP 19

Barriers and facilitators to gestational diabetes mellitus treatment in South India: a qualitative study

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Background: Gestational diabetes mellitus (GDM) increases the risk of future type 2 diabetes as well as the risk of a range of adverse pregnancy outcomes. In India, around one in five pregnant women develops GDM. In this study we investigate barriers and facilitators to treatment for women diagnosed with GDM in Tamil Nadu, India.
Material and methods: Semi-structured interviews with 19 women diagnosed with GDM from an urban and a semi-rural site in Tamil Nadu were conducted and analysed using qualitative content analysis.
Results: The following factors emerged as impeding treatment: the treatment is considered counterintuitive to lay perceptions of what is perceived as safe or healthy during pregnancy; low/poor interaction with health care providers, including receiving diverging messages regarding treatment; hardship associated with treatment such as cravings and pain from injections; difficulties in coordinating with work and social life; cost and availability of food items, insulin and health care; and feeling like a nuisance to the family. In turn, social support and good interactions with health care providers facilitated the treatment.

Conclusions: Our study identified a number of barriers to GDM treatment. However, we also found that social support and positive, high quality interactions with health care providers could mitigate some of these barriers and facilitate the treatment process. Efforts and adjustments at the individual, community and health system levels are needed in order to ensure that women with GDM are not only able and motivated to follow the treatment, but also have the opportunity to do so.

PP 20

Diagnosing gestational diabetes in low-resource settings: could the IADPSG criteria be simplified?

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Rationale: The International Association of the Diabetes in Pregnancy Study Groups (IADPSG) recommends a universal three- timepoint 75g oral glucose tolerance test (OGTT) to diagnose Gestational Diabetes Mellitus (GDM). However, feasibility and cost-effectiveness concerns, particularly in low-resource settings, have prevented universal implementation. We aimed to identify a robust, feasible and economical GDM testing strategy.
Methods: Anonymised service data from 25,653 consecutive singleton live-birth pregnancies in Cambridge (2004-2008) were included. Women were offered an OGTT after an elevated random plasma glucose (RPG>7.7mmol/l; 8-12 weeks) or 50g glucose challenge test (GCT>7.7mmol/l; 24-28 weeks). We compared one and two-timepoint OGTT approaches using ROC analysis with IADPSG three-timepoint criteria as reference standard.
Results: 3935 OGTTs yielded 1249 women with GDM. The OGTT 1-hour test was the best single test for predicting GDM diagnosis (ROC area 0.94; 95%CI 0.93, 0.95) performing well in all ethnicity and BMI categories. The OGTT 0-and-2 hour combination performed poorly (ROC area 0.86; 95%CI 0.85, 0.88; worse in lean women), diagnosing only 73% GDM and 78% overt diabetes and is therefore unlikely to be cost-effective. To assess the risk of selection bias based upon using a GCT, the analysis was repeated in those women who had an elevated RPG, regardless of GCT result (n=1935) with no change in the results. An abbreviated strategy with modified 75g glucose challenge (a diagnostic 1-hour test) followed by three-timepoint OGTT for those with intermediate hyperglycaemia (1-hour glucose 8.2-9.9mmol/l) would reduce OGTTs by 66% but would miss 5.5% of cases of GDM. This approach may reduce the burden of universal testing, maximise diagnostic performance and minimise clinical risk.
Conclusions: All abbreviated strategies miss cases of GDM. The OGTT 1-hour test performed best and should be included in all testing protocols.

PP 21

Health Literacy Levels in Women at Risk of Gestational Diabetes Mellitus

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Introduction The 2011 population study on health literacy found that 40% of the Irish population had inadequate health literacy. There has been little research in Ireland and internationally on health literacy in pregnancy. This research explores health literacy levels in women at risk of gestational diabetes (GDM).
Methods Functional health literacy and general health literacy, using the Newest Vital Sign (NVS) (U.K.) and the Health Literacy Survey Questionnaire respectively, were measured in pregnant women at risk of

GDM. Socio-demographic parameters, clinical data, including pregnancy outcomes were captured from a participant questionnaire and hospital electronic databases. .

Results There were 297 participants, of which 30 were diagnosed with GDM. Limited functional health literacy was found in 75 participants (25.3%) and limited general health literacy in 113 participants (38%). Household income, parental ethnic background, education attainment and social status were predictors of limited health literacy. Functional health literacy levels were higher in mothers who had taken pre-pregnancy folic acid compared with those who didn't take pre-pregnancy folic acid: median and interquartile ranges (IQR) of NVS (U.K.) were 5 (4-6) and 4 (3-5) respectively ($p = 0.02$). Similarly functional health literacy levels were higher in mothers who initiated breast-feeding compared with mothers who did not initiate breast-feeding: median (IQR) of NVS (U.K.) were 5 (4-6) and 4 (3-5) respectively ($p = 0.001$). Results indicated that 16.7% (12 of 75) women with limited functional health literacy had GDM compared with 6.2% (18 of 222) of mothers with adequate functional health literacy. This did not reach statistical significance ($p = 0.06$). General health literacy was not significantly associated with pre-pregnancy folic acid, initiation of breast-feeding or GDM. Limited health literacy was not associated with other adverse maternal or neonatal outcomes.

Conclusions This study confirms that limited health literacy is present in a significant proportion of pregnant women at risk of GDM. It also indicates a social gradient in health literacy in this population. Pre-pregnancy folic acid and initiation of breast-feeding are significantly associated with health literacy. This study provides prevalence data that can be used to inform the design of future studies to further explore the relationship between health literacy and adverse maternal and neonatal outcomes.

PP 22

Prenatal attachment in a sample of GDM patients.

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Prenatal attachment represents the bond developed between mother and fetus during pregnancy. It has been recently associated to self-care practices (e.g., maintaining good health practices) during pregnancy and to the quality of mother-infant postnatal interaction.

The aim of this explorative study is to investigate the relationship between prenatal attachment and specific psychosocial factors in a sample of GDM pregnant women.

The present cross-sectional study was conducted by applying the Prenatal Attachment Inventory (PAI) self-report questionnaire and an anamnestic form, which includes questions about earlier and current pregnancies, to a sample of 155 women attending prenatal care services, 110 of which with GDM diagnosis (age $M = 34.34 \pm 5.18$y) and 45 without GDM diagnosis (age $M = 33.8 \pm 5.34$y). All participants signed the consent form.

The analysis includes comparisons of averages, correlations and a regression model.

We found PAI scores are significantly higher in GDM pregnant women than in no-GDM pregnant women ($p < .05$), while no differences were found in normal/overweight/obese BMI groups. Higher PAI scores are found in those who had a voluntary interruption of pregnancy ($p < .05$) while no differences were found in those who experienced a miscarriage. PAI scores also showed a strong correlation with weeks of pregnancy ($r = .376$; $p < .01$) and with the importance attached to a natural delivery ($r = .238$: $p < .01$). A moderate correlation was found between PAI scores and the item "it was important to you seeing the ultrasound picture of your baby" ($r = .164$; $p < .05$). Hierarchical regression analysis were conducted to

test the role of GDM diagnosis, critic events in earlier pregnancies, and the importance of having a natural delivery on PAI scores. We found these variables predict a 12% of the total variance.
GDM diagnosis and specific psychosocial factors linked to the pregnancy may be associated with higher prenatal attachment.

PP 23

Screening and treatment for early-onset gestational diabetes mellitus: A systematic review and meta-analysis

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Aims: Early screening for diabetes in pregnancy (DIP) also detects women with lesser degrees of hyperglycemia (gestational diabetes, (GDM)), for whom diagnostic criteria are uncertain. We conducted a systematic review and meta-analysis to evaluate the current evidence for screening and treatment for early-onset GDM (<24 weeks' gestation).
Methods: We systematically searched five electronic databases (PubMed, CINAHL, EMBASE, Cochrane Library, and Scopus) up to November 2016. Any studies that assessed the screening and treatment outcomes of GDM women early in pregnancy were eligible for inclusion. One reviewer extracted data from 43 selected studies. The risk ratio and 95% confidence interval were used to measure the effect size. A random- effects model was employed to pool data across studies. A subgroup analysis was undertaken for developed and developing countries to reflect differences in resource settings.
Results: Our review found that a high proportion (15-63.6%) of women with GDM could be detected early in pregnancy depending on the setting, criteria used and screening strategy. Fasting plasma glucose (FPG) had a high false positive rate (4.4-22.8%) using ≥ 5.1 mmo/l in the first trimester, but this was 0-1.5% at ≥ 6.1 mmol/l. First trimester HbA1c had a low sensitivity for GDM (12.5-28.6%). A meta-analysis of 15 cohort studies that compared the pregnancy outcomes between early and late onset GDM women following treatment, indicated that early-onset GDM women were at significantly higher risk for insulin use (RR 1.62 [1.29, 2.04]) compared to late-onset GDM women. In the subgroup analyses, early-onset GDM women in the developed countries had increased risk of neonatal intensive care unit admission (RR 1.12 [1.04,1.22]) and perinatal mortality (RR 3.61 [1.90, 6.84]) than late-onset GDM women. Early onset GDM women in the developing countries had less risk of macrosomia (RR 0.46 [0.27, 0.80]) than late-onset GDM women. The main limitations of this review are heterogeneity of studies and near absence of randomized controlled trials.
Conclusions/Recommendations: There is insufficient robust evidence to guide approaches for screening, diagnosis or management of early-onset GDM. In the absence of empirical evidence, we currently recommend using a fasting glucose of 6.1-6.9 mmol/l in the first trimester and the 24-28 week GDM criteria in the second trimester. In view of the high likelihood of benefit from treatment at some threshold below DIP there is an urgent need for high quality evidence that demonstrates the benefit and possible adverse effects of treatment of 'early onset GDM'.

PP 24

Comparison of obstetric and perinatal outcomes of in vitro fertilization versus spontaneous conceived pregnancies complicated with gestational diabetes mellitus. The role of early screening and proper management

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The incidence of Gestational Diabetes Mellitus (GDM) is increased in In Vitro Fertilization (IVF) pregnancies. In literature, there is limited evidence regarding the effect of IVF on the outcome in pregnancies complicated by GDM. The aim of our study was to investigate the clinical characteristics of IVF vs Spontaneous Conception pregnancies complicated by GDM and their impact on the maternal and fetal outcomes. A total of 102 singleton IVF vs 102 spontaneous conception pregnancies diagnosed with GDM were included in our cross-sectional study. The clinical characteristics of the two study groups were as follows: [(Mean±SD) Age: 38.23±4.9 vs 34.1±3.2 years, p<0.001; BMI: 25.8±5.3 vs 23±4.1 kg/m^2, p<0.001; HbA1c: 5.2±0.5 vs 5.2±0.7% , p=NS; Fasting Blood Glucose (FBG): 84.1±8.4 vs 84.2±7.1 mg/dl p=NS, 1-hour Postprandial BG: 103.6±11 vs 106.5±10mg/dl, p=NS; Week of Diagnosis GDM: 21.8±5.2 vs 23.8±6.2, p=0.03; Week of starting Insulin: 22.8±5 vs 24.8±5, p=0.03; Insulin dose: 34.7±10 vs 29.5±16 iu/day, p=0.03; Miscarriage history: 32.5 vs 30.8%, p=NS; Smoking history: 30.5 vs 31.2%, p=NS]. The Obstetric and Perinatal history between the two groups is as follows: Maternal Weight Gain: 10.4±4.4 vs 11.9±3.7 kg, p=0.053; Week of Delivery: 36.9±2 vs 37.4±0.7, p=0.04; Neonatal Birth Weight: 2857±517 vs 2891±341 g, p=NS; women experienced Hypoglycaemia Episodes: 24.5 vs 26.5%, p=NS, Pre-eclampsia rate: 4.9 vs 3.9%, p=NS; Respiratory Distress Syndrome: 14.7 vs 12%, p=NS; Neonatal Hypoglycaemia: 17.6 vs 14.7%, p=NS, Jaundice: 20.6 vs 18.6%, Neonatal Intensive Care Unit admittance: 14.7 vs 15.6% p=NS, Caesarean Section (CS): 86.3 vs 56.9%, p<0.001. There were 2 cases of Perinatal Mortality in IVF group. Associations between clinical characteristics and the adverse outcomes were tested among the IVF group. CS as a complication was not included in the analysis. Regarding the glycemic control, 1-hour Postprandial BG but not FBG or HbA1c, was associated with maternal-fetal complications (r=0.504, p<0.001). Insulin dosage was associated with higher rate of maternal Hypoglycaemia (r=0.513, p=0.001), but it did not affect fetal outcome. History of preceding Miscarriage was associated with Smoking (r=0.299, p=0.007). BMI was not correlated with the week of GDM diagnosis. There was no significant difference in the pregnancy outcome of the IVF vs the Spontaneous Conception pregnancies complicated by GDM. Our results indicated a need for earlier GDM screening in the IVF vs Spontaneous Conception pregnancies. It is apparent that strict Postprandial metabolic control, which can be reached with intensive early Insulin therapy, can limit the incidence of the adverse pregnancy outcome.

PP 25

The effect of early vs late Gestational diabetes (GDM) on neonatal outcomes among obese women

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Aims/hypothesis: GDM diagnosed in the first trimester (early GDM) might be seen as a marker of increased metabolic burden possibly affecting the fetus for a longer time period compared with GDM diagnosed in the second trimester (late GDM). The aim of this study was to characterize obese women according to timing of GDM diagnosis, and to assess this in relation to neonatal outcomes.
Methods: Women at high risk for GDM over 18 years of age, planning pregnancy or pregnant at <20 weeks, with a pre-pregnancy body mass index (BMI) ≥30 kg/m^2 were divided according to the results of a 75 g two-hour oral glucose tolerance test (OGTT) performed at 13.1 weeks of gestation and repeated at 23.4 weeks if normal at first testing. Primary outcomes were offspring birth weight and large for gestational age (LGA). Secondary outcomes were Apgar scores, birth injuries, neonatal hypoglycemia, and need for intensive neonatal care.
Results: Out of a total of 361 women, 164 (45.4%) were diagnosed with GDM. Of these, 133 (81.1%) were diagnosed with early GDM and 31 (18.9%) with late GDM. The offspring of women with GDM had a higher birth weight compared with the offspring of women with normal glucose tolerance (p=0.019). No statistically significant differences in offspring birth weight or risk for LGA were seen between early and

late GDM. Instead, LGA was associated with number of previous deliveries (p<0.04) and gestational weight gain (p= 0.02). We detected no association between LGA and first trimester OGTT values.
Conclusion: No differences in neonatal outcomes were detected between early and late GDM. The exposure associated with early GDM might be counteracted by early treatment of hyperglycemia and confounded by maternal adiposity.

PP 26

BMI and physical activity during pregnancy: A cohort study in Denmark

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Introduction
Studies indicate that physical activity is preventive of pregnancy related disorders. Still, literature describing physical activity during pregnancy is sparse.
Objective
To explore physical activity among pregnant women according to their pre-pregnant BMI.
Methods
This population based cohort study included 400 singleton pregnant women at Aarhus University Hospital, Denmark (2010-2015). In each trimester, physical activity was objectively recorded using *Sensewear Armband Pro3* during four consecutive days. Measurements included daily metabolic equivalent task level (MET) and number of steps. Women with a pre-pregnant BMI <25, 25-30 and >30 were classified as normal weight, overweight and obese, respectively. We calculated means of daily MET level and number of steps. Using one-way ANOVA and Kruskal Wallis, we tested for differences in means across BMI groups.
Results
In each trimester, mean MET levels decreased with increasing BMI. Differences in mean MET levels across BMI groups were significant in all trimesters (MET p<0.000). Differences in mean steps across BMI groups were not significant in any trimesters (steps p>0.05).
Conclusion
Physical activity measured by MET, but not steps, was significantly higher among pregnant women of normal pre-pregnancy weight, during all trimesters, compared to those who were overweight or obese.

PP 27

Adherence to guidelines for screening for gestational diabetes in women who gave birth in 2016 at the IRCCS San Raffaele Hospital in Milan.

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Background. Adherence to guidelines for screening for gestational diabetes (GDM) is little known. In the period 2007-2010 in Lombardy, only 31% of pregnant women were screened (Nicotra F, Diabetes Metab 2015).
Aim. To estimate the rate of pregnancies screened for GDM in women who gave birth at the San Raffaele Hospital in Milan in the period 03.14.2016 - 07.05.2016.

Methods. During the period of study, we included 5 closed-answer questions in the Certificate of Birth Assistance (Cedap - Certificato di assistenza al parto), compulsorily compiled for each born, to identify women with pregestational diabetes (type 1 or type 2) or GDM.
Results. During the study period at the IRCCS San Raffaele we observed 599 deliveries. Nine patients were identified as having pregestational diabetes (6 type 1 and 3 type 2), equal to 1.8% of pregnant women compared to the expected 0.4%. Of the remaining 550 pregnancies, 464 (84.4%) were screened for GDM with one-step 75gr-OGTT. The 76.2% of women screened had at least one risk factor for GDM (age ≥ 35, BMI ≥ 25, first-degree relatives with diabetes, immigrant status). In women undergoing screening the prevalence of GDM was 8.8%; (95% CI: 6.4, 11.8%). Among women diagnosed with GDM by OGTT, 5.7% had no risk factor for GDM among those considered.
Conclusions. In our study we observed an increased percentage of pregnancies screened for GDM than that reported in the Lombardy region in the period 2007-2010 (31%). Although we recognize that our data may not be applicable to general population of Lombardy, this increase may have been observed for several reasons:

1. Between 2010 and 2016, GDM screening guidelines radically changed, simplifying the screening test with a single-step procedure at 24-28 weeks of pregnancy, and this may have facilitated prescription and acceptance of screening for GDM;
2. Prevalence of risk factors for GDM may be increased (older mothers, more overweight or obesity, more immigrant pregnant women);
3. Awareness of health professionals and women on the importance of screening for GDM may have risen.

Theme 4: BIOMARKERS

PP 28 *WITHDRAWN*

PP 29

Angiogenic factors and obesity in the Finnish Genetics of Pre-eclampsia Consortium (FINNPEC) Study

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While several studies have demonstrated that obesity increases the risk of pre-eclampsia (PE), the mechanisms have yet to be elucidated. We assessed the association between maternal obesity and PE and hypothesised that maternal body mass index (BMI) would be associated with an adverse angiogenic profile.
We studied 1450 pregnant women with PE and 1065 without PE in the Finnish Genetics of Pre-eclampsia (FINNPEC) study. Serum concentrations of soluble fms-like tyrosine kinase-1 (sFlt-1), soluble endoglin

(sEng), placental growth factor (PlGF) and their ratio were available from a subset at first and third trimester.
Prepregnancy BMI was higher in the PE group than in controls (mean±SD) 25.3±5.2 vs. 24.1±4,4, p<0.001, adjusted for parity, mother's age and smoking status before pregnancy).
In women with PE, a higher BMI was associated with lower sFlt-1 and sEng concentrations throughout the pregnancy (p=0.001, p=0.008, respectively). There were no differences in PlGF among PE women.
In conclusion, we confirm increased pre-pregnancy BMI as an important risk factor for PE. Furthermore, the sFlt-1 and sEng concentrations were inversely associated with maternal BMI contrary to the hypothesis that obesity would be associated with an antiangiogenic profile.

PP 30

Quantitative Proteomics-based Identification of Novel Serum Markers for First-Trimester Prediction of Gestational Diabetes Mellitus

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Background*:* Early and accurate prediction of gestational diabetes mellitus (GDM) is needed to allow timely intervention and improve perinatal outcome. Previously, we showed that prediction models for GDM in obese women based on adiponectin, several apolipoproteins and maternal age improved the discriminative power of adiponectin alone.
Aims/hypothesis: Here we hypothesize that first-trimester serum from obese women who later in pregnancy develop GDM, contains novel predictive protein signatures that add discriminative value to adiponectin.
Methods: A nested case-control study was performed on first-trimester serum, comprising 30 obese GDM cases (BMI≥27 kg/m^2) and 30 BMI matched controls. Samples were subjected to an in depth proteomics workflow including, abundant protein removal, 10-plex tandem mass tag (TMT) -labelling, and hydrophilic interaction chromatography prior to shot-gun LC-MS/MS.
Results*:* All samples were depleted of 14 abundant serum proteins using immunoaffinity chromatography. Preliminary data from 8 samples, which by now have been processed and subjected to discovery based LC-MS/MS, identified a total of 708 proteins at a 1% false discovery rate. The complete proteomics dataset will be analysed and presented.
Conclusions/interpretation: Multimarker models combining protein markers and clinical data have the potential to predict women at high risk of developing GDM.

PP 31 ***WITHDRAWN***

PP 32

predictive factors for glucose intolerance after delivery in patients with gestational diabetes

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<Aims> Women with gestational diabetes (GDM) have an increased risk of diabetes after delivery. Identifying patients who have postpartum glucose intolerance facilitates follow-up of patients with GDM. The aim of this study was to assess the clinical risk factors for postpartum glucose intolerance in patients with GDM.
<Subjects and methods> A total of 148 patients with GDM were included in this study. Of these, 30 patients were diagnosed with GDM before 20 weeks of gestation (B20w group) and 118 patients were diagnosed with GDM after 20 weeks of gestation (A20w group). An oral glucose tolerance test (OGTT) was performed on all subjects 58.0 ± 13.3 days after delivery. In each group, the association between the OGTT results after delivery and the following factors were analyzed: maternal age, pre-gestational BMI, family history of diabetes, plasma glucose levels on diagnostic OGTT for GDM, number of abnormal OGTT values, HbA1c and glycated albumin (GA) levels at the time of GDM diagnosis, serum C-peptide levels, lipid metabolism, insulin therapy during pregnancy, and pregnancy outcomes.
<Results> OGTT after delivery revealed glucose intolerance in 9 (30%) patients (IGT, 7; IFG/IGT, 2) in the B20w group and 35 (30%) patients (IFG, 2; IGT, 31; IFG/IGT, 2) in the A20w group. In the B20w group, patients with glucose intolerance had higher fasting glucose levels on OGTT, higher placental weight, and a larger number of abnormal values than patients with normal glucose tolerance. Logistic regression analysis showed that the number of abnormal values was an independent predictor for glucose intolerance in the B20w group. In the A20w group, patients with glucose intolerance had higher rates of family history of diabetes and of insulin injection therapy, higher 2-h glucose levels on OGTT, and higher GA levels than patients with normal glucose tolerance. Logistic regression analysis showed that the GA level was an independent predictor for glucose intolerance in the A20w group.
<Conclusions> Glucose intolerance after delivery may be associated with the glycated albumin level in the A20w group and the number of abnormal values on OGTT in the B20w group. The results suggest that predictors for glucose intolerance after delivery are different depending on the time of diagnosis of GDM.

Theme 5: PREGESTATIONAL DIABETES

PP 33

Birth trauma in babies born to women with and without type 1 diabetes in Sweden 1998-2012: relationship with maternal and baby weight

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We compared birth trauma rates in pregnancies among women with and without type 1 diabetes (DM1) and tested the relationship with maternal body mass index (BMI) and large for gestational age (LGA) as a risk factor. This is a population-based cohort study 1998-2012 using the Swedish Medical Birth Registry (MBR) which includes 99% of Swedish pregnancies. All pregnancies up until gestational week 41 were included. We excluded mothers with other types of diabetes, duplex pregnancies and all pregnancies ending with a caesarean section (51.1% and 16.5% in women with and without DM1 respectively). The incidence of birth trauma was adjusted for BMI, maternal age, parity, Nordic or non-Nordic origin, smoking, chronic hypertensive disease, LGA and the baby´s sex using logistic regression. This left 2,758

and 783,412 births with complete data among DM1 and control mothers respectively. The mean BMI, maternal age and gestational age at birth in full weeks was 25.6 (SD 4.5), 30.0 (SD 5.1) and 37.9 (SD 1.9) respectively among women with DM1 and 24.2 (SD 4.3), 29.7 (SD 5.1) and 38.9 (SD 1.5) respectively among controls. Preliminary results show that birth trauma rates did not vary significantly with increasing BMI compared with the reference BMI (18.50-24.9 kg/m^2) among women with DM1 (odds ratios (OR) with increasing BMI (<18.49, 25.0-29.9, 30.0-34.9, >35.0 kg/m^2) were 1.9 (95%CI 0.2-15.7), 1.0 (95%CI 0.7-1.5), 0.5 (95%CI 0.2-1.0), 1.1 (95%CI 0.5-2.4) respectively). Conversely, among controls, the OR for birth trauma increased with increasing BMI: 0.7 (95%CI 0.6-0.9), 1.4 (95%CI 1.3-1.5), 1.8 (95%CI 1.6-2.0), and 2.2 (95%CI 1.9-2.4) respectively. However, birth trauma was 3.9 (95%CI 2.7-5.7) and 7.0 (95%CI 6.5-7.5) fold more common after adjustment with LGA among women with and without DM1 respectively. We conclude that birth trauma rates are associated with LGA with comparatively greater impact among women without, than with, DM1. LGA is clearly an important outcome in its own right and a predictor of birth trauma. We hypothesise that the reduced risk of birth trauma from LGA among women with DM1 is due to increased monitoring with multiple ultrasounds to determine the fetal growth rate, along with earlier planned delivery (including earlier induction with vaginal delivery at a lower birthweight or caesarean section). While more research is needed to find better ways to reduce LGA in DM1, many of the obese control women would have undiagnosed/untreated GDM due to the Swedish criteria at the time (2 hours >=9.0mmol/l). Besides treating lower levels of hyperglycaemia during pregnancy, the frequency of growth monitoring in obese mothers to reduce their babies' risk of birth trauma due to LGA, needs to be evaluated. Life course cost effectiveness analyses would be useful.

PP 34

Risk factors for neonatal acidosis in women with type 1 diabetes

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Background and aims: Type 1 diabetes is associated with increased risk of adverse neonatal outcomes, including neonatal asphyxia. Low pH values in the umbilical artery have strong association with neonatal outcomes and have been widely adopted in clinical practice, especially in high-risk populations. The aim of this study was to identify factors associated with low arterial pH values (pH< 7.10) in infants of type 1 diabetic mothers.
Materials and methods: Clinical and laboratory data of 1069 women with type 1 diabetes and their infants from a period between 1993 and 2015 were extracted from clinical records of a tertiary care center of the Poznan University of Medical Sciences, Poland. Between 1993 and 2005 the recommended HbA1c in pregnancy was < 7.0 %, and from 2006 < 6.1%. Data of 280 women were excluded from the analysis due to: miscarriage (pregnancy loss < 22 weeks), multiple pregnancy and incomplete data. Finally, data of 789 women was included in the analysis. Based on pH values in the umbilical artery of their infants, women were divided into 2 groups: NORMAL pH- pH ≥ 7.10 and LOW pH- pH<7.10. Determinants of the LOW pH in umbilical artery were identified by logistic regression with data presented as odds ratios and 95% confidence intervals.
Results: 72 (9.1%) infants had LOW pH in the umbilical artery. LOW pH values were associated with decreased Apgar score at 1 minute (0.76 [0.70-0.82]) and 5 minute (0.77 [0.69-0.85]) after birth. Maternal age, age at diagnosis of diabetes and diabetes duration had no association with LOW umbilical artery pH. Maternal pre-pregnancy BMI, the presence of diabetic vascular complications, chronic hypertension, and gestational hypertension/preeclampsia had no impact on LOW umbilical artery pH. LOW pH values were not associated with gestational age at delivery and the degree of prematurity (late to moderate preterm 32-37 weeks, very preterm- 32-28 weeks and extremely preterm- < 28 weeks). There was association between maternal HbA1c [%] analyzed before delivery and LOW pH in the umbilical artery- 1.40 [1.11-1.78], P=0.005. Similar association was found for HbA1c analyzed between

20-24 weeks- 1.29 [1.03-1.63], P=0.026. There was no association between the first trimester HbA1c level as well as lack of preconception care and LOW pH in the umbilical artery.
There was association between urgent cesarean section (N=53) and LOW pH in the umbilical artery 1.64 [1.11-2.44], P=0.01 and this association was independent of HbA1c analyzed before delivery.
There was no association between both neonatal LGA (birthweight> 90 percentile) and SGA (birthweight < 10 percentile) and LOW pH in the umbilical artery.
Conclusion: Lack of efficient glycemic control after first trimester of pregnancy is the strongest predictor of neonatal acidosis in women with type 1 diabetes. However in the group of urgent cesarean sections for fetal distress, low umbilical artery pH values cannot be explained by maternal hyperglycemia.

PP 35

Pregnancy-specific estimated average glucose: a novel measure for assessing glucose control in pregnant women with diabetes.

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Background: Following the A1C Derived Average Glucose (ADAG) study HbA1c data is now widely reported as estimated average glucose (eAG), This aims to facilitate greater patient understanding of how glucose measurements on a daily basis are related to HbA1c, to improve glucose control. Diabetes in pregnancy is a critical situation for being able to accurately achieve and assess glucose control. However, HbA1c is considered to be unreliable for assessing glucose control during pregnancy due to physiological changes, and the ADAG analysis that this standard eAG calculation is based upon excluded pregnant women. Our aim was to critically examine the HbA1c-eAG relationship in the context of pregnancy using intensive continuous glucose monitoring (CGM) data.
Methods: CGM data from 117 pregnant women (89 with type 1 diabetes; 28 with type 2 diabetes) were analysed. Average glucose (AG) was calculated from 5-7 day CGM profiles (mean 1,275 glucose values/profile) and paired with a corresponding (±1 week) HbA1c. 688 AG-HbA1c pairs were obtained (mean 6 pairs/woman) across pregnancy. AG was the dependent variable in a regression model. Covariates were gestational week, study centre and HbA1c.
Results: There was a strong association between HbA1c and AG values in pregnancy (coefficient 0.67 [95% CI: 0.57-0.78]), i.e. a 1% (11 mmol/mol) difference in HbA1c corresponded to a 0.67 mmol/l (12.1mg/dl) difference in AG. The random effects model including gestational week as a curvilinear (quadratic) covariate fitted best, allowing calculation of a pregnancy-specific eAG, i.e. an HbA1c of 8.0% (64 mmol/mol) gave a pregnancy specific eAG of 7.4-7.7 mmol/l (133-140mg/dl) depending on gestational week, compared to a standard eAG of 10.2 mmol/l (183mg/dl). The pregnancy specific eAG associated with maintaining an HbA1c of 6% (42mmol/mol) during pregnancy was between 6.4-6.7 mmol/l (115-121 mg/dl) depending on gestational week.
Conclusions: The HbA1c-AG relationship is altered by pregnancy. Routinely generated standard eAG values do not account for this and should not be used. Pregnancy-specific eAG values are recommended for antenatal clinical care.

PP 36

The CONCEPTT-Diet Study: an analysis of diet and glycaemia in UK Women with Type 1 diabetes before and during pregnancy.

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Background: CONCEPTT is a multicentre randomised controlled trial evaluating the impact of real-time continuous glucose monitoring (RT-CGM) on maternal glycaemic control before and during pregnancy. CONCEPTT-Diet is a prospective observational study of UK participants investigating the relationship between maternal diet and glycaemia. Methods: Women with Type 1 diabetes, aged 18-40 years, **using** insulin pump therapy or multiple daily injections with baseline HbA1c 48-86 mmol/mol (6.5-10%) were eligible for the study. Participants were randomised to either RT-CGM or Home Glucose Monitoring (HGM) added to standard insulin delivery. UK participants who consented to be involved in the dietary study completed a 3-day food diary at run-in and at 24 weeks (pre-pregnant cohort) or at 34 weeks gestation (pregnant cohort). Dietary analysis was performed using validated software Dietplan 6.0. Results: There were 54 participants in the pre-pregnant cohort. Baseline mean energy intake was 1577 kcal/day, of which 42% was derived from carbohydrates (mean 175 g/day) and 41% from fat (mean 71 g/day). 49% of mean daily carbohydrate intake was from recommended sources. In the HGM group (n=30), mean daily protein consumption increased between baseline and follow-up, due to increased consumption of meat, bread and cheese. Carbohydrate intake from confectionary decreased in both HGM and CGM groups, with greater change observed in the CGM group (40% v. 25%).
In the pregnant cohort (n=44), mean daily energy intake was 1764 kcal, of which 43% was from carbohydrates (mean 204 g/day) and 40% from fat (mean 78 g/day). 49% of mean carbohydrate intake was from recommended sources. At baseline, macronutrient intake was more evenly spread throughout the day with larger snacks and smaller meals compared to the pre-pregnant cohort. No significant changes in macronutrient consumption were observed in the HGM group (n=25) between baseline and follow-up. In the CGM group (n=19), mean fat consumption decreased by 10 g/day, but baseline fat intake was high (mean 85 g/day). Carbohydrate intake from confectionary also decreased in both groups, with greater change observed in the CGM group (40% v. 30%).
Conclusions: Participants in this study demonstrate increased energy consumption from fats and a corresponding lower consumption from carbohydrates, compared to the background UK population. More than half the carbohydrates consumed are from non-recommended sources. Mean daily protein consumption increased between baseline and follow-up in the women randomised to HGM before pregnancy but not during pregnancy. Mean carbohydrate intake from confectionary decreased in all groups with greater change observed in the women receiving RT-CGM.

PP 37

Pregnancy outcome in patients with long lasting type 1 diabetes.

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Aims: The aim of our study was to examine the pregnancy outcome in relation to modified ways of treatment in last 23 years and to investigate into risk factors for perinatal complications among studied pregnant women with long lasting diabetes. Methods: Obstetrical data of the population-based cohort of 1069 consecutive type 1 diabetic patients with singleton pregnancies treated in Great Poland (west

region of Poland with 3,4 mln of people) during 1993- 2016. All patients were treated in Poznań University Hospital, the centre for diabetic pregnant women in west Poland. From the whole group we selected patients with diabetes lasting at least 15 years (N=450). The most recent childbirth of each woman was included. The three times of period were analysed in relation to the actual routine procedures in the University Hospital and acc. to standard pregnancy care for diabetes as recommended by the Polish Diabetes Association and Polish Gynecological Association: First between 1993-2000 (target blood pressure-TBP ≤140/90, antihypertensive treatment in pregnancy (AHTP) not related to stage of proteinuria, HbA1C in pregnancy <7,0%, target FG<5,0mmol/l, 1hr PP<7,8mmol/l, 2hr PP <6,7 mmol/l. Second between 2001-2005: TGB<135/85, ACE inhibitors before pregnancy, HbA1C <7,0%, AHTP if proteinuria>1,9g/24h, target FG < 5,0mmol/l, 1hrPP < 7,8mmol/l, 2hrPP <6,7 mmol/l).Third between 2006-2016 (TBP<135/85, ACE inhibitors before pregnancy, HbA1C <6,1%, AHTP if proteinuria>0,3g/24h, target FG 3,3-5,0mmol/l, PP<6,7 mmol/l). All women were on intensive insulin therapy using either multiple daily injections (MDI) or continuous subcutaneous insulin infusion (CSII) (in the third period of time).
Results: Our results have shown that in the last studied period patients get pregnant significantly later, have significantly longer diabetes, but start medical care significantly earlier. We didn't find any improvement in HbA1C level in first trimester, but in next trimesters in all groups better control (HbA1C) was observed. In the third group we observed significantly smaller number of premature deliveries. The mean neonatal weight was significantly bigger in the third period (3139±798). In all groups we observed low number of malformations (3,11%). We didn't find significant differences in patients age when DM was diagnosed, in number of overweight and obese women, number of patients with hypertension, time of gestational hypertension, as well as in HbA1c in first trimester. **Conclusions**: Our results confirm that pregnant women with long lasting diabetes thank to more efficient glycemic control, as well as intensive blood pressure and proteinuria treatment got the chance to deliver with less perinatal complications. However we still observe not sufficient glycemic control before pregnancy that is presented with no different $HbA1_c$ levels in first trimester in studied periods.

PP 38

ADVERSE OUTCOME IN PREGNANCIES WITH PREEXISTING DIABETES AND USE OF CONTINUOUS SUBCUTANOUS INSULIN INFUSION vs MULTIPLE DAILY INSULIN

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Aim: Continuous subcutaneous insulin infusion (CSII) is frequently used in pregnancies with preexisting diabetes and switch from multiple daily insulin (MDI) to CSII is often recommended for pregnancy. However, data investigating the potential advantage of CSII for glucose control and pregnancy outcome are still limited. A meta-analysis in 2016 could include only 154 pregnancies. Therefore, we analyzed the impact of mode of insulin application in our population of pregnant women with type 1.diabetes
Methods: Retrospective data collection from 206 women with type 1 DM who delivered between 2010-2016. 75 (36.4%) used (MDI) and 130 (63.1%) CSII, in 22 women CSII was started in early pregnancy.
Results: Women with MDI had similar parity (1.63 vs. 1.48 p = 0,28), maternal BMI (24.4 vs 24.5 p=0,64) and weight gain during pregnancy (15.5 vs. 16.7 kg, p=0,19) but diabetes duration was shorter (11.7 vs. 16.7 years, p <0,001) compared to CSII users.
HbA1c preconceptionally, in 1^{st}, 2^{nd} or 3^{rd} trimester was not significantly different between women with MDI or ICSII (7.2 vs 7.2% ,p=0,73; 6,7 vs 6,6% ,p=0,5; 6.1 vs. 6.2% p=0,33,; 6.2 vs. 6.1%, p=0,4) Preeclampsia occurred in 9.3% vs 12.3% (p=0,42) of the women. 18. vs 15.9% of the newborns had been born before 37 weeks of gestation (p= 0.3). Birth weight was significantly lower in MDI (3443 vs 3681 g, p= 0.01), as well as the LGA rate (32.0 vs 42.3%) but last did not reach significance. Preterm delivery,

neonatal hypoglycemia and transfer to NICU was similar. Stillbirth occurred in 3/75 (4.0%) in pregnancies with MDI and 2/130 (1.5%) with CSII.
Women with switch from MDI to CSII in early pregnancy (22) had significantly higher preconceptional HbA1c levels (7.1 vs 7.8 , p= 0.009) compared to women who used ICSII before conception (108), in 1st , 2nd or 3rd trimester both groups reached similar glucose control. Outcome data were not significantly different .
Conclusions: In our population, women with use of CSII did not achieve better glucose control compared to MDI but accelerated growth was more frequent. Women with switch to CSII in early pregnancy reached the same level of glucose control as women who used CSII before pregnancy although they had to get familiar with the technic in quite short time. From this study, there is no evidence to favorite CSII in pregnancy. For presentation at the DPSG meeting additional cases will be analyzed.

PP 39

MODY 2 in pregnancy and neonatal outcome: is it ethical not to treat hyperglycemia?

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Monogenic type 2 diabetes (MODY 2) shows mild and non-progressive fasting hyperglycemia, with small increase after glucose load; usually outside pregnancy it doesn't need any therapy. In pregnancy treatment depends on fetal genotype: if the fetus has the same mutation, higher glycemia are requested for normal insulin secretion and maternal standard treatment could lead to poor intrauterine growth. There are no data on glycemic targets suitable for a regular fetal growth. Patients and methods: We analyzed neonatal outcome, as birthweight and neonatal hypoglycemia, related to maternal glycemic profiles during pregnancy, in 3 MODY 2 affected women, one with non-affected fetus (patient A, pre-pregnancy MODY 2 diagnosis) and two with affected fetuses (patient B with MODY 2 diagnosis at 18th week of gestation and patient C with pre-pregnancy MODY 2 diagnosis). We arbitrary decided to treat only fasting BG >130 mg/dl and postprandial>160 mg/dl (when diagnosis was made). Fetal growth has been monitored through 3rd trimester US scan. Statistics: unpaired t-test for mean blood glucose values.Results: all patients had both fasting and postprandial high glycemic values, requiring insulin therapy to remain in established higher targets. Glycemic values were similar in all women, except for lower fasting in patient A and higher postprandial glycemia in 1st trimester in patient B (when she was known as type 2 diabetes). Non-affected baby showed high birth weight and neonatal hypoglycemia, while affected babies had normal birthweight (but in low percentiles). Conclusions: MODY 2 affected women develop both fasting and postprandial hyperglycemia in pregnancy, likely because the combined effect of glucokinase deficit and insulin resistance. Fetus'US scan is not accurate enough for therapeutic choises and estimates fetal weight too late. We believe that the best strategy is to analyze fetal genotype, hopefully from fetal cells in maternal blood. New glycemic targets safe for both mother and fetus are to be identified.

		Patient A	Patient B	Patient C
Fetal genotype/time of diagnosis		Normal/after birth	Mutated/18th week	Mutated/ after birth
Week of delivery		37	40	39
Birthweight (Kg-percentiles WHO 2017)		3.68 - >95°	3.2 – 10°	3.16 -25°
Neonatal hypoglycemia		YES	NO	NO
Mean fasting capillary glycemia ± DS (mg/dl)	I trim II trim III trim	110 ± 6 104 ± 6 111 ± 11	125 ± 11 117 ± 6 144 ± 11	132 ± 9 121 ±26 114 ± 35
Mean 1h post breakfast capillary glycemia ± DS (mg/dl)	I trim II trim III trim	144 ± 13 137 ± 9 140 ± 15	116 ± 24 135 ± 20 142 ± 13	148 ± 32 124 ± 42 125 ± 63
Mean 1h post lunch capillary glycemia ± DS (mg/dl)	I trim II trim III trim	156 ± 9 140 ± 24 128 ± 24	113 ± 19 140 ± 12 137 ± 26	145 ± 35 132 ± 41 131 ± 44
Mean 1h post dinner capillary glycemia ± DS (mg/dl)	I trim II trim III trim	134 ± 34 128 ± 34 128 ± 21	129 ± 23 137 ± 26 /	135 ± 32 131 ± 44 118 ± 53

PP 40

PREVALENCE AND PROGRESSION OF DIABETIC RETINOPATHY IN 499 TYPE 1 DIABETIC PREGNANCIES.

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Aims: 1) to study the prevalence of diabetic retinopathy during pregnancy in women with type 1 diabetes 2) to document the progression during pregnancy and factors associated with this progression. **Materials and Methods**: We studied a cohort of 499 type 1 diabetic pregnancies followed in the same centre from 1997 to 2015. Management followed the French guidelines. Retinal examination was performed by one ophthalmologist: each trimester in the absence of retinopathy, each month in case of retinopathy at first examination. Diabetic retinopathy was classified according to the ETDRS. Progression was defined as at least one stage of deterioration (apparition or aggravation of the retinopathy). **Results**: The mean age was 29.7±4.8 years with duration of diabetes of 13.6±8.1 years. The metabolic control was improved during pregnancy. At inclusion 69.7% of women had normal fundus photography, 23.8% a nonproliferative diabetic retinopathy (NPDR) and 6.4% a proliferative diabetic retinopathy (PDR). The progression of retinopathy occurred in 21.8% women (apparition in 24.4% and aggravation in 15.9%). The regression rate at 1 years' post-partum was 9.3%. Women who demonstrated progression had a higher preconceptional, 1st and 2nd trimester HbA1c ($p<0.05$, $p< 0.01$ and $p<0.01$) compared to the women without progression. Additionally, the drop in HbA1c was greater between preconception and first trimester ($p<0.01$), between first and third trimester ($p<0.001$), and between preconception and the lower HbA1c during pregnancy ($p<0.001$) among the women who had progression. After multivariate analysis, risk factors for retinopathy progression were duration of diabetes > 10 years ($p<0.0001$), nulliparity ($p<0.05$), and absence of retinopathy before pregnancy ($p<0.001$). **Conclusions**: This study

highlights the ongoing risk of retinopathy progression during pregnancy among women with type 1 diabetes. Our study reinforces other published works that found a progression of retinopathy associated with a more important fall in HbA1c level during pregnancy and validates the need for close follow up, especially in women with risk factors.

PP 41

Low prevalence of hypoglycaemia documented by continuous glucose monitoring during breastfeeding in women with type 1 diabetes who use carbohydrate counting – a preliminary report

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Aim: To evaluate the glucose levels over 24 hours and at night-time during breastfeeding, and to compare weight and insulin requirements before and after pregnancy in women with type 1 diabetes.
Methods: Prospective study of 13 consecutive breastfeeding women (mean 31.8 (SD ±4.0) years, 46% nulliparous) with type 1 diabetes for 22 (±8.6) years. All were experienced in carbohydrate counting. Eight women (62%) were on insulin pump. At 34 (±9.5) and 68 (±18.7) days after singleton delivery, blinded continuous glucose monitoring (CGM) was applied for six days. Thereafter insulin dose was adjusted.
Results: At 34 and 68 days after delivery glucose levels were similar over 24 hours (8.2 (±1.4) and 8.2 (±1.8) mmol/l, p=0.94) and at night-time (8.2 (±1.6) and 8.0 (±2.3) mmol/l, p=0.79). The percentage of time spent with CGM <4.0 mmol/l was similar over 24 hours (median 5.8 (range 0-12.2) and 3.4 (0-19.7), p=0.58) and at night-time (3.3 (0-12.0) and 5.4 (0-36.1), p=0.15). The number of episodes with mild hypoglycaemia in the previous week was lower at 68 than at 34 days (3 (0-10) vs. 4 (1-16)), but this did not reach statistical significance, p=0.15. Insulin dose tended to be 20% lower at 34 days than before pregnancy (0.41 (±0.14) vs. 0.53 (±0.18) IE/kg/24-h, p=0.08). Maternal weight at 34 days was close to pre-pregnancy weight (72.6 (±10.1) vs. 71.1 (±10.9) kg, p=0.54).
Conclusion: Breastfeeding women with type 1 diabetes, who use carbohydrate counting, return to pre-pregnancy weight within a month after delivery and have a low prevalence of hypoglycaemia documented by CGM.

PP 42

Awareness of pregnancy related issues and knowledge of disease in women of childbearing age with type 1 diabetes: what has changed in two decades.

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Aim. Aim of this study was to document awareness about diabetes and importance of pregnancy planning in women of childbearing age attending diabetes clinics of the IRCCS San Raffaele in Milan (Italy).
Methods. Between 29/02/2016 and 31/05/2016, we distributed a self-administered anonymous questionnaire to survey knowledge of women with type 1 diabetes about their disease and the

reproductive sphere. To document changes overtime results of this survey were compared to those obtained in 1997 using a similar questionnaire. The questionnaire was completed by 120 women (vs 85 in 1997).
Results. The mean age at diabetes onset was 13.3±8.7 years vs 18.3±10.2 years in 1997. Self-reported HbA1c levels improved to 7.4±3.1% (57±10 mmol/mol) from 8.0±1.7% (64±4 mmol/mol) in 1997. The proportion of patients attending diabetes education sessions increased to 55% from 23.5% in 1997. Of the current sample 72.6% of the women reported having received information about the importance of pregnancy planning vs. 62.2% in 1997; of the 46 pregnancies reported by our participants, 64% were not planned vs a rate of unplanned pregnancy of 66.7% (estimated on 41 pregnancies) in 1997. Eighty-five percent of women used some contraception during their lives, and 77% were using them at the time of the survey (the respective proportion were 72% and 65% in 1997).
Conclusions. Despite an overall improvement in glucose control, diabetes education, and use of contraception, the reported proportion of unplanned pregnancy remains high, with no appreciable changes from 1997, still missing a unique opportunity to improve pregnancy outcomes in women with diabetes.

PP 43

Characteristics and pregnancy outcomes of women with pre-gestational diabetes who delivered in Lombardy in 2012-2014: The SWEET BABY Study.

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Background. In Italy population-based data on outcomes of pregnancies complicated by diabetes are not available.
Aim. Aim of the study was to describe outcome of pregnancy of women with pre-gestational diabetes who delivered between 01.01.2012 and 31.12.2014 in Lombardy (10 million inhabitants, 28% of deliveries from immigrant mothers).
Methods. Data on 454 pregnancies complicated by T1DM or T2DM were retrospectively collected from 16 diabetes & pregnancy clinics.
Results. Women with T2DM (n=154, 33%) were older (36 vs 33 year), with shorter diabetes duration (3 vs 14 year), more likely to be obese (36.2% vs 7.2%), hypertensive (7.4% vs 1.5%), immigrant (57.1% vs 19.3%), less likely to plan their pregnancies (17.2% vs 45.7%), with lower HbA1c at booking (48 vs 54 mmol/mol) compared to women with T1DM (n=300). Among women with T1DM 47% were on CSII. Median HbA1c improved during pregnancy, although third trimester HbA1c was higher than second trimester HbA1c, with most women never reaching HbA1c<42mmol/mol. Women who planned their pregnancies had lower HbA1c throughout pregnancy.
Eight pregnancies resulted in stillbirth, 5 ($16.8^0/_{00}$) in women with T1DM and 3 ($19.5^0/_{00}$) in women with T2DM (reference $2.49^0/_{00}$). Two perinatal deaths were reported ($4.41^0/_{00}$, reference $3.5^0/_{00}$). None of the pregnancies ending with stillbirth or perinatal death was planned.
Conclusions. Pregnancies in women with pre-gestational diabetes bear considerable unfavorable outcomes, especially when pregnancy is unplanned. Monitoring outcomes of these pregnancies at regional level will inform healthcare professionals and women about the risks in the local setting and might identify weaknesses and strengths in care delivery.

PP 44

Portrait of women with type 1 or type 2 diabetes of childbearing age attending diabetes clinics in Italy: the AMD-annals initiative.

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Background. In Italy still only a minority of women with diabetes plan their pregnancies. Specific data on metabolic control, comorbidities and medications are rarely reported about women of childbearing age to highlight their suitability for conscious pregnancy.
Aim and Methods. We evaluated the characteristics relevant in case of an unplanned pregnancy among women with type 1 (T1DM) or type 2 (T2DM) diabetes, attending in 2011, diabetes clinics of the AMD-Annals initiative (300 clinics caring for >560,000 patients).
Results. The proportion of women with T2DM increased from 30.8% (95% CI: 29.9 to 32.4) to 67.5% (66.6 to 68.5) from age 18-30 years to age 36-45 years. Almost half of the women with T2DM were taking diabetes drugs not approved during pregnancy. The proportion of women with an HbA1c<7.0% was 20.0% (20.0 to 20.8) and 43.4% (42.8 to 43.9) for those with T1DM or T2DM, respectively. Furthermore, 46.7% (47.0 to 48.3) of women with T1DM and 33.5% (33.9 to 35.0) with T2DM had HbA1c ≥8.0%. The prevalence of obesity (BMI≥30) was 7-fold higher among women with T2DM than T1DM [7.4% (7.2 to 7.5) and 49.9% (49.4 to 50.5), respectively]. Women with T2DM were more likely to have hypertension or microalbuminuria than women with T1DM. At least one unfavorable condition for starting a pregnancy was present in 51% of women of childbearing age with T1DM and in 66.7% of those with T2DM.
Conclusions. In the setting of diabetes clinics in Italy, women of childbearing age with either T1DM or T2DM were far from the ideal medical condition for conceiving a child. Our data strongly support the need for actively counselling all women with diabetes of childbearing age about pregnancy and pregnancy planning.

PP 45

Take parity into consideration when treating pregnant women with Type 1 Diabetes

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The changing insulin resistance during pregnancy is a challenge for both patients and clinicians. The aim of the current study was to evaluate the insulin requirements in women with T1DM during pregnancy.

We conducted a retrospective cohort study consisting of women with T1DM who gave birth at Aarhus University Hospital between January 2004 and December 2014.

Data were collected on daily insulin requirements and HbA1c at every visit during pregnancy. Prepregnancy data constituted BMI, parity, age, daily insulin requirement, last known HbA1c and diabetes duration.

380 women with a total of 536 pregnancies were included in the study. The mean age was 31.1 y,prepregnancy HbA1c 59,7 mmol/L, prepregnancy BMI 25.1 and duration of diabetes 15.2 y. Parity was as follows: P0=43 %, P1=40 %, P2=14 % and P3+P4=3%.

Insulin requirements from week 11-16 decreased significantly with 4% and rose significantly from week 19 to delivery with a peak at week 33-36 at 70 % compared to pre-pregnancy insulin requirement. Insulin requirements increased with parity as the unadjusted difference between P0 and P1, P2 and P3+4 were 9, 12 and 23% (p=0.000) respectively. Adjusting for age, BMI and pre-pregnancy HbA1c emphasized the findings to 13, 21 and 34 % (p=0.000) and an additional significant difference between P1 and P3+4 at 19% (p=0.019) was found.

This large study shows that especially parity must be taken into account when treating this group of patients. Our findings could be useful in the development of a treatment algorithm for optimizing treatment of pregnant women with T1DM.

Theme 6: GDM-2

PP 46

Treatment with insulin Detemir vs NPH during pregnancy in women with gestational diabetes: comparison of glycemic control and pregnancy outcome

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Background and aims: In the literature there is only one study comparing insulin detemir (Det) versus neutral protamine Hagedorn (NPH) in women with gestational diabetes mellitus (GDM) regarding safety and efficacy. The objective of this retrospective study was to compare glycemic control, pregnancy outcome as well as fetal/neonatal outcome between treatments with insulin detemir and insulin NPH in women with GDM.
Materials and methods: A total of 192 women with GDM were included and two groups were formed. The first group comprised 98 women who received detemir and the second group comprised 94 women who received NPH. GDM was diagnosed based on IADSPG/WHO criteria. At the beginning all women were recommended to follow a specific diet and to perform self-monitored glucose measurements. Treatment with insulin was initiated based on: fasting blood glucose >95mg/dl or 1-hour postprandial glucose >130mg/dl and/or evidence of macrosomia or polyhydramnios on fetal ultrasound. All patients who needed rapid-acting insulin were excluded. Data regarding medical history, parameters of glycemic control, time and mode of delivery and neonatal outcomes were recorded.
Results: Demographics and baseline characteristics in both groups were similar: ethnicity (Greek: Det 87% vs NPH 82%), age (Det 36±4 vs NPH 37±5yrs), prepregnancy body mass index (Det 29±6 vs NPH 28±7kg/m^2), education, family history of diabetes mellitus type 2 (Det 43% vs NPH 43%), hypertension (0% in both groups), glycemic control estimated by Hemoglobin A1c (HbA1c) at diagnosis (median: Det 5.3 vs NPH 5.4%). There were no differences with respect to the week of insulin initiation (Det 27.7±7 vs NPH 27±7.5 weeks), the total insulin dose (median: Det 540 vs NPH 527 IU), the duration of insulin therapy (median: Det 53 vs NPH 56 days), the daily insulin dose/weight at the start and end of insulin treatment (median: Det 0.1 vs NPH 0.1 IU/kg and median Det 0.14 vs NPH 0.13 IU/kg respectively), as well as the number of insulin injections per day**.** Maternal overall weight gain during pregnancy (Det 10±7 vs NPH 12±9 kg), and weight gain per week since the start of insulin through to delivery (median:

Det 40 vs NPH 110g/wk) did not differ between the groups. The detemir group had slightly lower, although significant, HbA1c level at the end of gestation (median: Det 5.2 vs NPH 5.4%, p=0.035). There were no hypoglycemias or allergic reactions in both groups. Further, there were no differences regarding perinatal/neonatal outcomes: time (median: Det 38 vs NPH 38 weeks) and mode of delivery (Cesarean section: Det 62 vs NPH 48%), pre-term delivery (Det 14 vs NPH 21%), Apgar score (median: Det 9 vs NPH 9), birth weight (Det 3298±571 vs NPH 3031±589g), birth weight adjusted for gender and gestational age (Det 56th±19 vs NPH 50th±11.5 percentile), percentage of macrosomia (weight >90th percentile) (Det 5.6% vs NPH 0%) and small for gestational age (<10th percentile) (0% in both groups). **Conclusion**: Glycemic control and pregnancy outcome were equally effective in women using insulin either detemir or NPH during pregnancy.

PP 47

Management of GDM with insulin analogues: comparison treatment and pregnancy outcome from past to present.

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One of the main points in managing diabetes in pregnancy is insulin therapy; rapid analogues have long been investigated in pregnancy whereas long acting analogues have not been studied extensively. We conducted a retrospective study comparing two groups of women with GDM in two different periods, one group of 310 women treated from 2002 to 2003 (old group) and a group of 1723 women treated from 2013 to 2016 (new group) in High Risk Pregnancy Unit in Careggi University Hospital. In the new group insulin treatment started with Detemir (Det) when glycemic profile values during fasting/night were > 90. We use rapid analogue (R) when we are unable to normalize post-prandial blood glucose levels with Det or we have optimal fasting glycemic control but high postprandial values. Then we have analysed in the new group maternal characteristics and perinatal outcome in women treated with nutritional therapy (NT) alone (841) versus women treated with NT and insulin (881) and in three groups treated with different types of insulin analogues - R(91), R and Det(263), Det(498)-. We observed that 51.9% of women in the old group and 49.5% in the new group needed insulin. In the old group 85.2% of women were treated with R alone and 14.7% with R and NPH insulin instead in the new group 58.5% were treated with Det alone, 30.9% with Det and R and only 10.4% with R alone. Rate of Caucasian women, parity and BMI were significantly lower in women in the new group; we didn't find no difference in age, ponderal increase and rate of chronic hypertension. We found a lower incidence of severe maternal hypoglicemic events in new group. About perinatal outcome, we found a higher gestational age at delivery, fewer medical inductions and a better neonatal outcome in terms of Apgar index in the new group. There were no differences in mean birthweight, rate of macrosomia, LGA, SGA, preterm delivery, caesarean sections and hypertensive disorders, after correction for BMI. Inside the new group women treated with only NT have a lower BMI, less previous GDM and a markedly less affected OGTT compared with those who needed insulin with lower basal levels and lower peaks. Women in insulin therapy have a lower gestational age at delivery and a higher induction rate. No differences were found in caesarean section rate, operative delivery, rate of preterm delivery and neonatal outcomes after correction for BMI. Comparing the three groups with different therapy approaches (R, R and Det, Det) we found that women treated only with R have the lowest BMI, the lowest rate of previous GDM and the lowest basal values at the OGTT; women that required combined therapy have the highest rate of previous GDM, the highest BMI, higher basal and peaks values at the OGTT and a higher rate of patients in this group have three altered values at OGTT. About pregnancy outcome we found a higher rate of labour inductions in the group with combined therapy while there were no differences in neonatal outcomes in the three groups. Women in therapy only with Det needed a significantly lower number of shots compared with the other two groups. In conclusion we modified

the therapeutic approach to GDM preferring fasting glycemic control using only Det in almost 60% of women with fewer injections and better maternal compliance and having less maternal severe hypoglycemia and better perinatal outcomes.

PP 48

In the DALI study OGIS displays a good association with Hyperglycemia in Pregnancy in different periods of pregnancy but its association with clinical factors is poor

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Background and aims: During pregnancy, there is a characteristic decrease in insulin sensitivity (IS) that in the absence of a sufficient increase in insulin secretion leads to hyperglycemia.

We aimed to analyse different IS indices to identify the index with the best association with hyperglycemia in pregnancy (HiP) at different stages of pregnancy and the clinical factors associated with this index.

Materials and methods: 984 pregnant women participating in the DALI study for GDM prevention (BMI ≥29.0 kg/m^2 as inclusion criterion). Glucose tolerance was assessed at <20, 24-28 and 35-37 wks (IADPSG criteria). Insulin and glucose were measured at baseline, 60 and 120 min (plus 30 and 90 min in some sites). Insulin resistance (HOMA-IR) and sensitivity indices (QUICKI, OGIS and Matsuda) were calculated. Matsuda and OGIS indices were only available for 45% of OGTTs.

Multivariate logistic regression/area under the ROC curve (AU_ROC) were used to assess the association between IS and HiP. Multivariate lineal regression was used to assess the association between clinical factors and IS. Clinical factors addressed were: anthropometrics (maternal weight, height, BMI, neck circumference (NC)), age, ethnicity, socioeconomic conditions, obstetric history, impaired glucose tolerance, prior GDM, family history of diabetes, smoking habit, PCOS, heart rate (HR), site, and at 24-28 & 35-37 wks DALI intervention (healthy eating, physical activity or vitamin D). A forward method was used and significance was set at $p<0.05$.

Results: Participant characteristics: 86.2% Caucasian, age 32.3 years, pre-pregnancy BMI 33.0 Kg/m^2. At baseline 27.9% participants had HiP, 15.5% developed HiP at 24-28, and 15.2% at 35-37 wks.

In the multivariate logistic regression, the OGIS index displayed the best association with HiP in the three periods: OR=0.98 (95 CI 0.98-0.99) at <20 weeks, OR 0.98 (95 CI 0.98-0.99) at 24-28 weeks, OR=0.99 (95 CI 0.98-0.99) at 35-37 weeks. OGIS AU_ROC curves were 0.799, 0.796 and 0.731 at <20 wks, 24-28 wks and 35-37 wks respectively.

Independent maternal factors associated with OGIS at < 20 wks were: NC (-), HR (-), non-Caucasian ethnicity (-), age (-), PCOS (-) and maternal weight (+); R^2=0.23. Between 24-28 wks: were: NC (-), height (+), HR (-), and smoking (-); R^2=0.11. At 35-37 wks were: HR (-), healthy eating (-) and higher maternal education (+); R^2=0.11.

Conclusion: In women enrolled in the DALI study, the OGTT-derived IS index OGIS, displayed the best (negative) association with HiP. Clinical factors associated with OGIS differed with the pregnancy period but resting heart rate was an independent factor in the three of them.

PP 49 ***WITHDRAWN***

PP 50

Pregnancy outcomes of women with gestational diabetes based on the WHO 2013 and the NICE 2015 diagnostic criteria

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Background: Obesity and gestational diabetes mellitus (GDM) are two major risk factors for complications and are frequently associated. They play a synergistic role in maternal and neonatal outcomes. However, the respective impact of these two pathologies is poorly studied. In particular, there is little data in the literature on the role played by GDM on complications in pregnancies with class III obesity.
Objectives: we aim to analyze the impact of GDM on pregnancy complications in women with class III obesity
Material and methods: we performed a retrospective monocentric study including women with a pregestational BMI ≥ 40 kg /m2 with a single pregnancy from January 1996 to December 2014. Patients with chronic hypertension, type 1 or 2 diabetes, fetal malformation or termination of pregnancy were excluded. We compared the risks of maternal, fetal, neonatal and postpartum complications between patients with GDM and those without GDM.
Results: We included 354 patients in our study. 121 (34.2%) had GDM, 63 needed insulin treatment (52.9% of the GDM women). Patients with GDM were older (30.4 ± 5.1 vs 28.9 ± 4.8 years, p <0.05) and had more frequently a history of GDM (24.8% vs 6.1%; P <0.0001 BMI was not different between groups (43.8 ± 2.7 vs 43.5 ± 3). Patients with GDM were more often hospitalized (47.8% vs 29.8%, p = 0.001) and were more likely to have premature birth (12.5% vs. 5.2%, p = 0.01). Neonates from mothers with GDM were more frequently large for gestational age estimated 31,62% vs 19,40% for birth weight > 90° centile; p=0,01 and 25,64% vs 11,21% for birth weight > 97° centile; p<0,01 P = 0.01 and 25.64% vs. 11.21%, p <0.01), and had a higher rate of transfers to neonatal intensive unit (9.2% vs 4%, p = 0.05). There was no difference for preeclampsia, caesarean section, shoulder dystocia, neonatal hypoglycemia or postpartum complications. Outcomes were comparable in women with or without insulin therapy.
Conclusion: our study found that the rate of GDM is particularly frequent in class III obese women. Morbidly obese women with GDM were more at risk for complications and needed more often insulin therapy. Our results also suggest to pay a particular attention and to intensify the management in this high risk population.

PP 51

Evaluation of screening methods for Gestational diabetes mellitus in Sweden

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Introduction: The Swedish National Board of Health and Welfare (SNBHW) adopted the IADPSG criteria in 2015. However these criteria have not been implemented by the healthcare regions. In this cross-sectional, population-based study we evaluated the test characteristics of current screening methods in Sweden (risk factors or 2 hour OGTT) and different values of fasting blood glucose as indicators to perform an oral glucose tolerance test for diagnosing GDM. GDM is based on the IADPSG criteria (1.75 odds ratio (OR)) and HAPO data of 2.0 OR for adverse pregnancy outcomes.
Method: Between 1994-1996 all pregnant women (n= 3616) in Örebro county were offered a 75 g oral glucose tolerance test with determination of fasting capillary blood glucose and 2-hour capillary blood glucose was used to diagnose GDM. Random blood glucose was measured four to six times during

pregnancy. Data on traditional risk factors and BMI were registered during the maternal healthcare visits.
Results: 15.5% women met the IDPSG criteria (1.75 OR) based on only two values in the OGTT, and 9.0% were diagnosed if using an OR of 2.0. Current screening methods in Sweden showed 33 % and 39 % sensitivity when using the IADPSG criteria and HAPO data of 2.0 OR, respectively. A fasting cut- off value of 4.8 mmol/l when using the IADPSG criteria (1.75 OR) showed 92 % sensitivity, 95 % specificity and occurred in 19% of the patients. A fasting cut- off value of 5.1 mmol/l when using the HAPO data of 2.0 OR showed 92 % sensitivity, 98 % specificity and occurred in 10% of the patients.
Conclusion: Current screening methods for GDM screening in Sweden is poorly predictive of GDM according to the IADPSG criteria (1.75 OR) and HAPO data (2.0 OR), but fasting glucose showed good test characteristics and results in a lower rate of OGTTs.

PP 52

EFFECT OF GESTATION ON THE 2H 75G ORAL GLUCOSE TOLERANCE TEST

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BACKGROUND: The Finnish Current Care Guideline (FCCG) recommends fasting plasma glucose (PG) ≥5.3, 1h PG ≥10.0, or 2h PG ≥8.6 mmol/l in a 2h 75g oral glucose tolerance test (OGTT) as thresholds for gestational diabetes (GDM) diagnosis in both early (12-16 weeks) and late (24-28 weeks) gestation. However, data regarding appropriate thresholds for OGTT before 20 weeks' gestation is currently insufficient (McIntyre HD et al. Diabetes Care 2016;39:53–54). Furthermore, a recent large study suggests that HbA_{1c} ≥5.9% (≥41 mmol/mol) in early pregnancy may identify women at higher risk for adverse pregnancy outcomes (Hughes RC, Diabetes Care 2014;37:2953–59). **HYPOTHESIS:** We hypothesize that the pathological thresholds for post-glucose-load PG are lower in early than in late pregnancy OGTT due to lesser insulin resistance in early pregnancy. **OBJECTIVE:** To study the effect of gestation on OGTT results by performing OGTTs in early and late pregnancy in a population-based Finnish cohort. To describe the frequency of HbA_{1c} ≥5.9% (≥41 mmol/mol) in early pregnancy.
METHODS: All women booking for an early-pregnancy ultrasonography at South Karelia Central Hospital and Honkaharju Hospital, in southeastern Finland, were invited to participate during 3/2013-12/2016. 33% of all invited parturients refused and 8% were excluded (e.g. due to pre-gestational diabetes, medications, poor language skills). All participants (n=1633) gave an informed consent. HbA_{1c} was measured in 1579 participants at 9-12 weeks' gestation. Early-pregnancy HbA_{1c}≥6.5% (≥48 mmol/mol) was diagnosed as pre-gestational diabetes and appropriate treatment was initiated. 1466 participants had a 2h 75g OGTT at 12-16 weeks' gestation (OGTT1). 1207 participants had a 2h 75g OGTT at 24-28 weeks (OGTT2). PG was analyzed using a photometric hexokinase method. Statistical methods: Boostrap-type paired t-test. **RESULTS:** The frequencies of BMI (kg/m^2) <25, 25-29.9 and ≥30 were 53%, 28% and 18%, respectively, in the total cohort. At 9-12 weeks' gestation, HbA_{1c}≥5.9% was recorded in 2% (31/1579). HbA_{1c} ≥6.5% was recorded in 2 women, hence excluded due to pre-gestational diabetes. Using the FCCG thresholds, 15% (220/1466) of the participants were diagnosed with early GDM at OGTT1 and treated accordingly. At OGTT2, 13% (156/1207) of the participants had late GDM. At OGTT1, the mean (SD) fasting (n=1466), 1h (n=1454) and 2h (n=1442) values were 4.9 (0.34), 6.7 (1.74), and 5.6 (1.29) mmol/l, respectively. When only women with normal OGTT values using the FCCG criteria were included (n=958), the mean (SD) fasting, 1h and 2h values (mmol/l) were 4.8 (0.2), 6.2 (1.4), and 5.3 (1.0) at OGTT1 vs. 4.6 (0.3), 7.0 (1.4), and 5.9 (1.1) at OGTT2, p<0.001 for all comparisons. **CONCLUSIONS**: The mean fasting PG value at OGTT1 was remarkably high in our population. Using the current FCCG criteria, the GDM frequencies in both early and late gestation were also high, which could be due to high

prevalence of obesity and genetic predisposition. In patients without GDM, the mean fasting PG value was higher and post-glucose load values lower in OGTT at 12-16 weeks' gestation compared to OGTT at 24-28 weeks' gestation. Overall, the results suggest that the same diagnostic thresholds should not be used in early and late pregnancy OGTT.

PP 53

Relationship of objectively measured sleep duration to glucose control in women treated for gestational diabetes

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Background: Short (<6 hours) and long (>9 hours) sleep duration is associated with development of glucose intolerance and type 2 diabetes in non-pregnant adults, and short sleep duration has been associated with development of gestational diabetes (GDM) in pregnant women. The relationship of sleep duration to glucose control in women who have gestational diabetes has not been investigated. Our aim was to determine, in women with GDM, whether maternal night-sleep duration was associated with their glycemic control during the third trimester.
Methods: A prospective cohort study of 162 multi-ethnic women diagnosed with GDM (by 75g OGTT) at 24-28 weeks gestation. All women were treated to achieve tight capillary blood glucose targets according to NICE guidelines. A week of masked continuous glucose monitoring (CGM) was performed at 32 weeks gestation using. Sleep duration was simultaneously assessed, objectively by a wrist worn accelerometer. Functional data analysis (FDA) of the CGM data, with functional regression was performed to examine whether temporal patterns of glucose across the 24 hour day varied significantly in association with sleep duration. The directional relationship between sleep duration and glucose control was explored. The study received ethical approval and all women gave written informed consent.
Results: Sufficient CGM data was obtained from 142 women. The participant characteristics (mean ± SD) were: Age 32.7±5.1 years; BMI 30.6±6.4 kg/m2; 36% nulliparous; 46% on diet control only. The mean glucose was 6.4±1.4 mmol/l and the mean sleep duration was 7.3±1.4 hours. Using multilevel regression analysis with conventional CGM summaries, we found that longer sleep duration was associated with lower variability of glucose level represented by lower glucose standard deviation (β -0.025; p-value 0.026; 95% CI -0.003 to -0.047) and lower glucose interquartile range (β -0.049; p-value 0.017; 95% CI -0.009 to -0.058), but there was no significant relationship between sleep duration and mean glucose levels. However, exploring diurnal glucose pattern in depth using FDA we discovered a statistically significant U-shaped relationship between night-sleep duration and the following diurnal glucose level with lowest glucose levels following 7-8 hours night-sleep duration. Women with shorter night-sleep duration ran significantly higher glucose after breakfast and early evening the following day (β 0.4; 95% CI 0.1 to 0.7), while women with longer night-sleep duration ran significantly higher glucose throughout the afternoon and the evening following day (β 0.6; 95% CI 0.3 to 0.9). On the other hand, glucose level before and around bedtime was not associated with the following night-sleep duration, indicating that it is sleep influencing glucose control in our GDM population and not vice versa
Conclusions: This study suggests that maternal sleep duration in the third trimester is an important factor in achieving optimum glucose control in women with GDM. It offers the possibility that simple lifestyle interventions to maintain sleep duration at between 7-8 hours/night may be helpful in achieving tighter glucose control at this stage in pregnancy.

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Changing the certificate of delivery assistance to identify pregnancies complicated by diabetes: a pilot study

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Background. In Italy national pregnancy outcomes in women with diabetes are not available. However, these data are indeed collected on all newborns through the Certificate of Delivery Assistance (CeDAP). *Aim.* Aim of this study was to validate 5 simple closed-answer questions that added to the CeDAP would allow to identify pregnancies complicated by diabetes.
Methods. From 15/03/2016 to 31/07/2016 we added our 5 questions to the CeDAP used at our hospital. We chronologically reviewed all CeDAP and for each woman identified as having diabetes through the CeDAP (case), we identified as controls the three consecutive women without pre-pregnancy diabetes and with negative GDM screening. The validity of the answers was verified through interview with patients, and review of medical records.
Results. Among 777 women who delivered in the study period, we identified through the CeDAPs 65 women with diabetes (8 T1DM, 4 T2DM and 53 GDM). The validation process identified two false positive [2.9% (95% CI: 0.4, 10.2)] and no false negative. There was one case of diabetes misclassification (i.e., woman with T2DM classified as having T1DM) [1.6% (95% CI: 0.04, 8.2)]. The Cohen's kappa was 0.97 (95% CI: 0.935 to 0.988, $p<0.0001$), indicating very good agreement.
Conclusions. The 5 closed-answer questions added to the CeDAP correctly identified women with T1DM, T2DM or GDM. If added to the CeDAP used nationwide it would be possible to report the outcomes of pregnancies complicated by diabetes in Italy, to support health care policies to improve the outcomes of these pregnancies.

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Awards History

Jørgen Pedersen Lecture

1980 Claes Hellerström
1981 Lars Mølsted-Pedersen
1982 John Stowers
1983 Bob Schwartz
1984 Norbert Freinkel
1985 Willy Gepts
1986 Frederic Battaglia
1987 David Pyke
1988 Jørn Nerup
1989 Jessie Roth
1990 Henning Beck-Nielsen
1991 Jack Kitzmiller
1992 Bengt Persson
1993 Tom Lind
1994 Claus Kühl
1995 Boyd Metzger
1996 None (Audit Meeting, Copenhagen)
1997 David Hadden
1998 None (IADPSG meeting, Cairns, Australia)
1999 Joseph Hoet - who died shortly before the DPSG meeting; Short memorial speech for Joseph Hoet, given by Lars Mølsted-Pedersen.
2000 Eleazar Shafrir
2001 Ulf Eriksson
2002 Andre Van Assche
2003 Emilio Herrera
2004 Leona Aerts
2005 Alberto de Leiva
2006 None (Audit Meeting)
2007 Lois Jovanovic
2008 Gernot Desoye
2009 Kari Teramo
2010 Peter Damm
2011 Patrick Catalano
2012 Rosa Corcoy
2013 Moshe Hod
2014 Sylvie Hauguel-de Mouzon
2015 Elisabeth R Mathiesen
2016 None (Audit Meeting, Dublin)

Joseph Hoet Research Award

2003 Andrew Hattersley
2004 Andreas Plagemann
2005 Alexandra Kautzky-Willer
2006 None (Audit Meeting)
2007 Dorte Moller Jensen
2008 Jacob Friedman
2009 Davis Simmons
2010 Alicia Jawerbaum
2011 Helen Murphy
2012 Lene Ringholm
2013 Ursula Hiden
2014 Maria del Pilar Ramos Álvarez
2015 No presentation
2016 None (Audit Meeting, Dublin)

John Stowers Research Award

2007 Alicia Jawerbaum
2008 Mary R. Loeken
2009 Parri Wentzel
2010 Emilio Herrera
2011 Kavita Kumareswaran
2012 Thomas Bouckenooghe
2013 Andreas Ejdesjo
2014 Eleanor Scott
2015 Sine Knorr
2016 None (Audit Meeting)

Former DPSG Meetings

1	1969	Montpellier. France
2	1970	Aarhus, Denmark
3	1971	Oxford, England
4	1972	Madrid, Spain
5	1973	Bruges, Belgium
6	1974	Stockholm, Sweden
7	1975	Vienna, Austria
8	1976	Ulm, West Germany
9	1977	Copenhagen, Denmark
10	1978	Dubrovnik, Yugoslavia
11	1979	Bordeaux, France
12	1980	Como, Italy
13	1981	Liège, Belgium
14	1982	Villars, Switzerland
15	1983	Leuven, Belgium
16	1984	Belfast, Northern Ireland
17	1985	Floriana, Malta
18	1986	Catania, Italy
19	1987	East Berlin, DDR
20	1988	Athens, Greece
21	1989	Uppsala, Sweden
22	1990	Toledo, Spain
23	1991	Wexford, Ireland
24	1992	Silkeborg, Denmark
25	1993	Chalkidiki, Greece
26	1994	Chiemsee, Germany
27	1995	Visegrad, Hungary
28	1996	1st Audit Meeting, Copenhagen, Denmark
29	1997	Aberdeen, Scotland
30	1998	1st IADPSG Meeting, Cairns, Australia
31	1999	Brijuni, Croatia
32	2000	Nof Ginosar, Israel
33	2001	Oxford, England
34	2002	Balatonfüred, Hungary
35	2003	2nd IADPSG Meeting, San Salvador, Spain
36	2004	Luso, Portugal
37	2005	Mykonos, Greece
38	2006	2nd Audit Meeting, Abano, Italy
39	2007	Ibiza, Spain
40	2008	Cavtat, Croatia
41	2009	Frascati (Rome), Italy
42	2010	Warsaw, Poland
43	2011	Cambridge, England

44	2012	Lille, France
45	2013	St. Julien's, Malta
46	2014	Budapest, Hungary
47	2015	Malaga, Spain
48	2016	3rd Audit Meeting, Dublin, Ireland
49	2017	Nyborg, Denmark

Author Index

Participants in the 49th DPSG Annual Meeting

	Family Name	Name	Country
1	Alcalá	Martín	Spain
2	Alvarado	Fernanda	Guatamala
3	Anastasiou	Eleni	Greece
4	Andersen	Lise Lotte Torvin	Denmark
5	Andersen	Mette Bisgaard	Denmark
6	Benhalima	Katrien	Belgium
7	Bitterman	Olimpia	Italy
8	Bogaerts	Annick	Belgium
9	Bogdanet	Delia	Ireland
10	Caretto	Amelia	Italy
11	Carlsen	Emma Malchau	Denmark
12	Cartland	Sarah	UK
13	Catalano	Patrick	USA
14	Clarson	Cheril	Canada
15	Clausen	Tine Dalsgaard	Denmark
16	Corcoy	Rosa	Spain
17	Cunha	Nelson	Portugal
18	Dalfra	Maria Grazia	Italy
19	Damm	Peter	Denmark
20	Desoye	Gernot	Austria
21	Djelmis	Josip	Croatia
22	Dozio	Nicoletta	Italy
23	Dunne	Fidelma	Ireland
24	Egan	Aoife	Ireland
25	Eriksson	Ulf	Sweden
26	Fadl	Helena	Sweden
27	Feig	Denice	Canada
28	Festa	Camilla	Italy
29	Finn	Yvonne	Ireland
30	Fleming	Sheila	Canada
31	Francaite-Daugeliene	Migle	Lithuanin
32	Gam	Christiane Marie Bourgin Folke	Denmark
33	García-Patterson	Apolonia	Spain
34	Grunnet	Louise Groth	Denmark
35	Gundersen	Tina Djernis	Denmark
36	Gutaj	Pawel	Poland
37	Hanson	Ulf	Sweden
38	Hellgren	Paulina Arntyr	Sweden

39	Herrera	Emilio Herrera Castillón	Spain
40	Hildén	Karin	Sweden
41	Hill	David	Canada
42	Hjort	Line	Denmark
43	Holler	Monika	Austria
44	Houshmand-Øregaard	Azadeh	Denmark
45	Huvinen	Emilia	Finland
46	Immanuel	JIncy	USA
47	Iozzo	Patrizia	Speaker
48	Ivanisevic	Marina	Croatia
49	Jawerbaum	Alicia	Argentina
50	Jensen	Dorte Møller	Denmark
51	Jokelainen	Mervi	Finland
52	Josefson	Jami	USA
53	Jääskeläinen	Tiina	Finland
54	Kampmann	Ulla	Denmark
55	Kelstrup	Louise	Denmark
56	Knorr	Sine	Denmark
57	Koivusalo	Saila	Finland
58	Lapolla	Annunziata	Italy
59	Lauenborg	Jeannet	Denmark
60	Lindsay	Robert	UK
61	Loeken	Mary	USA
62	Lowe	William	USA
63	Mackin	Sharon	UK
64	MacLeod	Kim	UK
65	Maindal	Helle Terkildsen	Denmark
66	Mallén	María del Carmen Medina	Spain
67	Maresh	Michael	UK
68	Mathiesen	Elisabeth	Denmark
69	McCance	David	UK
70	McIntyre	David	Australia
71	Mecacci	Federico	Italy
72	Meek	Claire	UK
73	Mello	Giorgio	Italy
74	Metzger	Boyd	USA
75	Molinari	Chiara	Italy
76	Moses	Robert	Australia
77	Murphy	Helen	Ireland
78	Nankervis	Alison	Australia
79	Napoli	Angela	Italy
80	Naskauskiene	Gintare	Lithuania
81	Neoh	Sandra	Australia

82	Nielsen	Karoline Kragelund	Denmark
83	Nolan	Christopher	Australia
84	Nørgaard	Sidse Kjærhus	Denmark
85	Oats	Jeremy	Australia
86	Omori	Yasue	Japan
87	O'Tierney-Ginn	Perrie	Canada
88	Ovesen	Per	Denmark
89	Persson	Martina	Sweden
90	Pettersson	Miira Klemetti	Finland
91	Poston	Lucilla	UK
92	Preissl	Hubert	Speaker
93	Ramos Alvarez	M. Pilar	Spain
94	Ravnsborg	Tina	Denmark
95	Renault	Kristina Martha	Denmark
96	Ringholm	Lene	Denmark
97	Rodriguez	Gabriela Monroy	Spain
98	Rönö	Kristiina	Finland
99	Saeedi	Maryam	Sweden
100	Scavini	Marina	Italy
101	Schaefer-Graf	Ute	Germany
102	Scott	Eleanor	UK
103	Simeone	Serena	Italy
104	Simmons	David	Australia
105	Skajaa	Gitte Øskov	Denmark
106	Steven	Sarah	UK
107	Strutz	Jasmin	Austria
108	Tabák	Adam	Hungary
109	Tanvig	Mette	Denmark
110	Teramo	Kari	Finland
111	van der beek	Eline	Netherland
112	Viana	Marta	Spain
113	Vinter	Christina	Denmark
114	Wender-Ożegowska	Ewa	Poland
115	Wentzel	Parri	Sweden
116	White	Sara	UK
117	Wong	Tang	Australia
118	Yajnik	Ranjan	Speaker
119	Yamamoto	Jennifer	Canada
120	Yanagisawa	Keiko	Japan
121	Zawiejska	Agnieszka	Poland
123	Zoupas	Christos	Greece

Notes