Gestational diabetes mellitus (GDM) leads to adverse foetal and maternal outcomes, which large studies have shown can be reduced with treatment. There is debate about whether universal or risk-factor based screening is most appropriate but the International Association of Diabetes and Pregnancy Study Groups (IADPSG) recommends universal screening in populations with a high prevalence of Type 2 diabetes. The ATLANTIC Diabetes in Pregnancy (DIP) group studies GDM across the population of the Atlantic coast of Ireland. This study aimed to compare pregnancy outcomes for universal screening (US) Vs selective screening (SS) for GDM based on Irish guidelines.

During 2007-2008, US was employed and during 2009-2010 a SS approach was used, which included women on the basis of body mass index, age, family history, pregnancy history and ethnicity. Both strategies utilised 2 hour 75g Oral Glucose Tolerance Test (OGTT) using IADPSG cut off values. The population was categorised into three groups: Normal Glucose Tolerance from US (NGT - US), GDM from US (US-GDM) and GDM from SS (SS-GDM). Pregnancy outcomes according to screening strategy were compared.

During US 5286 women were screened, 557 (10.5%) were diagnosed with GDM. During SS, 562 were screened and 465 were identified as having GDM. In view of the SS criteria, SS women were older, with a greater BMI at screening (P< 0.01). However more women in SS received their diagnosis after > 28 weeks gestation (45.7% Vs 32.9 % P< 0.001). The percentages of adverse events detected were lowest in the US – NGT group, higher in the SS- GDM group and highest in the US- GDM group (Table 1). If we assume US is the gold standard and detects the population prevalence for adverse outcomes in GDM pregnancies, the results of this study show that SS potentially misses 2.1% of GDM associated pre-eclampsia, 7.3% GDM associated adverse birth outcomes and 6.9% of the GDM associated neonatal admissions.

SS does not identify all women with GDM and thus, cases of pre-eclampsia, neonatal morbidities and neonatal unit admissions are not being correctly assigned to GDM. These women and newborns miss the opportunity for timely diagnosis and appropriate evidence based interventions which may limit adverse pregnancy outcomes and influence future health of the mother and her offspring.

Table 1: Comparison of adverse outcomes in the three groups

<table>
<thead>
<tr>
<th></th>
<th>US-NGT (%)</th>
<th>SS-GDM (%)</th>
<th>US- GDM (%)</th>
<th>X² trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-eclampsia</td>
<td>180 (4.0)</td>
<td>24 (5.4)</td>
<td>41 (7.5)</td>
<td>0.00</td>
</tr>
<tr>
<td>Macrosomia</td>
<td>158 (3.4)</td>
<td>21 (4.6)</td>
<td>27 (4.9)</td>
<td>0.04</td>
</tr>
<tr>
<td>LGA</td>
<td>763 (16.3)</td>
<td>89 (19.5)</td>
<td>121 (21.8)</td>
<td>0.01</td>
</tr>
<tr>
<td>Adverse birth</td>
<td>694 (14.7)</td>
<td>112 (24.1)</td>
<td>175 (31.4)</td>
<td>0.00</td>
</tr>
<tr>
<td>NNU</td>
<td>324 (6.9)</td>
<td>70 (15.8)</td>
<td>123 (22.7)</td>
<td>0.00</td>
</tr>
</tbody>
</table>
PP 29
Trimester-Specific Reference Intervals for IFCC Standardised Haemoglobin A\textsubscript{1c}: New Criterion to diagnose Gestational Diabetes Mellitus (GDM)?

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We established trimester-specific reference intervals for IFCC standardised HbA\textsubscript{1c} in 311 non-diabetic Caucasian pregnant women (n=246) and non-pregnant women (n=65). A selective screening strategy based on risk factors for gestational diabetes was employed. Pregnancy trimester was defined as trimester 1 (T1, n=40) up to 12 weeks + 6 days, trimester 2 (T2, n=106) 13 to 27 weeks + 6 days, trimester 3 (T3, n=100) >28 weeks to delivery. The normal HbA\textsubscript{1c} reference interval for Caucasian non-pregnant women was 29-37 mmol/mol (DCCT: 4.8-5.5%), T1: 24-36 mmol/mol (DCCT: 4.3-5.4%), T2: 25-35 mmol/mol (DCCT: 4.4-5.4%), and T3: 28-39 mmol/mol (DCCT: 4.7-5.7%). HbA\textsubscript{1c} was significantly decreased in trimesters 1 (P <0.01) and 2 (P <0.001) compared to non-pregnant women. Retrospective application of selective screening to Caucasian women of the Atlantic DIP cohort determined that 5208 met the criteria. 945 of those women (18.1%) were diagnosed with Gestational Diabetes Mellitus (GDM) using the International Association of Diabetes and Pregnancy Study Groups (IADPSG) glucose concentration thresholds. HbA\textsubscript{1c} measurement within 2 weeks of the diagnostic Oral Glucose Tolerance Test (OGTT) was available in 622 of 945 (66%). Applying the decision threshold for T2: HbA\textsubscript{1c} >35 mmol/mol (DCCT >5.4%) identified 287 of 622 (46%) of those with GDM. HbA\textsubscript{1c} measurement in T2 (13 to 27 weeks) should be included in the diagnostic armamentarium for GDM. This would reduce the need for diagnostic OGTT in a significant number of women.

PP 30
How many women with Gestational Diabetes Mellitus are missed if selective screening strategies are used?

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The number of women with Gestational Diabetes Mellitus (GDM) is increasing in parallel with the increase in the prevalence of obesity worldwide. There is controversy over whether universal or selective screening strategies should be undertaken. The aim of this retrospective study was to establish the number of women proven to have GDM on a universal screening programme that would otherwise have been missed using selective ‘risk-factor’ based screening and applying either of the American (ADA) European (NICE) or Irish guidelines.

The ATLANTIC Diabetes in Pregnancy (DIP) programme offered universal screening for GDM to pregnant women in Ireland whose last menstrual period was between September 2006 and March 2009. 5,500 women consented and underwent a 75g Oral Glucose Tolerance Test at 24-28 weeks of gestation. The diagnosis of GDM was defined using the WHO criteria. Subsequently the dataset was re-analysed according to the International Association of Diabetes in Pregnancy Study Group [IADPSG] criteria. This dataset was used in the present study and selective screening risk factors were applied using the American Diabetes Association (ADA), National Institute for Health and Clinical Excellence (NICE) and Irish guidelines. The number of risk factors were computed for each participant using the three different guidelines. ADA guidelines: Family History of Diabetes, BMI≥25, BP≥140/90, and High risk ethnicity. NICE
guidelines: Family History of Diabetes, BMI>30, and High risk ethnicity. Irish guidelines: Family History of Diabetes, BMI≥30, Age≥40 and High risk ethnicity. The three guidelines provide a list of risk factors however not all the risk factors were included in this study due to lack of information. Out of the 5,500 women who consented to take part in the Atlantic DIP universal screening study, 681 (12%) were diagnosed with GDM according to IADPSG criteria. 101 (16%) women diagnosed with GDM by universal screening had zero risk factors. If a selective screening strategy using Irish guidelines was used these women would have been missed. If a selective screening using the NICE guidelines was used 120 (20%) of women would be missed. Only 33(5%) women would be missed if using the ADA guidelines.

In conclusion Selective screening based on risk factors misses cases of GDM. Selective screening using 2012 ADA criteria misses fewer women (5%) with GDM. Our results agree with the recommendations of the ADA clinical practice guidelines 2012 that “All women not known to have prior diabetes should undergo a 75g OGTT at 24 to 28 weeks of gestation”. If universal screening is not economically possible we should select women based on ADA 2012 selective criteria which includes women with a BMI>=25.

PP 31

The relevance of the IADPSG diagnostic criteria in a Mediterranean population

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2 Department of Medicine, University of Malta Medical School, Malta;
3 Faculty of Medicine Xavier BICHAT, University Paris VII, Paris, France;
4 Diabetes Center, National University of Athens, Athens, Greece

The IADPSG diagnostic cut-off criteria will significantly increase the number of cases of diagnosed GDM in any population. This will have significant cost consequences possibly directed towards individuals who are exhibiting normal physiological changes of pregnancy. The relevance of the increased cost in those women who are labeled GDM by the IADPSG criteria but normal by the ADA criteria needs to be assessed.

Method: A prospective, non-interventional, eleven-center study from around the Mediterranean recruited a total of 1368 women who underwent a 75g oGTT at 24-32 weeks of gestation. These were divided into three groups: A. women diagnosed as suffering from GDM using the ADA criteria [n=119]; B. women diagnosed as GDM using IADPSG criteria but considered normal by the ADA criteria [n=245]; and C. women diagnosed as having normal GT using the IADPSG criteria [n=1004].

Results: The Group B women were found to have statistically significant different glycemic profiles to both Group A and Group C women in regards to fasting, 1-hour and 2-hours blood glucose values, AUC, fasting insulin and HOMA-IR. In addition, Group B women had a statistically higher mean age [A=32.0 vs B=31.2 vs C=29.6 years], pre-pregnancy and third trimester BMI [26.8 vs 25.6 vs 24.2 and 30.5 vs 29.5 vs 27.6 kg/m² respectively], and blood pressure readings [diastolic: 71.7 vs 69.1 vs 65.8 mmHg] than those with defined normal glycaemic indices [Group C]. Their characteristics showed lower values than the ADA-defined GDM women [Group A]. The infants born at term showed a non-statistically significant tendency to mean high birth weights than infants born to Group C women, but lower weight than ADA-defined GDM women [3348.1 vs 3352.2 vs 3293.1 gm]. 26.1% of the ADA-defined GDM women received insulin.

Conclusions: The study confirms that the women who are labeled abnormal by IADPSG but normal by ADA criteria do have high risk factor characteristics. Directing specific management, even if simply dietary advice, is a sound option.
The debate regarding the utility of universal screening for diagnosis of gestational diabetes (GDM) is real and continues to generate lively discussion, especially regarding expenditure of health resources. In Italy, universal GDM screening was based on Carpenter and Coustan’s criteria till March 2010, when the International Association of Diabetes and Pregnancy Study Groups (IADPSG) recommendations were adopted leading to an immediate increase in GDM diagnosis. This increase has generated some alarm and in September 2011 the Italian Public Health Ministry recommended GDM screening only for women with risk factors. The aim of the present study was to compare GDM prevalence calculated according to different diagnostic procedures in the Italian population. We compared two groups of Caucasian pregnant women from the Tuscany region who have been screened for GDM according to different diagnostic criteria. Group A consisted of 3950 women undergoing universal screening based on Carpenter and Coustan’s criteria during the years 2001-2003. Group B included 2274 women undergoing universal screening according to the IADPSG criteria in the years 2010-2011. The two groups were comparable for clinical and anthropometric features. Finally we have retrospectively re-evaluated GDM prevalence applying the IADPSG criteria only on Group B women deemed at GDM risk because of personal history of GDM; pre-pregnancy BMI ≥25 Kg/m²; fasting plasma glucose at the first visit 100-125 mg/dl; age ≥35 years; previous macrosomia; family history of diabetes. Results are reported in the following table:

<table>
<thead>
<tr>
<th>Type of screening</th>
<th>Universal Screening 2001-2003</th>
<th>Universal Screening 2010-2011</th>
<th>Selective Screening 2010-2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>3950</td>
<td>2274</td>
<td>2274</td>
</tr>
<tr>
<td>Gestational diabetes %</td>
<td>8.7%</td>
<td>18.9%</td>
<td>17.2%</td>
</tr>
<tr>
<td>Impaired glucose tolerance</td>
<td>6.7%</td>
<td>not provided</td>
<td></td>
</tr>
</tbody>
</table>

When compared to historic prevalence, the use of the IADPSG criteria resulted in a significant increase of the prevalence of GDM from 8.7% to 18.9%. Moreover, applying the selective screening only 17% of women previously screened were excluded and the prevalence of GDM, although lower respect to IADPSG criteria remain significantly higher compared to that estimated by old criteria. In conclusion, we found large variations in GDM prevalence using various diagnostic criteria. The adoption of selective screening, in order to contain costs for Public Health System, are doubtful and require further examination. The debate continues!
PP 33
Oral glucose tolerance test during pregnancy in women with gestational diabetes: predictive capacity of large for gestational age and maternal post partum glucose tolerance
Monroy Rodríguez G, Tundidor Rangel D, Orellana Casado I, García-Patterson A, Adelantado Pérez JM, Corcoy R
Department of Endocrinology and Nutrition, Hospital Sant Pau, Barcelona, Spain.

Background: The oral glucose tolerance test (OGTT) used to diagnose gestational diabetes mellitus (GDM) is itself a predictor of large-for-gestational-age (LGA) newborns and abnormal maternal glucose tolerance after delivery. Recently, in an obstetric population representing the full spectrum of antepartum glucose tolerance, it has been reported that while fasting blood glucose was the best glycemetic predictor of LGA, postload glucose concentrations were better at predicting abnormal glucose tolerance after delivery. We aimed to evaluate the predictive ability for both outcomes of glucose concentrations in antepartum OGTT (fasting, 1hr, 2hr, 3hr), in women with GDM.

Methods: Retrospective analysis, questioning the database of the Endocrine Diseases and Pregnancy Clinic of the center. GDM is diagnosed with a two step approach (universal screening with a 50g oral glucose load, cut-off for positivity 7.8 mmol/l, 100g glucose, 3h OGTT for diagnosis confirmation using NDDG criteria). After delivery, reevaluation is performed with 75 g glucose 2h OGTT, 1997 International Expert Committee criteria. Selection criteria: 1) singleton pregnancies 2) delivery between 1/1/1986 to 12/31/2008, and information on 3) gestational age at delivery and newborn weight and sex, 4) diagnostic OGTT and reevaluation within 3-18 months after delivery and 5) additional potential predictors.

Results: Data on 1238 pregnancies with GDM were included. The best LGA predictor was a macrosomic newborn in a former pregnancy while none of the glycemic values at the diagnostic OGTT reached significance. As to abnormal glucose tolerance after delivery, the four glycemic values at the diagnostic OGTT were significant predictors, the highest OR corresponding to fasting blood glucose (OR 1.93, 95% CI 1.548 to 2.409, P < 0.000). In addition, fasting glucose also had the highest area under the ROC curve (0.643). We conclude that in a population of women with GDM, glycemic values at the diagnostic OGTT are good predictors of postpartum abnormal glucose tolerance but not of LGA.

PP 34
Maternal characteristics and outcome pregnancies of women with gestational diabetes diagnosed before 24 SA
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2 Department of Endocrinology and Diabetes, Huriez Hospital, CHRU Lille
3 Department of Statistics, CHRU Lille,
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5 Department of Paediatrics, CHRU Lille.

Aim: New guidelines have been proposed in France in 2010 after the publication of the new criteria IADPSG for the diagnosis of gestational diabetes mellitus (GDM). It has been recommended to follow the IADPSG criteria’s. The aim of this study was to evaluate maternal characteristics and outcomes of women with GDM diagnosed before 24 weeks of gestation compared to those diagnosed after 24 weeks.
Material and methods: We performed a prospective study during 6 months (01/02/2011 to 31/07/2011) in our centre. The diagnosis of GDM was determined according to the new IADPS criteria. The women with GDM were treated by diet and/or insulin therapy. We have analysed the screening modalities, the maternal characteristics and adverse outcomes in a cohort of 171 women with GDM.

Results: Among the 171 GDM, 41 (23.9%) were diagnosed before 24 weeks (group 1). In this group, 92.7% of women have had only a fasting glycemia and 7.3% have had an OGTT. In the group of women diagnosed after 24 weeks (group 2), 91.5 % of women have had an OGTT and only 8.5% a fasting glycemia. The women with GDM in the group 1 compared to those in the group 2 had the same age, had a higher pre gestational BMI (30.4 kg/m² vs 25.7 kg/m² p=0.0107), had more frequently a GDM history (39% vs 17%, p=0.003). There was no significantly difference of the familial history of diabetes between the two groups. The weight gain was less in the women in the group 1 compared to those in the group 2 (6.2 kg vs 9.4 kg, p=0.0079). HbA1c was not significantly different between the 2 groups (5.51 ±0.4% vs 5.54±0.39). There was no difference of the birth weight or the rate of caesarean section. The rate of transfer in neonatal unit was significantly higher in the group 1 compared to the group 2 (13.8% vs 3.2%, p<0.05).

Conclusion: This study confirms that the maternal characteristics are different in women with GDM diagnosed before 24 weeks compared to those diagnosed after 24 weeks. The care of the women with GDM diagnosed at the first prenatal visit is associated with a reduction of weight gain.

PP 35
Efficacy of a risk score compared to guidelines in the selection of pregnant women for the evaluation of gestational diabetes (DGM)
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2Diabetes Day Service, Pescara Town Hospital
3Catholic University of Campobasso (Italy).

Although a solid consensus exists today about how to diagnose GDM (75gr OGTT), much less agreement exists about which pregnant women to test, with the Guidelines for Physiological Pregnancy (PP) and the Italian SID-AMD 2010 Guidelines (SGL) offering slightly different interpretation of the risk profile. Aim of our study was to individuate a risk score for GDM which could be helpful in determining which pregnant women to screen by the OGTT test, and to compare it with the selection criteria proposed so far by the PP and the SGL guidelines. 1130 pregnant women tested by an 100gr OGTT at 24-28 gestational weeks (gw) were reclassified according to the new 75gr OGTT parameters which resulted in 438 GDM and 692 NGT.

The association between GDM and age, nationality, number of children and abortions, pregestational BMI, weekly weight gain (WG), family history of diabetes, previous GDM/IGGT, fasting glycaemia, previous diagnosis of Polycystic Ovary (PCO) and smoking was then tested by multivariate logistic analysis with subsequent assignment of a number for score calculation (see table). The obtained score showed an excellent predictive value (ROC curve = 0.78, Hosmer-Lemeshow p <0.0001) with a sensitivity of 81% (intermediate between PP = 59% and SGL = 99%) and a specificity of 70%, close to PP (75%) and much higher than SGL (3%).

This model was then validated on an independent database of 176 women evaluated with 75gr OGTT, obtaining a ROC curve = 0.82, Hosmer-Lemeshow p <0.0001 and a prevalence of GDM in tertiles as in the figure.
These data demonstrate a risk score for the development of GDM, with sensitivity and specificity greater than both PP and SGL criteria, that could be easily calculated from readily obtainable clinical parameters and used to establish who to screen for GDM.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y)</td>
<td>0.6age</td>
</tr>
<tr>
<td>FCO (yes/no)</td>
<td>ye=7</td>
</tr>
<tr>
<td>Fagrernatal BMI</td>
<td>0.4BMI</td>
</tr>
<tr>
<td>Weekly weight gain (every 100 g)</td>
<td>9/XGO</td>
</tr>
<tr>
<td>Family history of diabetes - 1st degree (yes/no)</td>
<td>ye=4</td>
</tr>
<tr>
<td>Previous GDM/GGT (yes/no)</td>
<td>ye=10</td>
</tr>
<tr>
<td>Previous pregnancy (abortion) (yes/no)</td>
<td>ye=5</td>
</tr>
<tr>
<td>Non-Italian nationality (yes/no)</td>
<td>ye=12</td>
</tr>
<tr>
<td>Fasting hyperglycaemia (FPG) (GTG (mg/dL))</td>
<td>1/FPG</td>
</tr>
</tbody>
</table>

PP 36

Review of pregnancy outcomes in women with gestational diabetes compared to those with mild fasting hyperglycaemia at St Mary’s Hospital, Manchester.

Morgan L, Maresh M and Myers JE
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Gestational diabetes (GDM) complicates 5% of pregnancies and is associated with significant obstetric and neonatal complications; particularly macrosomia and birth injuries. The new IADPSG definition for GDM sets a fasting blood glucose of 5.1mmol/L and two hour of 8.5mmol/L following a 75g oral glucose tolerance test, however this diagnostic threshold would triple the number of women diagnosed with GDM in our hospital per year. We sought to compare outcomes in women with IADPSG defined GDM compared to women diagnosed with GDM using local guidelines (fasting 6.0 mmol/L, two hour 8.5mmol/L).

All GTT results over a one-year period (Feb 2010-Jan 2011) at St Mary’s Hospital, Manchester were reviewed. Women were categorised as either “GDM” or “fasting hyperglycaemia” (FH) if they met the IADSPG fasting criteria.

The study group included 122 women with GDM and 105 women with FH. Ethnicity (28.7% vs 30.5% Caucasian; 31.9% vs 38.1% South Asian; 18.2% vs 18.7% Afro Caribbean) age, BMI and parity were similar between the groups, whilst a history of GDM was more common in the GDM group (9.0 vs 2.9%). Induced labour was more common in women with GDM (47.9% vs 18.4%, p<0.01) but frequency of caesarean section was not different (27.4% vs 24.5%). 16.1% of women with GDM delivered an infant >95th centile (using customised centiles) compared to 14.8% in the FH group. There were also a comparable number of shoulder dystocias (3% each group) and birth injuries (1% vs 2%) in each group.

Women with isolated mild fasting hyperglycaemia (5.1-5.9 mmol/L) have similar pregnancy outcomes to women with treated GDM. In line with HAPO, this data suggests that women with mild fasting hyperglycaemia could benefit from intervention in the antenatal period. Uncertainty regarding the most appropriate intervention for this group justifies further research.