Resting Heart Rate and The Risk Of Developing Impaired Fasting Glucose and Diabetes: The Kailuan Prospective Study

Liang Wang et al. Int. J. Epidemiol. (2015); doi: 10.1093/ije/dyv079. First published online: May 22, 2015.

The prospective analysis included 73 357 participants of the Kailuan cohort (57 719 men and 15 638 women). Resting heart rate was measured via electrocardiogram in 2006. Incident diabetes was defined as either the fasting blood glucose (FBG) ≥ 7.0 mmol/l or new active use of diabetes medications during the 4-year follow-up period. IFG was defined as a FBG between 5.6 and 6.9 mmol/l. A meta-analysis including seven published prospective studies focused on heart rate and diabetes risk, and our current study was then conducted using random-effects models.

During 4 years of follow-up, 17 463 incident IFG cases and 4 649 incident diabetes cases were identified. The corresponding adjusted hazard ratios (HRs) for each 10 beats/min increase in heart rate were 1.23 (95% confidence interval (CI): 1.19, 1.27) for incident diabetes, 1.11 (95% CI: 1.09, 1.13) for incident IFG and 1.13 (95% CI: 1.08, 1.17) for IFG to diabetes conversion. The risks of incident IFG and diabetes were significantly higher among participants aged < 50 years than those aged ≥ 50 years (P-interaction < 0.02 for both). A meta-analysis confirmed the positive association between resting heart rate and diabetes risk (pooled HR for the highest vs lowest heart rate quintile = 1.59, 95% CI:1.27, 2.00; n = 8).

Editor's Comment

This is a unique study correlating heart rate with development of dysglycaemia. Faster resting heart rate is associated with higher risk of developing IFG and diabetes, suggesting that heart rate could be used to identify individuals with a higher future risk of diabetes.

GLP-1 Analogue Liraglutide Promotes Weight Loss

N. Engl. J. Med 2015 Jul 02;373(1)11-22, Pi-Sunyer et al.

Obesity is a chronic disease with serious health consequences, but weight loss is difficult to maintain through lifestyle intervention alone. Liraglutide, a glucagon-like peptide-1 analogue, has been shown to have potential benefit for weight management at a once-daily dose of 3.0 mg, injected subcutaneously.

Pi-Sunyer et al. conducted a 56-week, double-blind trial involving 3731 patients who did not have type 2 diabetes and who had a body-mass index (BMI; the weight in kilograms divided by the square of the height in meters) of at least 30 or a BMI of at least 27 if they had treated or untreated dyslipidemia or hypertension. Patients were randomly assigned in a 2:1 ratio to receive once-daily subcutaneous injections of liraglutide at a dose of 3.0 mg (2487 patients) or placebo (1244 patients); both groups received counseling on lifestyle modification. The co-primary end points were the change in body weight and the proportions of patients losing at least 5% and more than 10% of their initial body weight.

At baseline, the mean (±SD) age of the patients was 45.1±12.0 years, the mean weight was 106.2±21.4 kg, and the

mean BMI was 38.3±6.4; a total of 78.5% of the patients were women and 61.2% had prediabetes. At week 56, patients in the liraglutide group had lost a mean of 8.4±7.3 kg of body weight, and those in the placebo group had lost a mean of 2.8±6.5 kg (a difference of −5.6 kg; 95% confidence interval, −6.0 to −5.1; P<0.001, with last-observation-carried-forward imputation). A total of 63.2% of the patients in the liraglutide group as compared with 27.1% in the placebo group lost at least 5% of their body weight (P<0.001), and 33.1% and 10.6%, respectively, lost more than 10% of their body weight (P<0.001). The most frequently reported adverse events with liraglutide were mild or moderate nausea and diarrhea. Serious events occurred in 6.2% of the patients in the liraglutide group and in 5.0% of the patients in the placebo group.

Editor's Comment

In this trial non-diabetic obese patients received lifestyle counseling and either GLP-1 analogue liraglutide or a placebo. After 56 weeks, the control group showed a mean weight loss of 2.8 kg compared with 8.4 kg for the liraglutide group. A greater proportion of the liraglutide group lost 5% of their body weight than the control group (63.2% vs 27.1%, respectively).

When combined with changes in diet and exercise, liraglutide is associated with a significant decrease in body weight. In this study, 3.0 mg of liraglutide, as an adjunct to diet and exercise, was associated with reduced body weight and improved metabolic control.

Heart Failure Risk in Type 2 Diabetics on Oral Glucose-Lowering Medications

Eur Heart J; 2015 Jun 25; EPub Ahead of Print; GP Fadini et al.

Oral glucose-lowering medications are associated with excess risk of heart failure (HF) but there is no comparative data among drug classes. Fadini G P et al. performed a retrospective study in 32 Health Services of 16 Italian regions accounting for a population of 18 million individuals, to assess the association between HF risk and use of sulphonylureas, DPP-4i, and glitazones.

Data were extracted on patients with type 2 diabetes who initiated treatment with DPP-4i, thiazolidinediones, or sulphonylureas alone or in combination with metformin during an accrual time of 2 years. The endpoint was hospitalization for HF (HHF) occurring after the first 6 months of therapy, and the observation was extended for up to 4 years. A total of 127 555 patients were included, of whom 14.3% were on DPP-4i, 72.5% on sulphonylurea, 13.2% on thiazolidinediones, with average 70.7% being on metformin as combination therapy. Patients in the three groups differed significantly for baseline characteristics: age, sex, Charlson index, concurrent medications, and previous cardiovascular events. During an average 2.6-year follow-up, after adjusting for measured confounders, use of DPP-4i was associated with a reduced risk of HHF compared with sulphonylureas [hazard ratio (HR) 0.78; 95% confidence interval (CI) 0.62-0.97; P = 0.026]. After propensity matching, the analysis was restricted to 39 465 patients, and the use of DPP-4i was still associated with a lower risk of HHF (HR 0.70; 95% CI 0.52-0.94; P = 0.018).

Editor's Comment

The authors of this retrospective study compared several classes of oral glucose-lowering medications in terms of increased risk of heart failure. A total of 127,555 type 2 diabetic patients on DPP-4 inhibitors, sulfonylureas, or thiazolidinediones with or without metformin were included. In this very large observational study, the use of DPP-4i was associated with a reduced risk of HHF when compared with sulphonylureas.

Effect of Diet and Exercise on Incidence of Gestational Diabetes Mellitus

D Simmons et al. Diabetes Care 2015 Jun 25; EPub Ahead of Print.

D Simmons et al. compared the impact of three lifestyle interventions (healthy eating [HE], physical activity [PA], and both HE and PA [HE+PA]) on GDM risk in a pilot multicenter randomized trial. Pregnant women at risk for GDM (BMI ≥29 kg/m(2)) from nine European countries were invited to undertake a 75-g oral glucose tolerance test before 20 weeks gestation. Those without GDM were randomized to HE, PA, or HE+PA. Women received five face-to-face and four optional telephone coaching sessions, based on the principles of motivational interviewing. A gestational weight gain (GWG) <5 kg was targeted. Coaches received standardized training and an intervention toolkit. Primary outcome measures were GWG, fasting glucose, and insulin sensitivity (HOMA) at 35-37 weeks.

Among the 150 trial participants, 32% developed GDM by 35-37 weeks and 20% achieved GWG <5 kg. HE women had less GWG (-2.6 kg [95% CI -4.9, -0.2]; P = 0.03) and lower fasting glucose (-0.3 mmol/L [-0.4, -0.1]; P = 0.01) than those in the PA group at 24-28 weeks. HOMA was comparable. No significant differences between HE+PA and the other groups were observed.

Editor's Comment

In this study,pregnant women at risk for gestational diabetes mellitus (GDM), but who were currently negative for GDM by oral glucose tolerance test were divided into 3 groups: healthy eating (HE), physical activity (PA), or healthy eating and physical activity (HE+PA). At 24 to 28 weeks gestation women in the HE group had gained 2.6 kg less than women in the PA group. Women in the HE group also had lower fasting glucose than did women in the PA group.

Interventions focused on the importance of healthy eating may help reduce the rate of gestational diabetes mellitus among pregnant women who are at risk. An antenatal HE intervention is associated with less GWG and lower fasting glucose compared with PA alone. These findings require confirmation by a larger trial, but support the use of early HE interventions in obese pregnant women.

Gestational Diabetes Mellitus Is a Significant Risk Factor for Long-Term Maternal Renal Disease

Ofer Beharier et al. The Journal of Clinical Endocrinology & Metabolism, Volume 100, Issue 4. Published Online: February 10, 2015.

Editor's Comment

Gestational diabetes mellitus (GDM) is an independent risk factor for recurrent long-term type 2 diabetes mellitus, cardiovascular morbidity, and vascular endothelial dysfunction. But development of renal complications are not yet established.

This study followed 9542 GDM cases for 11.2 years and have shown a significant dose-response association between the number of pregnancies with GDM and future risk for renal morbidity. GDM is a significant risk factor for future maternal renal morbidity and the risk is more substantial for patients with recurrent episodes of GDM.

The purpose of this study was to investigate whether GDM poses a risk for subsequent long-term maternal renal morbidity. This is a population-based non-interventional study comparing the incidence of future renal morbidity in a cohort of women with and without previous GDM. Deliveries occurred during a 25-year period, with a mean follow-up duration of 11.2 years. The study population was composed of all singleton pregnancies in women who delivered

between January 1988 and December 2013.The main outcome was diagnosis of renal morbidities.

Of 97968 women who met the inclusion criteria, 9542 (9.7%) had at least 1 previous pregnancy with GDM. Using a Kaplan-Meier survival curve, the researchers show that women with GDM had higher rates of total renal morbidity (0.1% vs 0.2%, for no GDM and with GDM, respectively; odds ratio, 2.3, 95% confidence interval, 1.4–3.7; $P < .001$). In addition, it was found that a significant dose-response association (using the χ^2 test for trends) between the number of pregnancies with GDM and future risk for renal morbidity (0.1%, 0.2%, and 0.4% for no GDM, 1 episode of GDM, and 2 episodes of GDM, respectively; $P < .001$). In a Cox proportional hazards model, adjusted for confounders, GDM was independently associated with future renal morbidity.

Editor's Comment

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Effects of Sulfonylureas on Lipids in Type 2 Diabetes Mellitus: A Meta-Analysis of Randomized Controlled Trials

Yue-hong Chen et al. Journal of Evidence Based Medicine. DOI: 10.1111/jebm.12157.

Yue-hong Chen et al. conducted a meta-analysis of randomized controlled trials (RCTs) to assess the effects of Sulfonylureas (Sus) on the level of lipids in patients with type 2 diabetes mellitus (T2DM). A total of 59 RCTs were included, of which 52 were included for final meta-analysis. The results suggested that SUs statistically increased the levels of FFA (SMD = 0.24, 95%CI 0.06 to 0.42) and TG (MD = 0.06, 95%CI 0.02 to 0.10), but decreased HDL-C (MD = -0.07, 95%CI -0.11 to -0.04) and LDL-C (MD = -0.11, 95%CI -0.17 to -0.04); but the SUs had no effect on TC (MD = 0.01, 95%CI -0.05 to 0.08), ApoA1 (MD = 0.01, 95%CI -0.03 to 0.04), and Apo B (MD = -0.01, 95%CI -0.05 to 0.03). When compared to metformin, SUs could increase TC and LDL-C; compared to glinides, SUs increased TC and lowered HDL-C; compared to thiazolidinediones, SUs reduced TC, LDL-C, HDL-C, and increase TG.

Editor's Comment

Previous studies suggested that dyslipidemia was potentially associated with anti-diabetic medications of sulfonylureas (SUs). The results were, however, inconsistent. The present study shows that SUs have a small effect on lipids, although they may statistically increase the level of FFA and TG, and decrease LDL-C and HDL-C.

Mechanisms of Acute Dysglycemic Brain Function in T1D

O'Connell MA et al. Abstract 379-OR: Presented at: American Diabetes Association (ADA) 75th Scientific Sessions; June 5-9, 2015; Boston.

Despite these advances, however, the specific neurobiological mechanisms that may underlie these changes are not well understood. In particular, the longitudinal studies documenting these effects show that these changes are acquired over

time, and the effects are cumulative, making it difficult to disentangle the potential causative neural insults. Further, although studies have illustrated significant differences in brain function during abnormal glycemia in adults, limited data exist in the pediatric population.

Using functional MRI (fMRI), which allows for noninvasive assessments of brain function, O'Connell and colleagues were able to examine in greater detail what occurs in the brains of young patients with type 1 diabetes during glycemic extremes.

They conducted a prospective study of 20 adolescents with type 1 diabetes (median age, 16.4 years). Median duration of diabetes was 7.7 years, and median HbA1c was 6.9%. Standard insulin clamp techniques were used to manipulate glycemia. Ten patients were studied during hypoglycemia and 10 during hyperglycemia, and recovery to euglycemia was evaluated in all patients.

The researchers performed fMRI at rest and during a working memory task in each state. As part of this study, they also assessed neuronal activity and perfusion using blood oxygen level dependent (BOLD) signaling and arterial spin labeling (ASL).

Results revealed that hypoglycemia was associated with significantly decreased neuronal activity (BOLD) in the temporoparietal cortex, which is a major working memory hub. However, hyperglycemia was linked to both significantly increased BOLD signaling in the basal ganglia and left frontal cortex.

Hyperglycemia was also associated with significantly increased brain perfusion (ASL), according to the data. This was most pronounced in the basal ganglia and subcortical regions.

Additionally, the investigators noted that in each instance, neuronal activity at recovery differed from baseline.

Cerebral blood flow and brain activity were significantly increased in areas known to be involved in working memory. The multiple areas of significant change seen indicate that during glycemic extremes, the brain needs to adapt and appears to preference certain regions over others.

Editor's Comment

In adolescents with type 1 diabetes, hyperglycemia and hypoglycemia were associated with changes in neuronal activity in certain brain regions, with abnormalities persisting even after recovery to euglycemia, according to a new study presented at the American Diabetes Association (ADA) 75th Scientific Sessions.

The adverse effects of hyperglycemia and hypoglycemia on cognition, including subtle effects on overall IQ, attention information processing and higher order executive functions, as well as reductions in the brain's grey and white matter in the brain, have been well documented in various studies.

This study shows that acute hypoglycemia and hyperglycemia have profound impacts on brain function in adolescents with type 1 diabetes. The combination of ASL and fMRI provides a novel multimodal approach to extend this work and examine further important questions relating to the effects of diabetes on the brain.

Short Sleep a Modifiable Risk Factor for Gestational Diabetes

D Reid et al.

SLEEP 2015: Annual Meeting of the Associated Professional Sleep Societies. Abstract 1145. Presented June 8, 2015.

The study team investigated whether insufficient sleep is associated with increased risks for gestational hypertension (GHTN), pre-eclampsia, and/or GDM.

Participants included 760 nulliparous women with singleton gestation enrolled in a multicenter prospective cohort study

of adverse pregnancy outcomes. Between 16 and 21 weeks gestation, they wore an actigraph to record objective sleep activity for 7 consecutive days. Women with pregestational diabetes and chronic hypertension were excluded. Short sleep duration was defined as average sleep of less than 7 hours per night.

The median nightly sleep duration was 7.4 hours; 28% of the women had short sleep duration, averaged over the 7 days. Overall, GHTN, pre-eclampsia, and GDM developed in 5.1%, 5.1%, and 4.1% of women, respectively.

For their analysis, the researchers grouped GHTN and pre-eclampsia together, and they found no significant association between short sleep duration and GHTN/pre-eclampsia. The rate was 11.3% with short sleep duration and 9.9% without (P = NS).

However, the rate of GDM was significantly increased in women with short sleep duration (6.6% vs 3.1%). Short sleep duration was associated with GDM even after adjustment for age and BMI (adjusted odds ratio, 2.12; 95% confidence interval, 1.02 - 4.41).

The association between reduced sleep and metabolic disturbance is "well known in the sleep community. Some of the work originally came out of the University of Chicago showing that if you restrict sleep you can cause an increase in insulin resistance and glucose intolerance."

This new large study in 760 nurses is consistent with what we know about reduced sleep and it having metabolic disturbances. For any woman that might suffer from some glucose intolerance, this emphasizes the importance of getting an adequate amount of sleep in pregnancy.

Editor's Comment

Short sleep duration during pregnancy is associated with increased risk for gestational diabetes mellitus (GDM), independent of maternal age and body mass index (BMI), a new study indicates. Prior studies have shown that sleep restriction adversely affects appetite-regulating hormones, insulin sensitivity, inflammation, and autonomic function. However, data regarding the clinical consequences of short sleep durations during pregnancy are limited. The new study suggests that short sleep duration is a modifiable risk factor associated with the development of gestational diabetes. Further research is needed to figure out whether screening for sleep disturbances and education to modify sleep patterns in women with short sleep duration can lessen the risk for GDM.

Type 2 Diabetes May Lower Amyotropic Lateral Sclerosis (ALS) Risk

Kioumourtzoglou M-A et al. *JAMA Neurol*. 2015; doi:10.1001/jamaneurol.2015.0910.

For the study, the researchers collected data on 3,650 people (average age, 65 years) listed in Danish National Registers who were diagnosed with ALS between 1982 and 2009. They then compared these patients with 365,000 healthy people.

The researchers also identified 9,294 patients diagnosed with type 2 diabetes. Fifty-five of the patients diagnosed with type 2 diabetes were later diagnosed with ALS, with an estimated odds ratio for ALS of 0.61 (95% CI, 0.46-0.80) for patients with diabetes. The average age of the diabetes-related diagnosis was 59.7 years.

Older age at diagnosis for either disease was associated with lower risk for ALS, the researchers said. The odds ratio for first mention of diabetes was 1.66 (95% CI, 0.85-3.21) before age 40 years but 0.52 (95% CI, 0.39-0.70) for older ages.

Editor's Comment
At present, prior studies have suggested a role of cardiometabolic health on pathogenesis of amyotrophic lateral sclerosis (ALS). But the association with diabetes mellitus has not been widely examined. Amyotrophic lateral sclerosis is the most common motor neuron disorder. Type 2 diabetes may reduce the risk for developing amyotrophic lateral sclerosis (ALS), according to a new report. They found a protective association between type 2 diabetes and ALS.

Type 2 Diabetes Risk Lower With Blood Type O

Fagherazzi **G et al.** *Diabetologia*. 2014; doi:10.1007/s00125-014-3472-9.

For this study, the researchers studied 82,104 women from the large, prospective E3N cohort from 1990 to 2008. They specifically evaluated the relationship of ABO blood type (A, B, AB and O), Rhesus factor and a combination of the two with type 2 diabetes.

Compared with group O blood, women with group A blood were 10% more likely to develop type 2 diabetes (HR=1.10; 95% CI, 1.02-1.18) and those with group B blood were 21% more likely to develop type 2 diabetes (HR=1.21; 95% CI, 1.07-1.36). Those with group AB blood were 17% more likely to develop the disease, but this association did not reach statistical significance (HR=1.17; 95% CI, 0.99-1.39). There appeared to be no difference in type 2 diabetes risk between Rhesus positive and negative groups (HR=0.96; 95% CI, 0.88-1.05).

When using the universal donors (blood type O–) as a reference category, the researchers found an increased risk for women with blood types A+ (HR=1.17; 95% CI, 1.02-1.35), A– (HR=1.22; 95% CI, 1.03-1.45) and AB+ (HR=1.26; 95% CI, 1.02-1.57). The most noticeable difference, however, was a 35% increased risk for type 2 diabetes in women with blood type B+ (HR=1.35; 95% CI, 1.13-1.60).

These associations remained even after adjustment for fasting plasma glucose and lipid concentrations in a case–control subsample, according to the data.

Editor's Comment
Studies on blood groups and their association with diabetes have been small and therefore unable to provide definitive results. People with blood type O may have a significantly lower risk for developing type 2 diabetes than those with blood types A, B or AB, according to data published in *Diabetologia*. While the mechanisms behind this link are currently unclear, it has been suggested that the human ABO locus may influence endothelial or inflammation markers, the researchers wrote. Additionally, ABO grouping may be related to various molecules associated with type 2 diabetes or it may also be a factor in determining the overall gut microbe composition, which affects metabolism.

Further pathophysiological research is also needed to determine why the individuals with blood type O have a lower risk of type 2 diabetes.

Metformin May Lower Lung Cancer Risk in Nonsmokers with Diabetes

Sakoda LC et al. *Cancer Prev Res*. 2015;8(2):174-179.

Results from studies evaluating the link between metformin and lung cancer have been mixed, according to earlier information. To further examine this relationship, Lori Sakoda, and colleagues conducted a retrospective cohort study of 47,351 patients with diabetes aged at least 40 years (54% men) who completed a health-related survey between 1994 and 1996.

Of all patients included in the study, about 46% were ever users of metformin, which was defined as filling two or more prescriptions with a 6-month period.

Follow-up for incident lung cancer lasted from Jan. 1, 1997 to June 30, 2012.A total of 747 patients were diagnosed with lung cancer during 428,557 person-years of follow-up of 80 of whom were nonsmokers and 203 who were current smokers, according to the data.

Results indicated no link between metformin use and lung cancer risk overall, though the researchers noted an inverse association between ever use of metformin and lung cancer risk in never smokers (HR=0.57; 95% CI, 0.33-0.99). This risk also appeared to decrease with longer use of the drug, with data demonstrating an HR of 0.48 (95% CI, 0.21-1.09) among those who had been taking metformin for 5 years or more.

Longer use of metformin was also associated with a decreased risk for adenocarcinoma (HR=0.69; 95% CI, 0.40-1.17) but an increased risk for small cell carcinoma (HR=1.82; 95% CI, 0.85-3.91).

Editor's Comment

Non-smokers with diabetes treated with metformin appeared to have a lower risk for lung cancer,according to a new data published in Cancer Prevention Research.The results suggest that the risk associated with metformin might differ by smoking history were unexpected. Metformin use was not associated with lung cancer risk when we looked at all patients with diabetes. However, the results suggest that risk might differ by smoking history, with metformin decreasing risk among nonsmokers and increasing risk among current smokers Additional large, well-conducted studies are needed to clarify whether metformin may be used to prevent lung or other cancers, particularly in specific subpopulations, such as nonsmokers.

Metformin May Reduce Open-Angle Glaucoma Risk

Lin H-C et al. *JAMA Ophthalmol*. 2015;doi:10.1001/jamaophthalmol.2015.1440.

The researchers collected 10 years of data on 150,016 people with diabetes. All were aged 40 years or older at the start of the study. During the study, the investigators found that 3.9% of the participants developed open-angle glaucoma.

Results revealed that patients taking the highest amount of metformin had a 25% reduced risk for developing open-angle glaucoma compared with those not taking the medication. For every 1-gram increase in metformin taken, the risk was reduced by 0.16%.

The researchers estimated that taking a standard dose of metformin (2 grams per day) for 2 years would reduce the risk for open-angle glaucoma by 20.8%. This risk reduction was seen even after accounting for lower blood glucose levels. Other diabetes medications were not associated with reduced risk for open-angle glaucoma.

Editor's Comment

Metformin is associated with a lower risk for developing open-angle glaucoma, according to a study published in JAMA Ophthalmology. This study suggests that metformin may be affecting [open-angle glaucoma] risk on multiple levels, some involving improved glycemic control and some involving mechanisms outside glycemic control such as neurogenesis, inflammatory systems, or longevity pathways targeted by caloric restriction mimetic drugs.

If confirmed by prospective clinical trials, these findings could lead to novel treatments for this sight-threatening disease.

The effect of Anaemia and Abnormalities or Erythrocyte Indices on Hba1c Analysis: A Systematic Review

English E et al. Diabetologia 13 Apr 2015, doi:10.1007/ s001.

The World Health Organization and the American Diabetes Association both recommend using HbA1c levels to diagnose type 2 diabetes, at a value of 6.5% (48 mmol/mol). This same cut-off level is also used in the United Kingdom and most of Europe. Emma English from the University of Nottingham and colleagues identified studies carried out between 1990 and 2014 that involved at least one measurement of HbA1c and glucose and at least one index of anaemia. They found 12 suitable studies, most of which focused on iron deficiency anaemia. They found that overall the presence of iron deficiency, with or without anaemia, led to higher HbA1c values than in controls, with no corresponding rise in blood glucose concentration. There was just one exception, which found low HbA1c values in very severe cases of anaemia. The researchers also found some data indicating that non-iron deficiency anaemias also affected HbA1c levels to a varying degree. The World Health Organization threshold defining anaemia is 120 g/L (7.4 mmol/L) haemoglobin in non-pregnant women and 130 g/L (8.1 mmol/L) in men. Around 29% of non-pregnant women worldwide have anaemia. The estimated prevalence of anaemia in men is 13%; this is likely to be higher in older men, but data are scarce. The review was limited because of the small number of studies, many with low numbers of participants, and the authors said that more research was needed.

Until further evidence became available they recommended that when glucose and HbA1c measurements gave different results doctors should consider abnormalities related to anaemia or iron deficiency. They recommended that if iron deficiency were identified then iron supplements should be given before HbA1c measurement was used for diagnosis or monitoring.

Editor's Comment

Iron deficiency and anaemia can lead to a false diagnosis of diabetes by distorting readings of glycated haemoglobin (HbA1c) concentrations, concludes a systematic review of the evidence published in Diabetologia. HbA1c is likely to be affected by iron deficiency and iron deficiency anaemia with a spurious increase in HbA1c values. This may lead to confusion when diagnosing diabetes using HbA1c. This review clearly identifies the need for more evidence, especially in identifying the types and degrees of anaemia likely to have significant impact on the reliability of HbA1c.