

## Health and Social Care Committee – inquiry into the availability of bariatric services

### Working lunch with Swansea University Academics, 13 February 2014

Members present: David Rees, Elin Jones, Lindsay Whittle, Kirsty Williams, Gwyn Price, Rebecca Evans.

As part of its inquiry into the availability of bariatric services, the Health and Social Care Committee attended a working lunch with Swansea University academics on 13 February. The aim of the lunch was to allow Members the opportunity to discuss with the academics any research that they were undertaking, or aware of, that may be of relevance to the inquiry.

Following the working lunch the academics each provided a note on the research that was discussed with the Committee, as the relevance of their work could inform the Committee's report on the inquiry.

Academics in attendance:

- Dr Cathy Thornton, Reader in Immunity;
- Dr Sarah Prior, Lecturer in Diabetes;
- Dr Richard Bracken, Associate Professor in Exercise and Biochemistry;
- Dr Danielle Jones, Post doc Researcher in Diabetes.

#### Dr Cathy Thornton PhD

Obesity in pregnancy is associated with adverse maternal and fetal outcomes with an allied burden on health care resources. Long term health consequences for the offspring include: hypertension/cardiovascular disease, insulin resistance/type 2 diabetes, and obesity. Fetal programming of metabolic function likely underlies these relationships: high maternal levels of glucose, free fatty acids and amino acids underlie permanent changes in appetite control, neuroendocrine function, and energy metabolism. The pathophysiological mechanisms linking maternal obesity with adverse outcomes in the offspring are unknown but could include changes in metabolism of glucose and lipids, adipose-derived mediators such as adipokines, and inflammation. We are studying the effects of maternal obesity on the inflammatory response of the placenta and newborn (using umbilical cord blood). This will help us to better understand the relationship between the inflammatory response of mother and child, provide information for improving pre-conception education of women, and identify strategies to limit the detrimental effect of maternal obesity on the health of their children.

Dr Sarah Prior

‘Does bariatric surgery adversely impact on diabetic retinopathy in persons with morbid obesity and type 2 diabetes?’ - a pilot study

(Authors: RL Thomas, SL Prior, JD Barry, SD Luzio, N Eyre, S Caplin, JW Stephens, DR Owens).

We conducted a retrospective pilot analysis of electronic hospital records between 1998 and 2012 to assess the incidence and progression of diabetic retinopathy (DR) 12 months post bariatric surgery in persons with morbid obesity and type 2 diabetes.

40 out of 148 patients had pre- and post-surgery DR screening. Of those without DR pre-surgery 1.5% (n=26) progressed to minimum background DR (BDR) post surgery. Those with minimum BDR pre-surgery (n=9) revealed no progression, with 55.6% (n=5) showing evidence of regression. One person with moderately severe BDR and two with pre-proliferative DR (PPDR) prior to surgery experienced progression. Two persons with PPDR prior to surgery remained under the hospital eye services and were therefore not eligible to be re-assessed by the screening service.

There was a low incidence of new DR and progression of DR in those either without evidence of retinopathy or with minimal BDR prior to surgery with some subjects showing evidence of regression. There was however a risk of progression of DR in those with moderate BDR or worse, and should therefore be monitored closely post-surgery.

In our study those persons who experienced progression of DR had pre-existing moderate DR, higher fasting plasma glucose levels and higher systolic blood pressure prior to surgery. Additionally they demonstrated a greater reduction of fasting glucose post-surgery compared to those with no change or regression of DR. Therefore, persons with these characteristics pre-operatively should be monitored closely post-surgery for evidence of progression. Attempts should also be made to optimise therapy in those with high glucose and blood pressure prior to surgery. Larger prospective studies are now required to better assess the influence of the normalisation of glycaemic control after bariatric surgery on microvascular outcomes such as DR, nephropathy and neuropathy.

(Bibliography: J. Diabetes Complicat. 2014 28(2): 191-195)

Dr Richard Bracken

Thank you to the Chair for the opportunity to contribute to the inquiry into availability of bariatric services. As an exercise physiologist, my research interest is in the exploration of the physiological, metabolic and functional benefits of being more physically able in individuals who are obese and/or have diabetes (type 1 or 2). Over my research career, I have witnessed enormous positive benefits in individuals who were confident to start and maintain a regular physical activity programme; often through our funded research studies.

It was encouraging that at several points in the meeting mention was made of the need for a 'joined-up' approach of surgeons, physicians, psychologists and dieticians to deal with the obese individual before or after bariatric surgery. In my view, it is essential that an exercise physiologist is also part of the 'care programme' where the functional capacity of the individual is established, improved and maintained following surgery.

The World Health Organisation now ranks physical inactivity as the fourth biggest killer ahead of obesity and is the main cause for ~21–25% of breast and colon cancers, 27% of diabetes and 30% of ischaemic heart disease. Being more physically active reduces post-surgical complications arising from a continued sedentary lifestyle and contributes to better weight management of the individual post-bariatric surgery.

Recommendation: Inclusion of an exercise physiologist that strengthens the effectiveness of a multidisciplinary care team.

### Dr Danielle Jones

Oxidative stress is an imbalance between the production of free radicals and the ability of the body to detoxify their harmful effects by antioxidants. A free radical is an oxygen containing molecule that is highly reactive with other molecules. Oxidative stress leads to many conditions including neurodegenerative diseases such as Parkinson's disease and Alzheimer's disease, gene mutations and cancers, chronic fatigue syndrome, heart and blood vessel disorders, atherosclerosis, heart failure, heart attack and inflammatory diseases.

The overall aim of this thesis was to investigate the role of fat in obesity and type 2 diabetes (T2DM) focusing on markers of oxidative stress and gene expression (the increased or decreased activation of particular genes) in human abdominal fat from subjects categorised as lean (L), obese (O) and obese with type 2 diabetes (ODM). It was expected that oxidative stress levels would increase with obesity and T2DM. However, results showed lower level of oxidative stress in subjects with obesity and type 2 diabetes. Overall, there appeared to be a protective mechanism in the subjects with diabetes. A significant proportion of the subjects with diabetes were on drug therapies which may have affected the results in these experiments as they may minimise the effects of oxidative stress.

Expression of genes, which may code for proteins involved in oxidative stress and antioxidant production, were looked at in the fat to identify any differences in obesity and diabetes. An increased expression of an antioxidant gene (Glutathione reductase) was seen in subjects with obesity and diabetes compared to those without. From this it was concluded that an environment of high oxidative stress, which may be caused by increased blood glucose in diabetes, causes increased expression of this antioxidant gene.

From these results, it may be hypothesised that within these subjects, the situation of oxidative stress is in fact reversible as the antioxidant capacity in these subjects is evident, and in combination with correct drug therapy it may be possible to combat oxidative burden and reduce the subsequent damage inflicted upon the cells. Particularly within the obese and obese with type 2 diabetes subjects in this study, bariatric surgery may play a positive role in the correction of this oxidative state and it would be of interest to be able to follow up this study by repeating this analysis one year post-operative to see if oxidative burden has improved in these subjects.