TOTAL DIET & MEAL REPLACEMENTS EUROPE

SCOPE
Strategic Centre for Obesity Professional Education

WORLD OBESITY

Seminar

Healthcare cost-reduction & improved quality of life with evidence-based weight-loss in diabetes & osteoarthritis

University College Dublin
Conway Institute of Bio-molecular and Biomedical Research

Tuesday 16th April 2019
11:00 – 13:00

PROGRAMME

11.00-11.05

Welcoming remarks

Professor Carel le Roux,
University College Dublin

11.05-11.15

Total Diet Replacements and why they deliver more weight loss and other benefits than conventional diets

Professor Anthony Leeds, bariatric physician
Central Middlesex Hospital, England,
on behalf of TDMR Europe

Department of Diabetes and Endocrinology, Central Middlesex Hospital, London; Faculty of Science, University of Copenhagen and Parker Institute Frederiksberg Hospital, Copenhagen.

Total Diet Replacement (TDR) formula liquid 800kcal/d low calorie diets (LCD) are composed of nutritionally complete soups, shakes, bars and porridges formulated to provide all needed vitamins, minerals, essential fats and protein. They can also be given as 600kcal/d very low calorie diets (VLCD). TDR programmes are always offered with a behavioural component and physical activity guidance.

TDR weight loss programmes deliver more weight loss than conventional diets because they facilitate a greater energy deficit resulting in greater weekly weight loss, typically 1.3kg/week in women and 1.5kg/week in men. Higher rates of weight loss are safe (all trials report full safety data) and highly motivating and rates of compliance are high, e.g. 91% in the PREVIEW diabetes prevention programme. There is some evidence that a greater initial rate of weight loss is associated with better weight maintenance at 6 and 12 months later. Low dietary energy intakes are also associated with higher blood ketone levels and these may mediate a suppression of appetite, possibly through modulation of the effects of the hunger hormone ghrelin.

TDR have now been shown to deliver health benefits in early diabetes, more advanced insulin-treated diabetes, osteoarthritis, obstructive sleep apnoea, coronary arterial disease and psoriasis. The greater energy deficits delivered by TDR cause major changes in metabolic processes such as liver glucose and lipid synthesis with rapid improvement in biochemical markers of disease including those of inflammation. Symptoms related to inflammation, such as knee pain, may abate rapidly. Weight maintenance (10% of initial body weight) after initial weight loss with TDR has been demonstrated for four years in elderly obese with obesity with maintenance of symptom and cardiovascular risk benefit, and for two years in early diabetes.

Declaration of interest: Anthony R Leeds was employed full-time by Cambridge Weight Plan until March 2019 and is now chairman of TDMR Europe.

11.15-11.35

Obesity and diabetes threaten European quality of life and regional health and social care budgets

Professor Mike Lean, University of Glasgow, Scotland

Type 2 diabetes has increased dramatically, especially in younger people as populations have become more obese. It brings multiple complications, including blindness, amputations, kidney failure, heart disease and dementia. It shortens life expectancy by up to 8 or 10 years, and absorbs about 10% of total healthcare costs in Europe. Most of the costs are from complications

Until recently, the standard treatment of type 2 diabetes has been with tablets until insulin is required. These reduce blood sugar, but do not greatly reduce the complications. The 10-year survival is about 60% (compared with 70% with a cancer such as Non-Hodgkin's lymphoma).

The landmark DiRECT trial, published 2018 and 2019, funded by the charity Diabetes UK, has confirmed that type 2 diabetes is primarily a nutritional disease, and reversible. Almost 9/10 patients can achieve a remission with >15kg weight loss, and 70% after 2 years. All cardiovascular risk factors, and quality of life, improve. This degree of weight loss is only possible using a Total Diet Replacement approach, plus structured support for long-term maintenance. DiRECT used the Counterweight-Plus programme developed in Scotland. The NHS in both England and Scotland has announced that remission should become the primary aim of treatment, using the DiRECT intervention, and it is recommended by the European Association for the Study of Diabetes.

New Commission regulations for TDRs were announced in the EU Official Journal, entering into force on 27th October 2017, starting to apply by 2022. These regulations threaten to make the currently successful TDRs more expensive and less acceptable to patients, opposing our efforts to check the epidemic of type 2 diabetes. They do not appear to be well-based in science, and need to be reviewed:

- Decrease magnesium content to <250mg/day (to avoid diarrhoea?)
  - There was no diarrhoea with current TDRs
  - Magnesium protects against type 2 diabetes
- Increase Essential Fatty acids (to reduce CVD?)
  - Current TDRs already reduce CVD risks (and cancers)
  - Essential Fatty Acids cost, and become rancid
- Increase protein content (to increase weight loss?)
  - Weight loss with TDR is already very good
  - More protein adds costs, and makes these diets unpalatable
- Mandatory addition of choline (unclear why)
  - Choline is not required in the human adult diet

11.35-11.45

My successful use of Total Diet Replacement for weight loss followed by weight maintenance and diabetes remission on the DiRECT programme

Joe McSorley, Paisley, Scotland

11.45-12.05

PREVIEW- study and prevention of type 2 diabetes

Professor Mikael Fogelhom, University of Helsinki, work package leader on EU 7th Framework funded PREVIEW project

Despite the evidence that a lifestyle program combining prudent diet, increased physical activity and weight loss reduces the risk for T2D in susceptible individuals, important details remain unanswered. These include the long-term effects and sustainability of diets higher in protein with a lower glycaemic load, combined with the effects of higher intensity exercise.

The aim of the PREVIEW intervention was determine the preventative impact of a high-protein and low-GI diet in combination with moderate or high intensity physical activity on the incidence of type-2 diabetes in predisposed, middle-aged and older adults. This was be done by conducting a randomized, controlled, multicentre trial (RCT) among participants at risk of developing diabetes (overweight with BMI $\geq$ 25 kg/m2 and increased diabetes risk factors). The trial was performed in 6 EU countries (Denmark, Finland, UK, the Netherlands, Spain and Bulgaria), and in Australia and New Zealand.

A total of 2,223 individuals with pre-diabetes started the 2-months weight loss phase and 962 completed the 3-year weight maintenance phase (43%). The total number of T2D cases (primary endpoint) was low, amounting to only 62 cases after 3 years with no differences between the two diets ($p = 0.45$). T2D incidence did also not differ between the two physical activity regimes ($p = 0.27$). Body weight decreased by 11% after the weight loss phase and was still 5% lower than at baseline after 3 years (completers). All outcomes related to glucose or lipid metabolism, anthropometrics and blood pressure imrpoved significantly after the LED phase. After 3 years, BMI, fat mass, fat-free mass, waist, hip and thigh circumference, 2-h glucose, insulin, C-peptide, HOMA-IR, and triglycerides were still significantly lower compared with baseline values. A group difference was seen for C-reactive protein and diastolic blood pressure ($p < 0.05$) , but otherwise there were no differences between the two diet groups, two physical activity groups, or the four groups combined ($p > 0.05$).

In conclusion, we could not prove that a high protein-low GI diet would be superior to a moderate-protein diet in prevention of T2D. A large initial weight loss that is partly sustained by an intensive behavioural intervention over 3 years may be one explanation for the unexpectedly low incidence of T2D.

12.05-12.25

Obesity and osteoarthritis – a double blow for Europe's elderly people

Professor Henning Bliddal, Director, Parker Arthritis Institute, Copenhagen, Denmark

Obesity is widely acknowledged as a risk factor for both the incidence and progression of osteoarthritis and has a negative influence on outcomes. Loss of at least 10% of body weight, coupled with exercise, is recognized as a cornerstone in the management of obese patients with osteoarthritis, and can lead to significant improvement in symptoms, pain relief, physical function and health-related quality of life.

However, questions remain surrounding optimal management. With the Copenhagen program the greater proportion of individuals obtain a significant weight loss and this can be sustained in various ways over years afterwards. These results have been reached in spite of co-existing knee osteoarthritis leading to the phrase that bad knees are no excuse for not losing weight.

It is a general notion that replacement of a bad knee with an alloplasty will pave the way for weight loss; this has been shown not to be the case, on the contrary, a weight gain has been observed after the operation. The aging population in Western Europe will lead to increasing numbers of elderly citizens at risk for knee OA. With a parallel increase in prevalence of obesity, we are facing an enormous burden for the individuals and society with increased health expenses. Fundamentally, the soundest move against this development is a tight weight control, which should be sponsored by the health authorities at all levels.

12.25-12.45

The clinical and cost effectiveness of a community based total diet replacement weight-loss programme

Dr Nerys Astbury and **Dr Seamus Kent**, University of Oxford, England

Background
There is limited evidence on the effectiveness and cost-effectiveness of low-energy total diet replacement programmes for routine weight management in ro. In the DROPLET study, 278 adults with obesity were randomly allocated to receive either a behavioural support programme delivered by their practice nurse or a low-energy total diet replacement (TDR) programme offered by a commercial provider in the community, with products providing an initial 810 kcal/d for 8 weeks, followed by gradual food reintroduction for 4 weeks, along with regular behavioural support up to 6 months.

Clinical outcomes
Patients in the TDR group lost more weight (-10.7 kg) than those in the usual care group (-3.1 kg) at 12 months, with an adjusted mean difference of -7.2 kg (95% confidence interval -9.4 to -4.9 kg). The TDR group showed greater improvements in the biomarkers of cardiovascular and metabolic traits than the usual care group, with no difference in adverse events of moderate or greater severity experienced.

Cost-effectiveness
Using a multistate lifetable model and the weight reduction observed at 12 months we estimated the quality-adjusted life-years and direct healthcare costs (in UK 2017 prices) over a lifetime with TDR versus nurse-led support assuming weight returned to baseline over five years. The per-person costs of the TDR and nurse-led programmes were £796 and £34, respectively. The incremental cost-effectiveness ratio of TDR was £12,955 (£8,082 to £17,827). TDR was estimated to be more cost-effectiveness in older adults and those with a higher BMI, with little difference by gender.

Conclusions
Compared with regular weight loss support from a practice nurse, a programme of weekly behavioural support and TDR seems to be tolerable, and leads to substantially greater weight loss. At current retail prices and with plausible long-term weight regain trajectories, TDR is projected to be cost-effective in adults with obesity and could be considered as an option to treat obesity in routine health care settings.

Funding
This research was funded by the Cambridge Weight Plan. The funders had no role in study design, data collection, data analysis, data interpretation, or writing of the report.

12.45-12.55

Q&A Session

12.55-13.00

Concluding remarks

by **Professor Carel le Roux**, University College Dublin

13.00-14.00

Networking lunch and drinks

SPEAKERS

Professor Carel le Roux

University College Dublin

Professor Carel le Roux graduated from medical school in Pretoria South Africa, completed his specialist training in metabolic medicine at St Bartholomew's Hospitals and the Hammersmith Hospitals. He obtained his PhD from Imperial College London where he was later promoted to Reader. He moved to University College Dublin for the Chair in Experimental Pathology and he is now the Director of the Metabolic Medicine Group. He previously received a President of Ireland Young Researcher Award, Irish Research Council Laurate Award, Clinician Scientist Award from the National Institute Health Research in the UK, and a Wellcome Trust Clinical Research Fellowship for his work on how the gut talks to the brain.

Professor Anthony Leeds

Chair, TDMR Europe

Anthony Leeds is visiting professor in the Faculty of Science, University of Copenhagen, and visiting adjunct professor in the School of Health Sciences, International Medical University, Kuala Lumpur. He practices bariatric medicine in the UK's NHS in the diabetes and endocrinology department at the Central Middlesex Hospital in London. His current research interests include the use of low energy diets in weight management to achieve diabetes remission and prevention. At the Parker arthritis Institute, Frederiksberg hospital, Copenhagen, where he is an honorary senior research fellow, he focusses on weight loss in osteoarthritis (http://parkerinst.dk/staff/anthony-leeds). He was Senior Lecturer at King's College London until September 2007 and was Medical Director of Cambridge Weight Plan, where he facilitated a programme of clinical trials, until March 2019. He is Chairman of TDMR-Europe (https://tdmr-europe.com/) the stakeholder industry group responsible for responding to European Commission proposals on legislation related to total diet replacement and meal replacement products.

Professor Mike Lean

University of Glasgow

Mike Lean MA, MB, BChir, FRCP (Edinb), FRCPS (Glasgow), FRSE holds the Glasgow University chair of Human Nutrition, based at Glasgow Royal Infirmary, where he is also a consultant physician with NHS responsibilities for an acute medical ward and emergency receiving duties. His primary training was in Medicine, completing a Cambridge MA degree in History and Philosophy of Science. Medical undergraduate training was at St Bartholomew's Hospital, and postgraduate training mainly in Aberdeen and Cambridge. He received research training as an MRC Clinical Scientist for 4 years at the MRC and University of Cambridge Dunn Nutrition Laboratories, and on a Leverhulme Scholarship to the University of Colorado in Denver, in 2003. He has held Visiting and Adjunct Professorships at the Robert Gordon University, Aberdeen; the University of Otago, New Zealand (currently) and at University of Sydney, Australia (also currently). He has been a non-executive director of the Health Education Board of Scotland for 8 years, and chaired the Food Standards Agency Advisory Committee on Research. He was awarded the Rank Nutrition lectureship by Diabetes UK in 2013; the Tenovus Medal in 2017 and elected a Fellow of the Royal Society of Edinburgh in 2018.

Professor Lean has published over 450 peer-reviewed papers. H-Index (November 2018) = 98 (61 since 2013). Visit his Google Scholar page. His research, and related PhD training programmes, encompass the wide range of molecular, clinical and public health aspects of Human Nutrition, a body of integrated sciences underpinning all biomedical and health research. In 2014 he was one of only 19 Scottish researchers in the top 1% of their fields world-wide for international citations, on the Thomson-Reuters 'Highly Cited' Researcher listing. He is PI for the Diabetes Remission Clinical Trial, the largest research programme ever funded by Diabetes UK.

Joe McSorley

TDR-user

Joe McSorley is a 58 years old network engineer, employed by BT. He has been married to his wife Yi for 7 years and have 2 stepsons. He was diagnosed as type 2 diabetic and applied for the opportunity to get involved in the DiRECT study and was accepted.

Professor Mikael Fogelhom

University of Helsinki

Mikael Fogelholm has been the Professor in Public Health Nutrition at the University of Helsinki since 2011. He has 198 original research publications and reviews listed in PubMed. Mikael's main research interest has been the interactions between dietary patterns, physical activity and obesity. His largest project right now (after finishing PREVIEW) are related to use of loyalty-card food-purchase data in assessment of dietary habits in the population, and to nutrition transition and prevention of non-communicable diseases in Kenya. Besides active research, Mikael is the head of the Master's Program in Human Nutrition and Food-related Behaviour, also at the University of Helsinki. When not working, he is usually out doing mountain biking or orienteering, or alternatively playing the piano.

Professor Henning Bliddal

Director, Parker Arthritis Institute

Henning Bliddal is a specialist in rheumatology. Since 1997 he has been Leader and Professor of Research at the Parker Institute, a clinical research unit of Rheumatology, Copenhagen University Hospital, Bispebjerg and Frederiksberg, Denmark. HB's research projects have over the last years concentrated on treatment of patients with knee osteoarthritis (OA) with very significant results in patients with this disease in combination with obesity. HB has supervised numerous medical students and physicians, including 25 PhD students. He has extensive teaching experience and is a regular contributor and guest speaker at national and international congresses. HB has contributed to textbooks, and has published more than 350 papers (2019) in international medical journals covering many different aspects of rheumatology. For details please refer to PubMed and Embase. H-index 64, citations >16000 GCP certificate 3 Dec 2018

Dr Nerys Astbury

University of Oxford

Nerys Astbury is a Senior Researcher in Diet & Obesity in the Nuffield Department of Primary Care Health Sciences. Her interests are in strategies that can be used for the prevention and treatment of obesity.
Her most recent study was testing a low-energy total diet replacement for the routine management of obesity in primary care – DROPLET study.

Dr Seamus Kent

University of Oxford

Dr Seamus Kent is a Senior Researcher in Health Economics at the Nuffield Department of Population Health, University of Oxford. Seamus has several years of research experience in health economics. He has a particular interest in obesity, and was the recipient of an NIHR Doctoral Research Fellowship to explore the impact of excess weight on the use and costs of healthcare services in the United Kingdom. He has an extensive publication record in obesity research with peer-reviewed papers in Obesity Reviews, Obesity, the International Journal of Obesity, and the Lancet Public Health. Seamus has a DPhil in Population Health from the University of Oxford, and master degrees in Medical Statistics from the University of Leicester and in Health Economics from the University of York.

TOTAL DIET & MEAL REPLACEMENTS EUROPE

Total Diet & Meal Replacements Europe is the European trade body for manufacturers and distributors of formula diet products, including total diet replacement products (TDRs) and meal replacement products (MRPs) which provide safe, evidence-based weight loss and weight management programmes for the overweight and obese.

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