

# Prevention of diabetes through lifestyle intervention

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# VALORISATION

**SOCIETAL RELEVANCE**

Diabetes is one of the fastest growing chronic diseases worldwide and already 422 million people have diabetes according to the WHO. Every year, 1.6 million deaths are directly attributable to diabetes. Around 90% of all diabetes cases are made up by type-2 diabetes (T2D), which usually develops later in life. The development T2D has been associated with lifestyle and environmental factors and therefore the key for successful prevention of T2D may lie in changing these factors.

The PREVIEW study was initiated in 2013 with the aim to find the most effective lifestyle-components (diet and physical activity) in the prevention of T2D. Furthermore, the study was set out to increase our knowledge on the relationship between lifestyle factors, health and well-being. The PREVIEW intervention was shown to be highly successful for long-term body weight loss and reductions in insulin resistance. The large number of participants benefitted directly from the intervention and our findings are especially relevant for the increasing number of people classified as having pre-diabetes. However, since we found beneficial effects on a variety of anthropometric, metabolic and behavioral parameters, it really indicates the importance of lifestyle intervention for improving health in a population with pre-diabetes.

In the first 8-weeks of the PREVIEW intervention participants started with a low-energy diet (LED) to achieve at least 8% weight loss. During this period, participants consumed a range of formula products of the Cambridge Weight Plan (Northants, UK). The average weight loss of the participants was 11%, showing the success of the LED. Our results contribute to the evidence that a LED is a safe and suitable method to achieve weight loss and by presenting our findings at national and international meetings we hoped to stimulate the usage of LEDs in clinical settings.

It is evident that a better understanding of processes in specific organs and their role in diabetes development and prevention will help to develop new therapeutic or preventive methods for T2D. We were able to show effects of the intervention on intrahepatic lipids and brain reward reactivity using non-invasive imaging techniques.

Moreover, the close association of intrahepatic lipid accumulation and insulin resistance that we found throughout the intervention underlined the importance to address intrahepatic lipids in the prevention of T2D. Furthermore, with the increasing number of people presenting with liver diseases including non-alcoholic fatty liver disease, better strategies to reduce intrahepatic lipids are needed. We showed that sufficiently high protein intake after weight loss was associated with reduced intrahepatic lipids. This finding may contribute to developing optimal diet strategies to reduce intrahepatic lipids or prevent intrahepatic lipid accumulation.

We also found multiple factors interacting with brain reward reactivity. Increased body weight, body-fat percentage and insulin resistance was related to increased brain reactivity to food images, while increased protein intake during weight maintenance and dietary restraint was related to reduced brain reactivity to food images. These findings may suggest that people with increased body weight or insulin resistance are more sensitive for food cues in terms of anticipated reward and therefore overeat and have less control over their food intake. This is an important issue to address especially for long-term weight loss and interventions. Since we also

found inverse relations between protein intake during the weight maintenance phase and changes in cognitive restraint and brain reactivity to food cues, these factors may be exploited to reduce the increased sensitivity to food cues and therefore increase compliance to a diet or intervention.

### **ECONOMIC RELEVANCE**

According to the WHO, 2.5% to 15% of annual national health care budgets are direct healthcare costs of diabetes. Therefore, the prevention of T2D is also relevant from an economical aspect. PREVIEW will assess the costs, effectiveness and benefits of providing extended support, reinforcement and motivation to make lifestyle changes and maintain these in the longer term. This information will be relevant for future prevention programs and assigning clinical value to such designs. The research was funded by the 7<sup>th</sup> Framework Programme of the European Commission, which also indicates the interest for the whole society.

The findings will also help in the debate of the validity and consequences of the 'pre-diabetes' classification. Especially since the pre-diabetes cut points were lowered by the American Diabetes Association, people have argued that the resulting rise in people with pre-diabetes exceed the capacity of health care systems. Moreover, the ranges in parameters like insulin resistance, body weight, age etc. of the population with pre-diabetes increased, leading to difficulties in the interpretation of interventions and outcomes.

### **ACTIVITIES AND PRODUCTS**

Obviously, research alone will not lead to a reduction in the risk of diabetes. Therefore, an important part of the PREVIEW study was to facilitate the new knowledge from the project to all relevant stakeholders. This has been achieved in different ways and forms.

First of all we used the PREVIEW website ([www.previewstudy.com](http://www.previewstudy.com)), via which everyone had and still has easy access to the study information, newsletters and results/publications. Moreover, the website includes an e-learning module which has been specifically designed using the knowledge of the PREVIEW study and PREVIEW partners to educate the general public. The e-learning module contains study material to learn about diabetes, diet, physical activity and behavior change using an interactive format.

Furthermore, we developed and published the PREMITS toolbox, which is a theory-driven, evidence-based program to change physical activity and dietary behaviors people with pre-diabetes. This toolbox was designed for the PREVIEW study, but by publishing it we shared this knowledge for future interventions and treatment programs.

Other features of the project that by themselves or in combinations may lead to future practical applications include the cook books with recipes designed by Meyers Madhus to reach or limit a glycaemic index level and eating plans based on food unit systems. Moreover, information on glycaemic index values have been made available to national food databases so it can be reached by the general public.

## **TRANSLATION INTO PRACTICE**

A major strength of the PREVIEW study is the feasibility to translate the study and especially the intervention into practice. Results and conclusions can therefore be readily transferred to clinical interventions and treatment methods. The intervention was applied in free living conditions and dietary and physical activity guidelines were designed to be feasible for everyone without additional resources or personal counseling. Guidance was provided via group counseling sessions, which is a practical and economical way to reach a larger audience. Next to these practical issues, this type of research is pivotal to translate findings from animal work or smaller and controlled studies to daily life settings.