

## 0825

**The effects of exercise- versus diet-induced weight reduction on the body fat composition and the vascular function in type 2 diabetes**B. Koo<sup>1</sup>, K. Han<sup>1</sup>, H.-J. Kim<sup>1</sup>, E. Kim<sup>1</sup>, H.-J. Kim<sup>1</sup>, K. Pak<sup>1</sup>, H. Son<sup>2</sup>, K. Min<sup>1</sup>;<sup>1</sup>Internal medicine, Eulji University School of Medicine,<sup>2</sup>Internal medicine, The Catholic University of Korea College of Medicine, Seoul, Republic of Korea.

**Background and Aims:** Overweight individuals are at increased risk for developing cardiovascular disease. However, the effects of weight loss on the vascular structure and function and insulin resistance are inconclusive especially in regard to the difference in the modality of weight loss. The purpose of this study was to evaluate the effects of the increased daily usual physical activity versus diet restriction with comparable amount of weight loss on diverse metabolic parameters and markers of vascular functional or structural change in type 2 diabetic women.

**Materials and Methods:** We randomly assigned 70 women with type 2 diabetes to control (C), diet (D), exercise (E) or diet with exercise group (DE). The C were given the conventional education for diet and exercise, the D were restricted their calorie intake lower than 1400 kcal/day, and the E were encouraged to increase their daily activity more than 2000 kcal/day. For 12 weeks, we monitored their daily activities with Lifecorder® (Suzuken Co., Nagoya, Japan), their diet with diet records and body weight (BW) weekly, and excluded the subjects who could not reach their target level of diet or exercise.

**Results:** Finally, 55 subjects (C, n=15; D, n=18; E, n=11; DE, n=11) were included for the analysis. The mean age of subjects was 56±8 years, the duration of diabetes was 8±6 years, BW was 67.8±6.6 kg and BMI was 27.7±2.4kg/m<sup>2</sup> and there were no differences among 4 groups. After 12 week program, change and percent change of BW were significantly bigger in the D and the DE [D: -4.8±1.4 kg (-7.2 %), DE: -5.1 ± 2.7 kg (-7.5 %)] than other two groups [C: -1.5±1.6 kg (-2.2 %), E: -2.2±2.0 kg(-3.3 %)].

There was significant reduction in subcutaneous and visceral fat in the all intervention groups ( $P<0.05$ ) except the C. However, the proportion of visceral fat to the total fat was decreased ( $P<0.01$  in both) and insulin sensitivity calculated by  $K_{it}$  was improved ( $P=0.002$  and  $0.008$ , respectively) only in the E and DE but not in the D. Flow mediated dilatation (FMD), endothelium-independent dilatation (EID) and augmentation index (AI) were significantly improved only in the DE ( $P=0.001$ ,  $P=0.010$ ,  $P=0.008$ , respectively) but there were no changes in carotid IMT, pulse wave velocity (PWV), and ankle-brachial index (ABI). In the case of D, there were no differences in the FMD, EID and AI, but a deteriorated tendency in PWV and ABI ( $P=0.034$  and  $0.021$ , respectively). The changes of other parameters such as LDL cholesterol, free fatty acid, HbA1c, adiponectin and IL-6 were not significantly different among groups.

**Conclusion:** In conclusion, the increased daily physical activity with diet control for 12 weeks significantly reduced visceral fat % and improved insulin sensitivity, endothelial function and aortic stiffness, which were not observed in the diet control only in spite of the comparable amount of weight loss.

## 0826

**The relationship between lifestyles and prediabetes with metabolic syndrome in newly developed type 2 diabetes mellitus – based on the Diabetes Case Management Program 2001, Taiwan**M. M. Fuh<sup>1</sup>, H.-Y. Su<sup>2</sup>, H.-Y. Chang<sup>3</sup>, C.-T. Chang<sup>4</sup>, R.-H. Chen<sup>4</sup>, C.-C. Chen<sup>4</sup>, C.-C. Lee<sup>5</sup>, C.-C. Lin<sup>6</sup>;<sup>1</sup>Diabetes Prevention and Control Center, China Medical University Hospital, Taichung, <sup>2</sup>Dietetics, Taipei Medical University Hospital,<sup>3</sup>Division of Health Policy, National Health Research Institute, Hsinchu,<sup>4</sup>Medicine, China Medical University Hospital, Taichung,<sup>5</sup>Neurology, China Medical University Hospital, Taichung,<sup>6</sup>Family Medicine, China Medical University Hospital, Taichung, Taiwan.

**Background and Aims:** In order to evaluate the relationship between lifestyles and metabolic syndrome in the prediabetes state in newly developed type 2 diabetes mellitus ( T2DM ) and ensuing development of primary preventive interventions in high risk people, a nationally standardised, multi-professionally integrated, evidence-based and patient-center healthcare program – DCMP 2001 was implementing in a medical center, Mid-Taiwan.

**Materials and Methods:** From 2003 to Dec. 2006, 6928 diabetes were randomly recruited in DCMP 2001. Based on the number of metabolic syndrome criteria in the ATP III, all the newly developed T2DM (n=1331) was classified into 3 Groups, GI (2 or less), GII (3criteria), and GIII (more than 3). Accordingly, the lifestyle measurements ( lifestyle I : no smoking, no alcoholic and regular exercise; lifestyle II : smoking and/or alcoholic and/or no exercise ) were tri-monthly interviewed and recorded by the diabetes nurses following lifestyle intervention after seeing physician. From this cohort, all the newly developed T2DM were randomly sorted out and further divided up into 4 groups with different age ranges of onset of disease,  $\leq 40$  years,  $> 40$  to  $\leq 50$  years,  $> 50$  to  $\leq 60$  years, and over 60 years for study. Comparisons between groups were performed by using Chi-Square test. The significant level was set at  $p<0.05$ .

**Results:** In patients of younger onset of diabetes in GIII and GII, the lifestyle measures showed that almost 80% cases were living on lifestyle II. The older onset of diabetes in G III and GII, however, 50% cases were sticking on lifestyle I ( Table 1 and 2 respectively ). These differences in lifestyles between younger and older onset of T2DM with metabolic syndrome in prediabetes state at different age ranges were statistically significant not only in the GIII ( $p<0.0001$ ) but also in the GII diabetes ( $p< 0.0001$ ). Comparison between exercisers and non-exercisers in GIII and GII also shown that non-exercisers developed diabetes were significantly earlier than the exercisers (  $p=0.004$  and  $p<0.0001$  respectively).

**Conclusion:** The aforementioned results clearly indicated that lifestyles and regular physical activity would have significant impact on not only the ages of onset of diabetes but also the development of metabolic syndrome from the prediabetes state to newly developed T2DM.

Table 1. The case and percentage distributions of different lifestyles at different age ranges in newly developed type 2 diabetes mellitus with metabolic syndrome (GIII)

	Lifestyle I		Lifestyle II		p-value
	Case	%	Case	%	
$\leq 40$	12	22.2	42	77.8	$<0.001$
$>40 \leq 50$	15	20.0	60	80.0	
$>50 \leq 60$	22	25.3	65	74.7	
$>60$	52	47.7	57	52.3	

GIII: MetS and prediabetes before T2DM diagnosed

Table 2. The case and percentage distributions of different lifestyles at different age ranges in newly developed type 2 diabetes mellitus with metabolic syndrome (GII)

	Lifestyle I		Lifestyle II		p-value
	Case	%	Case	%	
$\leq 40$	16	19.0	68	81.0	$<0.001$
$>40 \leq 50$	30	22.4	104	77.6	
$>50 \leq 60$	67	44.4	84	55.6	
$>60$	96	55.5	77	44.5	

GIII: MetS in prediabetes

## 0827

**The long-term effects of lifestyle intervention in impaired glucose tolerant subjects: determinants of intervention outcome**C. Roumen<sup>1</sup>, E. J. M. Feskens<sup>2</sup>, E. Corpeleijn<sup>1</sup>, W. H. M. Saris<sup>1</sup>, E. E. Blaak<sup>1</sup>;<sup>1</sup>Human Biology, Maastricht University,<sup>2</sup>Division of Human Nutrition, Wageningen University, The Netherlands.

**Background and Aims:** Lifestyle interventions may be effective in improving glucose tolerance and preventing diabetes. Less is known on what factors determine intervention outcome. Here, we evaluated the efficacy of a lifestyle intervention in a Dutch population with impaired glucose tolerance (IGT) and analysed which factors were predictive of changes in glucose tolerance and insulin sensitivity (as assessed by HOMA-IR)

**Materials and Methods:** We studied 147 IGT subjects, initially randomised into an intervention group; n=74 (INT) and control group; n=73 (CON) during a mean of 4.2 years lifestyle intervention. Subjects underwent

measurements of body composition, body fat distribution, glucose tolerance (OGTT), insulin sensitivity (estimated by HOMA-IR), and maximal aerobic capacity ( $\text{VO}_2$  max). Subjects in the intervention group were individually guided with respect to diet and a physical activity. Guidance was based on general public health recommendations.

**Results:** INT decreased their total fat and saturated fat intake and increased their carbohydrate and fibre intake, whereas this did not change in CON ( $p < 0.05$  group  $\times$  time interaction).  $\text{VO}_2$  max improved more in INT, compared to CON ( $p = 0.042$ ). Body weight decreased in INT during the first 3 years, but increased again during the last part of the study, whereas body weight did not change in CON ( $p = 0.20$  group  $\times$  time interaction). 2-hr glucose levels increased less in INT compared to CON ( $+0.24 \pm 0.39$  mM vs  $0.95 \pm 0.38$  mM, respectively,  $p = 0.041$ ). Cumulative diabetes incidence increased less in INT ( $n = 18$ ) than in CON ( $n = 27$ ,  $p = 0.052$  group  $\times$  time interaction). At baseline, low body fat mass, plasma resistin levels, high 2-hr glucose and Apo lipoprotein A (ApoA) levels were most predictive of a decrease in 2-hr glucose levels ( $p < 0.05$ ). High fasting insulin and mono unsaturated fat intake at baseline were most predictive of a decrease in HOMA-IR ( $\beta = -0.540$ ,  $p = 0.001$  and  $\beta = -0.329$ ,  $p = 0.009$ , respectively). Stepwise regression analysis in INT revealed that lifestyle-induced change in fasting glucose was most predictive for  $\Delta 2\text{h}$  glucose ( $\beta = 0.436$ ,  $p = 0.009$ ) and  $\Delta$ body fat mass was most predictive for  $\Delta$ HOMA-IR ( $\beta = 0.577$ ,  $p = 0.001$ ).

**Conclusion:** In conclusion, our lifestyle intervention program, aiming at increasing physical activity and using a healthy diet, improved glucose tolerance and reduced diabetes incidence. INT subjects with high baseline 2-hr glucose improved more in glucose tolerance. Lifestyle-induced changes in body fat mass were most predictive for the improved insulin sensitivity.

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## 0828

### Saturated dietary fats intake and the leisure-time physical activity among persons with high risk of type 2 diabetes. Results from National type 2 diabetes prevention programme in Finland (FIN-D2D)

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**Background:** Lifestyle changes including increased physical activity, reduced fat and increased fibre have shown to be even more effective than medication in prevention of type 2 diabetes. The basis of behaviour change is the assessment of the need for change. FIN-D2D is a big prevention programme for type 2 diabetes in Finland and, in this, the use of the Transtheoretical model as a health counselling method is recommended.

**Aims:** To examine the baseline findings concerning the participants' self-reported use of saturated dietary fats and leisure-time physical activity and to determine which factors affect their need for change of use of saturated dietary fats and the leisure-time physical activity.

**Materials and Methods:** The data consists of 3397 adults (men 37 %, women 63 %, mean age 55 yrs, mean BMI  $32.1 \text{ kg/m}^2$  (in men 31.5 and women 32.4), mean waist circumference 103.1 cm (in men 108.4 cm and women 100.4 cm) with high risk of T2D, who voluntarily participated and were referred to lifestyle counselling by primary care providers. The assessment of person characteristics, self-reported leisure-time physical activity and consumption of saturated dietary fats was based on questionnaires completed by participants and nurses. The Pearson's  $\chi^2$ -test and multivariate logistic regression were used.

**Results:** One third of all respondents were physically active. 27 % percent reported having a diet with high saturated dietary fat content. According to the logistic regression analysis, in women (BMI  $> 30$ ) overweight increased the probability to the self-reported need of change saturated dietary fats use. In men abundant saturated dietary fats use and an age less than 65 increased the probability of the need for change fats use. The need for changing physical activity was more prevalent among overweight women  $< 45$  years of age, and among physically in-active men with waist circumference  $< 94$ cm.

**Conclusion:** The amount of high-risk persons, who eat too much saturated dietary fats and are insufficiently physical active, is alarming. Most of the participants reported that they are consciousness of their needs of behaviour changes. An assessment of the participants' knowledge and stages of change

should be carried out in more detail, making the content of counselling more effective, personal and relevant to the participants' needs

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## 0829

### Effectiveness of a national diabetes prevention campaign for high risk groups in The Netherlands

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**Background and Aims:** Currently 850.000 people in the Netherlands have diabetes and about 3.2 million is at risk for developing the disease in the coming years. Research has shown that a healthy lifestyle can delay the onset of diabetes or even prevent it. Determining which individuals are at risk for diabetes type 2 and stimulating these individuals to live healthily is thus imperative. Consequently, these goals are the main focus of the national prevention campaign entitled 'Look at Diabetes'. This campaign targets high-risk groups (people older than 45 years of age with overweight or obesity) and endeavours to make them aware that they are at risk for developing diabetes type 2. Special attention has been paid to people with a risk higher than average: people with a Turkish, Maroc or Hindu background and with a lower educational level. Those at risk are stimulated to perform the Dutch Diabetes Risk Test. When as a result of this test, people have a high risk of developing diabetes, they are advised to visit their GP for further diagnosis and advice. The campaign itself (April–December 2006) is based on behavioural theories and consists of national and local activities, both for target groups and intermediaries (GP's, practice nurses, dieticians, municipal health organisations).

**Material and Methods:** In order to assess the efficacy of the campaign on knowledge, risk perception (perceived seriousness and perceived vulnerability), perceived avoidability of risk and number of high risk persons detected, a study was performed using the best available design for evaluating mass media campaigns. This study consisted of an effect and process evaluation among target groups and professionals. In total 911 people older than 45 years of age and overweight were recruited for this study: 645 person with an autochthonous and 266 persons with an allochthonous background. To correct for the Hawthorne effects, 50% was asked to participate in the study three times (panel group) and 50% was asked to participate only once (new sample). Data collection took place prior and 3 months after the start, and at the end of the campaign using a combination of face to face interviews (allochthonous respondents) and interviews by phone (autochthonous respondents). Professionals completed a questionnaire concerning attitudes, self-efficacy and perceived barriers to diabetes prevention prior and after the campaign.

**Results:** The campaign was successful in reaching all target groups, especially those with an allochthonous background. Generally the campaign was effective in increasing knowledge concerning diabetes, perceived 'avoidability of risk' and risk perception. Due to the campaign a significant number of people were diagnosed as having diabetes or prediabetes. The study among professionals showed a very positive attitude to diabetes prevention interventions in general and to the campaign in specific. After the campaign the perceived barriers for taking an active role in diabetes prevention were significantly decreased.

**Conclusion:** The campaign was effective in reaching high risk groups with respect to their risk of diabetes and concerning this risk, taking adequate follow up, especially for allochthonous groups. The campaign was also effective in stimulating professionals to take an active role in accomplishing the main targets of the campaign. Based on the results, the national campaign will be further improved and continued for the forthcoming years.

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