

## Subclinical thyroid dysfunction and the risk of heart failure events: an individual participant data analysis from five prospective cohorts

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### Background/Introduction

Subclinical thyroid dysfunction has been associated with systolic and diastolic dysfunction. However, few prospective data exist regarding the association between subclinical thyroid dysfunction and heart failure (HF) events, as well as subgroups at increased risk.

### Methods

We conducted a systematic review in MEDLINE and EMBASE databases without language restrictions, and included prospective observational cohorts with a baseline thyroid function measurement and subsequent follow-up of HF events. Individual data on 19726 participants with 198725 person-years of follow-up were supplied from 5 prospective cohorts in the United States and Europe. Euthyroidism was defined as a TSH 0.45-4.49 mIU/L, subclinical hypothyroidism as a TSH between 4.5-19.9 mIU/L and subclinical hyperthyroidism as a TSH <0.45 mIU/L, both with normal free thyroxine levels.

### Results

Among 19726 participants, 1'618 had subclinical hypothyroidism (8.2%), 515 subclinical hyperthyroidism (2.6%) and 17'593 were euthyroid. During follow-up, 1'838 participants had HF events. In age- and gender-adjusted analyses, the risk of HF increased with higher TSH levels: hazard ratio (HR) was 1.04 (95% confidence interval [CI] 0.79-1.36) for a TSH level of 4.5-6.9 mIU/L, 1.81 (CI 0.88-3.71) for a TSH level of 7.0 to 9.9 mIU/L, and 1.93 (CI 1.07-3.48) for a TSH level of 10.0 to 19.9 mIU/L (p for trend = 0.01). After further adjustment for cardiovascular risk factors, the risk of HF was lower but remained significant among those with TSH ≥10 mIU/L (HR 1.55, CI 1.08-2.21). HR among those with TSH ≥10 mIU/L was higher (HR 2.14, CI 1.15-3.97) in sensitivity analyses excluding thyroid medication users.

### Conclusion

Subclinical hypothyroidism, but not subclinical hyperthyroidism, is associated with an increased risk of HF events in those with higher TSH levels, particularly in those with TSH levels ≥10 mIU/L. Given the high prevalence of subclinical hypothyroidism and of HF events among elderly, this question needs to be addressed in an appropriately powered randomized controlled trial.

## Correlates of physical fitness in patients with type 2 diabetes

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### Background/Introduction

Several fitness outcomes such as muscular strength, aerobic fitness or walking speed are important predictors of mortality and morbidity. We tested if different physical fitness measures correlated to classical morbidity and mortality outcome measures such as BMI, cardiovascular risk factors, metabolic control, diabetic complications and socioeconomic status in patients with type 2 diabetes.

### Methods

Seventy-seven patients from 8 DIAfit centers in the French part of Switzerland were recruited to participate in the study. Hypoglycemic episodes, medication use, BMI, blood pressure, vibration threshold (a measure of neuropathy), lipid profile and HbA1c were assessed. Educational level (EL) was used as proxy for socioeconomic status. We tested the following fitness outcomes: Aerobic fitness (maximal cycle ergometry; W), walking speed (required time for 10m walk; sec), functional lower limb muscle strength (required time for chair stand; sec), balance (maximal time for unipedal stand; sec) and flexibility (finger-floor distance; cm).

### Results

All seventy-seven patients (age 60.2 ± 10.3 yrs (range 30-85 yrs), 58% female, diabetes duration 9.3 ± 7.2 yrs) participated in the study, 6% had at least weekly hypoglycemic episodes. 77% had treated hypertension, 62% had treated dyslipidemia. For 3 patients, falls have been recorded in the last year. The BMI was 31.8 ± 4.9 kg/m<sup>2</sup>, the vibration score 5.5 ± 1.9 and the HbA1c 7.3 ± 1.7%. 41% of the participants had a high, 37% a middle and 22% a low EL). Among all 5 fitness measures, age was inversely correlated with aerobic fitness and balance (r = -0.3, p=0.02 and -0.4, p=0.001). Furthermore, aerobic fitness was higher in men compared to women P=0.0001). In this population, BMI, the vibration threshold, HbA1c levels, the presence of hypertension or of dyslipidemia were not associated with physical fitness measures except for a positive correlation between the vibration sensibility and balance (r=0.3, p=0.04). In contrast, EL was associated with aerobic fitness (r=0.48, p=0.001), muscular strength (-0.4, p=0.006) and walking speed (-0.47, p=0.001).

### Conclusion

In this population of mostly treated patients with type 2 diabetes, classical morbidity and mortality outcome measures were not associated with different physical fitness measures. In contrast, socioeconomic status was highly associated with physical fitness measures in these patients. These findings provide insight into different modulable clinical pathways with the perspective to further improve outcomes.

## An interdisciplinary education program training health professionals to encourage physical activity in patients with type 2 diabetes

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### Background/Introduction

Innovative and feasible ways to encourage physical activity (PA) in diabetic patients are needed. We aimed to evaluate a new interdisciplinary program encouraging health professionals in the community to establish community-based PA programs for patients with type 2 diabetes.

### Methods

The one day interdisciplinary education program took place in the French part of Switzerland in November 2010 and included theoretical presentations, therapeutic education skills training, practical PA sessions, interactive discussions with diabetic patients participating in ongoing PA programs and profession-specific workshops. All participants were given a 47-item evaluation form including both closed and open questions.

### Results

Seventy-one health professional participated (23 physicians, 18 dieticians, 16 sport therapists and 14 diabetes educators) and all filled out the evaluation form. Ninety-three % or more of the participants stated that such an education program was innovative and found it to be adapted or very adapted to their daily practice. Ninety-three % or more found all above mentioned aspects of the program both interesting or very interesting and helpful or very helpful for their daily practice with the exception of therapeutic education which was helpful or very helpful for 86% of the participants. Fifty-five % of the participants rated the theoretical presentations, 49% the therapeutic education sessions, 51% the practical PA sessions, 71% the discussion with patients and 43% the profession-specific workshops as being very interesting. They were no gender or health profession-specific differences in the evaluation (all p=NS). In response to the open question "what is your general impression of this education program", 33/37 responses mentioned the interdisciplinary nature to be an innovative and outstanding strength of the program.

### Conclusion

This innovative interdisciplinary education program was equally attractive across different health professions working in the community. The perceived outstanding strengths were the interdisciplinary nature and the discussion with patients. Further novel approaches of training programs and their effects on modifying patient behavior will be evaluated in the future.

## Low to moderate amounts of sugar sweetened beverages impair glucose and lipid metabolism, including beta-oxidation of fatty acids, in healthy young men - a randomized controlled trial

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### Background and aims

Sugar-sweetened beverages (SSB) have unfavorable effects on glucose and lipid metabolism if consumed in high quantities by obese subjects but the effect of lower doses in normal weight subjects is less clear. The aim was to investigate the effects of SSB, consumed in small to moderate quantities for three weeks on LDL particle distribution, acylcarnitine profiles and other parameters of glucose and lipid metabolism in healthy young men.

### Materials and Methods

29 subjects were studied in a prospective, randomized, controlled cross-over trial. Six three-week interventions were assigned in random order: (1-5) 600 ml SSB containing 40 or 80 g of fructose (medium/high fructose (MF/HF)), or glucose/day (medium/high glucose (MG/HG)) or 80 g of sucrose/day (high sucrose (HS)); (6) dietary advice to consume low amounts of fructose (LF). Outcome parameters were measured at baseline and after each intervention. In addition, acylcarnitine profiles (fasting and during an euglycemic hyperinsulinemic clamp) were measured by mass spectroscopy in a second group of 9 subjects undergoing the same interventions.

### Results

LDL-particle size was reduced after HF by -0.51nm (95% CI -0.19 to -0.82nm) and after HS by -0.43nm (-0.12 to -0.74, p<0.05 for both). Similarly, a more atherogenic LDL subclass distribution was seen when fructose containing SSB were consumed (MF, HF and HS, p<0.05). Fasting glucose increased significantly after all interventions (4-9%, p<0.05). Long-chain fasting acylcarnitines were increased after fructose and sucrose diets (HF and HS), but not after glucose (HG) diets (e.g. C16 Palmitoylcarnitine HF 1.36, HS 1.34 vs HG 0.96 µmol/l, p < 0.05). Depending on the diet, an euglycemic hyperinsulinemic clamp has differential effects on the levels of long chain (i.e. intermediates prior to beta-oxidation) versus short and medium chain acylcarnitines. Overall, these acylcarnitine patterns suggest an effect of fructose containing diets on beta-oxidation flux.

### Conclusion

The present data clearly demonstrate potentially harmful effects of low to moderate consumption of SSB on markers of cardiovascular risk such as LDL particles and fasting glucose. Analysis of acylcarnitine profiles is performed for the first time in this setting and yields further insights into fatty acid metabolism, suggesting effects of fructose containing diets on beta-oxidation of fatty acids.

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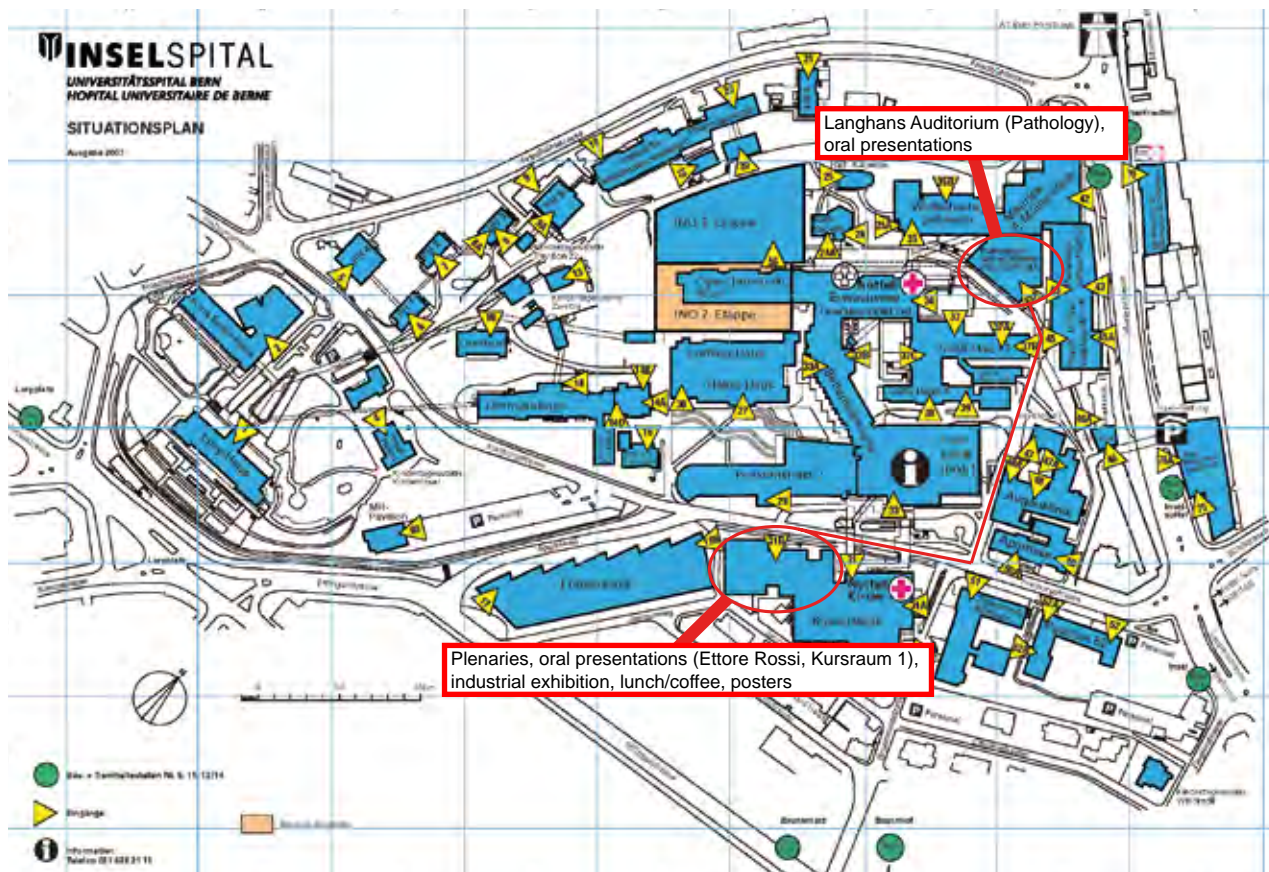
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