Decrease of Subcutaneous Adipose Tissue Topography (SAT-Top) in Healthy Young Children

P.S. Kaimbacher

Introduction
The research and observation of body composition is a topic of current interest. For the assessment of health and variables influencing nutrition and growth, it is of great interest to focus on the population of young children. Objective: This poster, therefore, presents the measurements of subcutaneous body fat distribution in a sample of clinically healthy children with the age range of zero to seven years. In this study we focus on the description of subcutaneous adipose tissue topography (SAT-Top), of healthy subjects during infancy and childhood analysing 1.) the SAT-Top deviations in different age groups and 2.) the difference between female and male subcutaneous adipose tissue patterns for each age group.

Methods
For this purpose, the optical device LIPOMETER (EU Pat. No. 0516251) was applied to measure the thickness of subcutaneous adipose tissue layers (in mm) at 15 well-defined body sites on the right side of the human body. This set of measurement points defines the so-called subcutaneous adipose tissue topography (SAT-Top). In this study, SAT-Top was determined in 275 healthy children (128 girls and 147 boys) divided into three age groups (infant: zero to one year, toddler: one to five years, child: five to seven years).

Results
The results of the measurements are presented on three levels: total subcutaneous adipose tissue (Total-SAT), four body regions (SAT-arms, SAT-trunk, SAT-abdomen, SAT-legs) and 15 body sites. Our results show a clear physiological decrease in subcutaneous body fat in girls (–39.8 %) and boys (–43.8 %). One interesting result was the finding that the decrease happens mainly in the trunk, abdomen and lower extremities, while the body fat distribution of the upper extremities remains more stable over time. Furthermore, slight SAT-Top differences between girls and boys were found.

Conclusions
This study provides a basic documentation of SAT-Top in healthy children ranging in age from zero to seven years. An accurate description of SAT-Top in healthy children could help to characterise various diseases in relation to over- and malnutrition (failure to thrive, feeding and eating disorders) throughout childhood.

Key words
body composition, body fat distribution, LIPOMETER, subcutaneous adipose tissue topography

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Nutrition Transition and Food Consumption Pattern in Eastern Mediterranean Region

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During the four decades, significant social, economic, demographic and political changes have occurred in the region that have greatly influenced the nature, scope and magnitude of the health and nutrition problems and the burden of disease and their related risk factors in most countries. Changes in per capita GNP and lifestyles have affected changes in food consumption patterns in most countries of the region. The region has been categorised to four country clusters with regards to nutrition stages and dominant nutrition problems:

A. **Countries in advanced nutritional transition stage**, with high level of overweight and obesity, and moderate under-nutrition and micronutrient deficiencies in some population sub-groups, i.e. Gulf Countries, Iran and Tunisia.

B. **Countries in early nutritional transition stage** characterised by moderate level of overweight and obesity, under-nutrition in specific population pockets and age groups, and widespread micronutrient deficiencies. Countries in this category are Egypt, Jordan, Lebanon, Libya, Morocco and Syria.

C. **Countries with significant under-nutrition**, particularly high levels of acute and chronic child malnutrition, widespread micronutrient deficiencies, and emerging overweight, obesity and nutrition of indulgence in certain socio-economic subgroups. I.e. Djibouti, Iraq, Pakistan, Palestine, and Yemen. These countries are low income countries with high percentage of poverty.

D. **Countries in emergency and humanitarian crisis** with severe child and maternal under-nutrition and widespread micronutrient deficiencies. Four countries are included: Afghanistan, Somalia, Iraq and Sudan

Countries with low income and/or affected by emergencies

relay mostly in food subsidies and food aid, have the same food consumption characteristics as many poor countries in the world, relaying in cereals. The daily caloric intake is insufficient (2000–2300 kcal/d) cereals contribute to: 60–80 % of total calorie intake, while in countries with advance and early nutritional transitional is exceeding 2900 kcal/d. Cereals contribute more than half of the calorie intake. Sugar consumption has also risen considerably to reach an average level of 30–40 kg/capita/annum. Similarly, fat consumption has increased in several countries and it contributes: 20–25 % of the daily energy supply.

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Estimates of Energy Requirements in Austrian Pupils Preliminary Results of the ASNS 2010/11 Study

P. Putz, I. Elmadfa

Introduction

As a component of the "Austrian Nutrition Report 2012", physical activity behaviour of school children is being examined countrywide. Measures of energy expenditure enable conservative estimates of energy requirements. Additional energy needs derived from growth are relatively small in school aged children and account for 1–2 % of total energy expenditure (TEE).

Aim

To estimate energy requirements of school aged boys and girls.

Methods

By means of a quota sampling stratified for age, gender and geographical region, 267 pupils aged 6 to 14 years have been recruited so far. Basal metabolic rates (BMR) were calculated using the Henry-equations considering gender, age and measured bodyweight. Physical activity was observed by Actigraph GT1M motion sensors on five consecutive days. Activities that are not captured by the motion sensor (e.g. cycling or swimming) were recorded in a daily activity protocol. A flat rate value of 10 % of TEE was included for diet induced thermo-genesis. The physical activity level (PAL) stands for the ratio TEE/BMR. All results are presented as median values [CI 95 %].

Results

TEE was markedly lower in boys aged 6 to 8 years (2344 [2292–2498] kcal/d) when compared to boys aged 13 to 14 years (3080 [2786–3382] kcal/d) which resembles the level of adult men. In girls, TEE stayed practically constant over this age range (2059 [1774–2132] vs. 2101 [2049–2620] kcal/d). During compulsory school education, a remarkable change from a sufficiently active to a predominantly passive lifestyle could be observed in both genders (boys: PAL 2.00 [1.93–2.08] to 1.71 [1.54–1.84]; girls: PAL 1.88 [1.83–1.96] to 1.65 [1.49–1.71]).

Conclusions

In general, energy expenditure derived from physical activity is higher in boys when compared to coeval girls. At school enrolment, children's physical activity behaviour is at a desirable level but declines rapidly until the final stages of compulsory school. The gain of energy expenditure with age in boys is a result of a disproportionately increase of BMR caused by the change of body composition during adolescence. Generally, average energy requirements for girls aged six to 14 years seem to be about 2100 kcal/d. In boys, age plays a key role resulting in a range of about 2300 to 3100 kcal/d. By all means, individual variability needs to be borne in mind.

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Health Enhancing Physical Activity in Austrian Pupils Preliminary Results of the ASNS 2010/11 Study

P. Putz, I. Elmadfa

Introduction

Valid data on physical activity behaviour of pupils are being captured by means of objective measures. This approach eliminates common problems of surveillances like over-reporting, capacity to remember, or untrue information.

Aim

Assessment of health enhancing physical activity in Austri-

an pupils and determination of its influencing factors.

Methods
By means of a quota sampling stratified for age, gender and geographical region, 267 pupils aged 6 to 14 years have been recruited so far. Physical activity was observed by Actigraph GT1M motion sensors on five consecutive days. Motion was captured in moderate (3–6 metabolic units) and vigorous (>6 metabolic units) intensity. Bouts stand for at least ten minutes lasting activity periods. Socio-economic status was assessed using the "family affluence scale" on the basis on four standardised questions. All results are presented as median values (CI 95 %).

Results
On average, children spent 135 [124–147] minutes per day in moderate to vigorous activities. 91 % of which has pertained to moderate intensity activities. Children from Western Austria spent significantly more time in vigorous intensity activities when compared to those from the East (16 [12–19] vs. 10 [7–12] minutes/day; $p < 0.01$). On average, only 16 (13; 18) minutes per day were spent in activity bouts. Boys were more active than girls (153 [139–166] vs. 120 [111–127] minutes/day; $p < 0.01$) and children aged 6 to 8 years were more active than those aged 13 to 14 years (185 [173–207] vs. 93 [80; 117] minutes/day; $p < 0.01$). Moreover, children with low family affluence showed more physical activity when compared to those with high family affluence (182 [121–198] vs. 124 [111–138] minutes/day; $p < 0.05$). Daily time spent in moderate to vigorous physical activity showed negative correlations to waist circumference (Rho = -0.19; $p < 0.01$), hip circumference (Rho = -0.24; $p < 0.01$), and body fat ratio (Rho = -0.24; $p < 0.01$).

Conclusions
Gender, age, geographical region, and family affluence have an impact on the amount of moderate to vigorous physical activity. Not sports and physical activity for transportation form the pupils' activity pattern, but spontaneous physical activity characterised by short and frequent activity periods. The amount of motion has a relevant impact on the shape and composition of the body.

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Vergleich des Vitamin-D-Status bei Erwachsenen im Sommer und Winter

D. Wottawa, I. Elmadfa

Einleitung
Vitamin D wird einerseits über die Nahrung aufgenommen und andererseits im menschlichen Körper unter UV-Lichteinfluss synthetisiert. Vitamin D beeinflusst nicht nur den Calciummetabolismus und damit die Knochenmineralisation, aktuelle Studien zeigen zudem einen Zusammenhang mit dem Muskelstoffwechsel, Krebs, Diabetes mellitus und Multipler Sklerose. Der Normalbereich für die 25-OH-Vitamin-D-Konzentration liegt bei 20–70 µg/L, der wünschenswerte Bereich zur Prävention von Krebs- und Autoimmunerkrankungen liegt bei 30–70 µg/L.

Ziel
Das Ziel dieser Erhebung, welche im Rahmen der Österreichischen Studie zum Ernährungsstatus erfolgte, war zu untersuchen, ob der Vitamin-D-Status österreichischer Erwachsener im Winter aufgrund der geringeren UV-Lichteinstrahlung niedriger ist als im Sommer. Zudem soll gezeigt werden, ob es einen Unterschied der Vitamin-D-Versorgung bei Männern und Frauen gibt.

Material und Methoden
Insgesamt wurden Blutproben von 162 Österreicherinnen und Österreichern genommen (58,7 % Frauen und 41,3 % Männer). 70 Blutabnahmen erfolgten im (Spät-)Sommer, in den Monaten Juli bis September, die restlichen erfolgten im Dezember und April. Anschließend wurden die Konzentrationen an 25-OH-Vitamin D2 und D3 im Plasma bestimmt. Die Analyse erfolgte mit einem Komplett-Kit der Firma Recipe mittels HPLC. Die Auswertung der Ergebnisse erfolgte mit SPSS 18. Es wurde mit dem K-S-Test auf Normalverteilung geprüft und anschließend der t-Test bei unabhängigen Stichproben angewandt.

Ergebnisse
Der mittlere Vitamin-D-Status des untersuchten Kollektivs liegt im Normalbereich bei 29,9 ± 10,6 µg/L (74,8 ± 26,5 nmol/L). Bei jenen Blutproben, die im Dezember und April abgenommen wurden, liegt die Vitamin-D-Konzentration bei 25,4 ± 11,2µg/L (63,5 ± 28 nmol/L), 28,3 % liegen unterhalb des Normalbereichs. Bei jenen Proben, die im (Spät-)Sommer abgenommen wurden liegt die Konzentration deutlich höher bei 35,8 ± 13,5 µg/L (89,5 ± 33,8 nmol/L), nur bei 6,7 % dieser Personen ist die Konzentration unter 20 µg/l. Der Unterschied des Vitamin-D-Status zwischen den Jahreszeiten war statistisch signifikant ($p < 0,05$); zwischen Frauen und Männern gab es keinen Unterschied ($p > 0,05$).

Schlussfolgerungen
Da die Vitamin-D-Konzentration im Winter signifikant niedriger als im Sommer ist, soll vor allem im Winter auf eine Vitamin-D-reiche Ernährung sowie ausreichende UV-Lichteinstrahlung geachtet werden.

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Status Estimations and its Influencing Factors on Water Soluble Vitamins and Related Compounds among Austrian Adults Preliminary Results of the ASNS 2010/11

N. Weidl, I. Elmadfa

Introduction
Biochemical markers deserve special attention and give an objective measurement when assessing the nutritional status.

Aim
To investigate the status of water soluble vitamins and its influencing factors among Austrian adults.

Method
364 adults aged 18 to 65 years have been recruited through quota sampling stratified for gender, age and geographical region. Blood and urin samples in addition to a questionnaire have been collected. Radio immuno assay was used to assess folate and vitamin B12 concentrations in plasma. Vitamin B6, C and homocystein concentrations in plasma and vitamin B2 and B1 concentrations (mmol) in urin in relation to creatinine (mmol) excretion were analysed using HPLC. All results are presented as median values [IQR 95 %].

Results
Most study participants assessed were in the range of an optimal status when looking at concentrational biomarkers. Suboptimal values (high risk of deficiency) could be observed for only 1.6 % for vitamin B2, 3.2 % for vitamin B1, 4.9 % for folate, 7.5 % for vitamin B12 and 0.3 % for vitamin C. Low risk of deficiency was observed for 14 % for vitamin B6. Markedly lower concentrations in men than women were found for vitamin B1 (42 [29–91] nmol/mmol vs. 49 [31–75] nmol/mmol, $p<0,05$), vitamin B2 (78 [38–131] nmol/mmol vs. 90 [51–162] nmol/mmol, $p < 0,05$), vitamin C (54 [40–70] µmol/L vs. 67 [56–80] µmol/L, $p < 0,01$) and folate (16 [11–22] nmol/L vs. 19 [14–25] nmol/L, $p < 0,01$) but higher concentrations for vitamin B6 (56 [40–92] nmol/L vs 49 [33–68] nmol/L, $p < 0,05$) and homocystein (14 [12–16] vs. 12 [10–14] $p < 0,01$). No significant difference was observed for vitamin B12. Smokers had a lower vitamin C concentration when compared to non smokers ($p < 0,01$). Vitamin supplementation contributed for all nutrients to an elevated concentration except for vitamin B12 when compared to non vitamin supplementation users ($p < 0,01$). Homocystein concentration was lower in supplementation users ($p < 0,05$). Body mass index (BMI) was not associated with a change in nutrient concentration. A BMI above 25 was associated with an elevated homocystein concentration ($p < 0,05$).

Conclusion
In general women had a higher concentration of most water soluble vitamins except for vitamin B6 when compared to men. To make more general assumptions on the nutritional status functional biomarkers in addition to nutrient intake data need to be considered.

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Intake of Macronutrients in Austrian Children aged between 7 and 14 Years and the Effect of Different Influencing Factors

K. Wagner, I. Elmadfa

Introduction and Objective
An adequate energy and macronutrient intake is important for the development and growth of children. The full supply of energy and macronutrients may be affected by different influencing factors like age, gender, location of home, wealth or migration. Therefore this analysis was done to detect risk groups with inadequate energy and macronutrient intake.

Methods
The study sample, which is a preliminary subsample for the Austrian Nutrition Report 2012, included 267 Austrian children aged between seven and 14 years. Data were collected from October 2010 to June 2011. Dietary intake was measured with a 3-day dietary record and analysed with the nutritional software package nut.s. Anthropometric data were measured; additional individual-related data e.g. socio-economic status was assessed with a self administered questionnaire. Values are presented as mean and standard deviation.

Results
Compared to Reference Intake Values (D-A-CH, 2008) all age groups had a too low energy intake (6.5 ± 1.5 MJ). Whereas the intake of carbohydrates (54.5 ± 6.8 % of energy intake) and fat (31.4 ± 5.6 % of energy intake) was adequate for all age groups, the intake of protein (13.0 ± 2.8 % of energy intake) was too high. Moreover, the intake of fibre was too low for all age groups (2.0 ± 0.5 g/MJ).

Analysis of tested influencing factors showed that boys had a higher intake of energy ($p < 0.05$) compared to girls and age affected the intake of fibre ($p < 0.05$). The location of home concerning Western and Eastern Austria, as well as urban or rural areas did not have an effect on the intake of energy and macronutrients. Furthermore, family affluence as well as the education level of the mother had no effect on the intake of energy and macronutrients. Children with migration background had a higher relative protein intake ($p < 0.01$) but this characteristic did not affect other macronutrients.

Conclusion

In this preliminary analysis self reported energy intake was too low for children. However, the contribution of macronutrients was adequate for carbohydrates and fat but slightly high for protein. Although the intake of macronutrients was stable against several influencing factors (location of home, family affluence) further investigation is needed to detect groups which have a high risk of inadequate macronutrient intake.

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Influence of Sleep Efficiency and Duration on Energy and Carbohydrate Intake of 10 to 14 year-old Children

E. Ballhaus, P. Putz, I. Elmadfa

Introduction

In the course of studies for the "Austrian Nutrition Report 2012", sleep parameters of 10 to 14 year old children have been evaluated next to physical activity and nutrition behaviour, which play an important role for growth, maturation, and health of children. Concurrent with the rise of obesity worldwide, a chronic sleep deprivation has been detected. Short sleep duration turned out to be a novel risk factor for weight gain and obesity.

Aim

To estimate the influence of sleep efficiency and duration on energy and carbohydrate intake in 10 to 14 year old children.

Methods

65 children have been recruited as part of a study for the "Austrian Nutrition Report 2012". Each child wore an Actigraph GT1M on three consecutive nights. Thereby, sleep quality was captured by measurements of sleep onset, sleep latency, total sleep time, number and duration of awakenings and sleep efficiency, i.e. total sleep time divided by time in bed. Additionally, a three-day dietary record was completed, whereby energy intake as well as the distribution of carbohydrates could be estimated by the software package nut.s science. All results are presented as mean values (CI 95 %).

Results

On average, children had a self-reported energy intake of 1207 (1127–1374) kcal/d. Carbohydrates contributed to 54 % (51–56) of energy intake (E%). 28 E% (26–31) accounted for complex carbohydrates, 15 E% (13–17) for disaccharides, and 8 E% (7–9) for monosaccharides. Sleep efficiency (90 % [87–91]) showed negative correlations with total energy intake ($r = –0.487$; $p < 0.01$), carbohydrates ($r = –0.256$; $p < 0.05$), monosaccharides ($r = –0.467$; $p < 0.01$), and fructose ($r = –0.510$; $p < 0.01$). In almost the same manner, sleep duration (495 [481-509] minutes) showed a significant relationship to total energy intake ($r = –0.283$; $p < 0.05$), monosaccharides ($r = –0.297$; $p < 0.05$), and fructose ($r = –0.283$; $p < 0.05$). Energy intake was lowest after a sleep duration of 9 to 9.5 hours (1079 [842–1316] kcal).

Conclusions

Short sleep duration and low sleep efficiency were related to a higher intake of total energy and total carbohydrates, especially regarding monosaccharides like fructose. A sleep duration of 9 hours correlated with the lowest energy intake and could therefore be recommended to children aged 10 to 14.
The study (BMG-70420/0342-II/B/8/2009) was supported by the Federal Ministry of Health.

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Prevalence of Overweight and Obesity in Austrian Children

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Introduction

As shown in the last Austrian Nutrition Reports from 1998 and 2003, child overweight and obesity remain a problem of public health concern. Overweight and obese children are more likely to experience obesity-related health problems and to face psychological problems. To implement obesity prevention strategies it is inevitable to monitor the current situation.

Aim
To examine the prevalence of overweight and obesity in Austrian children.

Methods
The presented data were collected within a cross-sectional study (Austrian Study on Nutritional Status) which was conducted 2010/11 to prepare the Austrian Nutrition Report 2012. Altogether, 266 7- to 14-year-old school children were examined. Body height and body weight were measured. For the classification of underweight, normal weight, overweight and obesity the 10th percentile, the 90th percentile and the 97th percentile were used as cut-off points.

Results
4.7 % of the girls (n=128) were underweight, 74.2 % normal weight, 15.6 % overweight and 5.5 % obese. In boys (n=138), the prevalence of overweight was 17.4 % and of obesity 11.6 %. 2.8 % were underweight and 68.1 % normal weight. Body weight was above the recommended ranges in 18.1 % of the girls aged 7 to 10 years and in 29.0 % of the boys in this age group. With increasing age, the prevalence of overweight and obesity in girls rose further: 25.0 % of 11- to 14-year-old girls were overweight or obese. In boys, the prevalence of overweight and obesity remained constant. In Eastern Austria, 22.8 % of school-aged girls and 29.4 % of school-aged boys were classified as overweight or obese, whereas in Western Austria the prevalence was 10.3 % and 28.5 %, respectively. As shown in previous nutrition reports, a distinctive west-to-east upward gradient is apparent. The prevalence of overweight and obesity in school-aged children rose markedly in comparison with the Austrian Study on Nutritional Status 2007. The percentage of overweight and obese girls increased from 17 % to 21.1 % and that of boys from 21 % to 29 %.

Conclusion
The problem of child overweight and obesity still remains of particular concern. Therefore effective public health efforts should be developed to promote healthy growth and to prevent obesity in young people.

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Prevalence of Overweight and Obesity in Austrian Adults

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Introduction
Worldwide, the prevalence of overweight and obesity is increasing dramatically. New analyses of the *International Association for the Study of Obesity* and the *International Obesity Taskforce* estimate that approximately 1.0 billion adults are currently overweight, and a further 475 million are obese. Previous studies showed that in Austria the prevalence is increasing, too. Therefore, overweight is one of the most common public health issues in Austria.

Aim
To examine the prevalence of overweight and obesity in Austrian adults.

Methods
The presented data were collected in the course of a cross-sectional study (*Austrian Study on Nutritional Status*) which was conducted 2010/11. Altogether, 318 Austrian adults aged 18 to 65 years were examined. Body height and body weight were measured.
In adults the body mass index (BMI) is commonly used to classify underweight, normal weight, overweight and obesity and is calculated as weight in kilograms divided by the square of the height in metres (kg/m²). The WHO defines overweight as a BMI ≥25 kg/m² and obesity as a BMI ≥30 kg/m².

Results
18 % of adults aged between 18 and 42 years were overweight and 6 % were obese. With increasing age the prevalence rises further: 32 % were overweight and 19 % were obese.
In Austria previous studies showed a distinctive west-to-east upward gradient concerning the prevalence of overweight and obesity. The presented study confirmed this gradient. In Eastern Austria, 29 % of adults aged between 18 and 42 years were overweight and another 9 % were obese. In Western Austria, only 10 % of this age group were overweight and another 3 % were obese. Among adults aged between 43 and 65 years, 39 % were overweight and another 27 % were obese in the Eastern area. In the Western area, only 25 % of this age group were overweight and another 7 % were obese.
A trend of a rising prevalence of overweight and obesity continues 2011 in men along with the *Austrian Studies on Nutritional Status 2003 and 2008* (41 %; 52 %; 53 %). In women, a slight decline could be observed in the current examination (26 %; 31 %; 23 %).

Conclusion
Hence 23 % of females and about half of males are overweight and obese, overweight is still a huge public health issue in Austria.

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Vegetables and Plant Oil Improve Risk Factor for Secondary Complications in Subjects with Type 2 Diabetes

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Background
The number of people suffering from Type 2 Diabetes (T2DM) worldwide has reached an alarming level and is predicted to increase even further. Epidemiological studies emphasise the role of glycaemic control in T2DM subjects to prevent later complications. The diet has major impact on the onset and progress of diabetes related complications. Therefore a human intervention study was performed to investigate the ability of a nutritional therapy to modify risk factors associated with diabetes.

Methods
76 diabetic and 23 non-diabetic subjects took part in a parallel intervention study. Subjects were randomly assigned to the control or intervention group. All subjects received information about the potential of a healthy diet and subjects, who were randomised to the intervention group, received daily additionally 300 g of vegetables and 25 g of plant oil for eight weeks. HbA1 and parameters of lipid metabolism were measured at baseline (T0), after four (T1), eight (T2 – end of intervention), and 16 weeks.

Results
Glycaemic control improved significantly after four and eight weeks of intervention in diabetic subjects (HbA1c –2.59 % after four weeks and –2.91 % after eight weeks). Surprisingly HbA1c was also significantly reduced after eight weeks in diabetic subjects of the control group, receiving information about the benefits of a healthy diet (–3.04 % after eight weeks). Levels of HbA1c remained constant in healthy subjects. Total cholesterol and LDL were significantly reduced after eight weeks of intervention in diabetic and healthy subjects (total cholesterol –4.55 %, LDL –6.82 % in diabetic subjects and total cholesterol –8.63 %, LDL –2.49 % in healthy subjects after eight weeks). Triglycerides and HDL were not changed during the intervention. There were no significant effects on parameters of lipid metabolism in subjects of the control group.

Conclusion
A nutritional intervention with vegetables in combination with a plant oil rich in polyunsaturated fatty acids has beneficial effects on glycaemic control and lipid metabolism of diabetic subjects. Even information about health benefits of a balanced diet has impact on glycaemic control.

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Detecting Body Fat – a Weight Problem – BMI versus Subcutaneous Fat Patterns

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Backround
Although the body mass index (BMI, kg/m^2) is widely used as a surrogate measure of adiposity, it is a measure of excess weight, rather than excess body fat, relative to height. The BMI classification system is derived from cut points obtained from the general adult population and may not be specific for subgroups such as athletes and young adults. The use of subcutaneous adipose tissue topography (SAT-Top) seems to be a more effective access for such cases.

Aim
The purpose of this study was 1) to describe the interrelation between BMI and the SAT-Top within young athletes and not active controls, 2) to ascertain the accuracy of the BMI classification system as a measure of body fat, 3) to comparatively evaluate by means of receiver operating characteristic (ROC) curves the diagnostic powers of BMI and SAT thicknesses at different body sites and 4) to investigate the usefulness of the subcutaneous fat patterns as a screening tool for a risk phenotype in adolescent and physically active.

Methods
The optical device *LIPOMETER* was applied to measure the thickness of subcutaneous adipose tissue (SAT) in mm at 15 well-defined body sites distributed from neck to calf on the right body site. This set of measurement points defines a SAT-Top. Age, height, weight, BMI and SAT-Top were determined in 64 men (32 athletes and 32 controls matched in age, height, weight and BMI) and 42 women (21 athletes and 21 controls with comparable age and height). Female athletes provided even significantly higher weight and BMI compared to their controls. The selectivity of measurement points was detected by ROC-analysis, which is a useful method for organising classifiers and visualising their performance. The higher sensitivity and specificity, the more the ROC-Curve shifts into the upper left corner of the graph and the Area Index (= AI) goes towards one, so consequently the selectivity between the groups is strong. Generally the AI can reach from zero to one (= strongest selectivity). If the curve is near the diagonal (= AI 0.5) the selectivity is weak (see BMI in men). If the AI is <0.5 you find the curve under the diagonal and you have to check the counter-hypothesis (see BMI in women).

Results
In men the measurement point neck (AI = 0.952) and the

compartment trunk (AI=0.960) provided the strongest discrimination power: 90.6 % (= 58 of 64) of the subjects were correctly classified as athletes or controls. In women the measurement point triceps (AI = 0.908) 85.7 % (36 of 42) correctly classified subjects and the compartment arms (AI = 0.923) 88.1 % (37 of 42) correctly classified subjects showed the strongest discrimination power.

Conclusion
The results of our current study suggest that BMI is not an accurate predictor of fatness in young athletes and nonathletes, because SAT-Top provided enormous differences between these groups. Probably due to a larger muscle mass among the male and female athletes, BMI incorrectly classified normal fat athletes as overfat. Therefore, our results suggest the subcutaneous fat patterns are a better screening tool to characterise fatness in physically active young people.

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Die Lebensmittelverpackung im Spannungsfeld zwischen Marketing und Gesetz: Eine Untersuchung über den Einfluss der Verpackung und deren Werbewirkung auf das Konsumentenverhalten am Beispiel von Obst und Gemüse

S. Moosheer, G. Karner, J. Möseneder

Der Aufmachung eines Produktes kam in letzter Zeit besondere Aufmerksamkeit zu, da, ausgelöst durch Verpackungen mit irreführendem Potenzial, immer öfter infrage gestellt wurde, inwieweit der gesetzliche Schutz der Konsumenten bezüglich täuschender Lebensmittelverpackungen lückenlos gewährleistet ist.
Diese Arbeit hat sich zum Ziel gesetzt, die rechtlichen Grundlagen der Lebensmittelverpackung, deren werbewirksame Ausschöpfung seitens des Marketings und die möglichen, sich daraus ergebenden Fehlannahmen der Konsumenten über das Produkt darzustellen. Des Weiteren wird das Thema um die Werbewirkung eines Lebensmittels vertieft behandelt und dahingehend untersucht, ob durch forcierte Werbemaßnahmen auch eine Erhöhung des Obst- und Gemüseabsatzes und folglich des Obst- und Gemüsekonsums der Österreicherinnen und Österreicher – ein zentral angestrebtes Ziel der Berufsgruppe der Diätologie – erreicht werden kann.
Hierzu folgt nach der literarischen Aufbereitung des Themas eine einleitende, aus Sicht der Konsumenten aufbereitete Status-quo-Analyse über die derzeit oder in den letzten Jahren in Ostösterreich wahrgenommenen Werbemaßnahmen für Obst und Gemüse. Das Ergebnis der Analyse, die mangelnde Nutzung der Werbemittel am Verkaufsort (Point of Sale, POS), war Ausgangspunkt für die darauffolgenden Marketingideen und -strategien, welche den Obst- und Gemüseabsatz stärken sollen. Verdeutlicht wurde die Wirkung des Marketings durch ein Feldexperiment in einem österreichischen Supermarkt, wo zum einen die Absatzveränderung bei Zweitplatzierung von Cherrytomaten an der Kassa, und zum anderen der Absatzzahlenvergleich bei veränderter Verpackungsgestaltung untersucht wurden.
Die Ergebnisse zeigen, dass eine Kassa-Zweitplatzierung auch bei Obst- und Gemüsewaren zielführend ist: Der Absatz stieg von 34 auf 104 verkaufte Packungen an. Außerdem griffen 61 Prozent der Käufer zur verzierten Tomatenverpackung.
Aus der Untersuchung kann man schließen, dass der Obst- und Gemüseverkauf durch verstärkte Werbemaßnahmen (vor allem am POS) erhöht werden kann. Unter der Annahme, dass man isst, was man kauft, kann dies auch als neue Möglichkeit gesehen werden, Österreichs Bevölkerung zu einem erhöhten Obst- und Gemüsekonsum zu bewegen.

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Körperschema und Diätverhalten: Unterschiede zwischen realer und wahrgenommener Körperform in Bezug auf das Körpergewicht und im Zusammenhang mit dem Diätverhalten von Jugendlichen

S. Gimplinger, D. Wewerka-Kreimel, J. Möseneder, G. Karner

Die Prävalenz von übergewichtigen und adipösen Jugendlichen ist stark angestiegen. Gegensätzlich wird von der Gesellschaft ein untergewichtiger Körper als Schönheitsideal angesehen. Da ein Großteil der Jugendlichen versucht, diesem Idealbild durch gewichtssenkende Maßnahmen zu entsprechen, steigt die Unzufriedenheit mit der eigenen Körperform. Dadurch kann eine verzerrte Körperformwahrnehmung entstehen.
In dieser Arbeit soll geklärt werden, wie sich das Körpergewicht auf die Beurteilung der Körperform und auf das Diätver-

halten auswirkt. Dadurch soll der Zusammenhang zwischen dem Körpergewicht und der Bewertung der Körperform bzw. der Körpergewichtsreduktion untersucht werden.
Durch eine quantitative Befragung mittels Fragebogen und der Erhebung von Körpergewicht, Körpergröße und Taillenumfang (TU) wurde das Thema empirisch untersucht. Die Grundgesamtheit stellten 180 Oberstufengymnasiastinnen und -gymnasiasten im Alter zwischen 14 bis 18 Jahren dar, wobei 69 Mädchen und 48 Jungen den Fragebogen korrekt ausfüllten (n = 117). Nominal skalierte Variablen wurden anhand von Kreuztabellen verglichen und durch den chi^2 Test nach Pearson auf signifikante Abweichungen geprüft. Die Stärke des Zusammenhangs wurde durch den Kontingenzkoeffizienten (C) nach Pearson berechnet. Die Ergebnisse zeigen einen höchst signifikanten ($p \leq 0{,}001$) Zusammenhang zwischen dem Gewicht und der Körperformwahrnehmung (C = 0,649). Acht von elf Übergewichtigen nehmen sich als normalgewichtig wahr und keine/r der adipösen Jugendlichen bezeichnet sich als „dick". Der Zusammenhang des Gewichts mit der Gewichtsreduktion ist schwach (C = 0,334). Es haben dennoch 82 % der übergewichtigen und 80 % der adipösen Schülerinnen und Schüler versucht, Gewicht abzunehmen. Diese Ergebnisse widersprechen sich, da sich der Großteil der übergewichtigen Jugendlichen nicht als „rundlich" betrachtet, aber schon Gewicht reduzieren wollte. Inwieweit hier das gesellschaftliche Schönheitsideal bzw. andere Faktoren einwirken, sollte durch weitere Studien repräsentativ analysiert werden.

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Qualitative Analysis of Chinese Medical Herbs for the Prevention and Therapy of Age Related Diseases

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Background
Age related diseases (ARD) have a dramatic impact on the health care budgets in developing countries. This study aims to contribute to the quality control of Traditional Chinese Medicine (TCM) herbs, which could be used for prevention and therapy of ARD. Sinitang is a Chinese herbal formula which has a long tradition to prevent and treat cardiovascular diseases. It consists of Fuzi (*Aconitum carmichaelis*), Ganjiang (*Zingiber officinalis)*, Rougui (*Cinnamomum cassia)* and Gancao (*Glycyrrhiza uralensis*). Hongqu (Red Yeast Rice), Jiaogulan (*Gynostemma pentaphyllum*), Baiguo (*Ginkgo biloba* seed), Yinxinye (*G. biloba* leaf) and Danshen (*Salvia miltiorrhiza*) are "anti aging" herbs used for lowering the cholesterol level, reducing the risk of cardiovascular diseases and improving cerebral and lung functions.

Methods
The Quality control of the Chinese herbs was performed by High Performance Liquid Chromatography (HPLC). The protein of herbs was analysed by Sodium Dodecylsulfatepolyacrylamide Gel Electrophoresis (SDS-PAGE) and protein sequencing.

Results
The active components [8]-gingerol, cinnamaldehyde and glycyrrhizic acid were identified in Sinitang by HPLC. Lovastatin was detected in the extracts of Hongqu. Rutin was identified in Jiaogulan extracts. The ginkgolides A and B were detected in Baiguo and Yinxinye extracts. Salvianolic acid B was detected in Danshen. The dried leaves of *S. officinalis* from Austria and Albania contained the same substances. One unknown substance appeared in all species of *Salvia*.

Conclusion
HPLC is a useful method for quality control of Chinese and European medical herbs. The protein analysis including determination of protein concentration and protein identification by sequencing could promote the development of quality control of TCM herbs to a new level.

Keywords
Quality control, Chinese medical herbs, HPLC, age related diseases

This study was supported by the Austrian Federal Ministry of Science and Research and the Austrian Federal Ministry of Health (TCM Research Cluster Austria, 09/2008–09/2011).

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Traditional Chinese Herbal Medicine for Prevention and Therapy of Heart Failure

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Background
Heart failure (HF) is a killing disease in Europe. Ten million people are currently suffering from HF. Every year 300.000 patients die of chronic heart failure (CHF), and 400.000 patients are diagnosed de novo. CHF is one of most important diseases in cardiology with a dramatic impact on the health

care budgets in the developed countries.

Objective
This project aims to contribute to the evidence based evaluation of traditional Chinese medical herbs in the prevention and treatment of heart failure using a rat model of chronic heart failure post myocardial infarction (MI).

Design
We chose a Chinese herbal formula "Sinitang" (SNT) as a basic formula in this study. SNT consists of four Chinese medical herbs: Aconitum carmichaelii, Zingiber officinale, Glycyrrhiza uralensis and Cinnamomum cassiahas, and has a longstanding tradition in the prevention and treatment of cardiovascular disease in China. Quality control, toxicological and pharmacological investigations were performed including HPLC fingerprinting analysis and heavy metals testing. Hemodynamics measurements by transthoracic echocardiography were assessed in vivo in a rat model in order to evaluate the heart function. The impact of SNT on ventricular remodelling was evaluated by measuring the expression and activity of serum and heart tissue markers (cardiac troponin T, collagens, Hs-CRP, IL-6, TNF-α and endothelin) in animals and in cell cultures.

Results and Conclusions
A clear reduction of left ventricle (LV) remodelling and improvement of cardiac function after myocardial infarction (MI) were observed after SNT treatment. Data demonstrated that SNT decreases the inflammatory process. Rats accepted readily SNT and no toxic side effects were observed. The Chinese herbal formula SNT is a possibility for prevention and treatment of myocardial infarction.

Key words
Heart failure, myocardial infarction, Chinese medical herbs, rat model

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Dairy Products of Hay Fed Cows as Suppliers of cis-9, trans-11-conjugated Linoleic Acid and their Effect on Atherosclerotic Processes

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Purpose and Research method
Dairy products of hay fed cows could gain importance for the prevention of cardiovascular diseases due to their content of CLA and omega-3-fatty acids. According to studies, CLA act, beside other effects, as antiatherogenics or as antiinflammatories and reduce elevated blood lipids.

Results
The average daily intake of CLA in Austria is about 400 mg. Dairy products of hay fed cows show considerably high amounts of CLA. An effective dose of 1500 mg CLA could be achieved by those certain dairy products. Up to now, dietitians in Styria do not recommend them in nutritional treatment.

Conclusion
A lot of research still has to be done until milk and dairy products become a standard for the nutritional treatment of cardiovascular diseases. The results of this bachelor's thesis should heighten the awareness of high quality dairy products.

Keywords
Conjugated linoleic acid, Trans-vaccenacid, Atherosclerosis, Inflammation, Trans fatty acids, omega-3-fatty acids

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Plasma Levels of Sodium, Chloride and Potassium of 118 Austrian Men and Women between the Age of 18 and 64 Years

T. Kuen, I. Elmadfa

The main electrolytes in the body are sodium, chloride and potassium. Sodium and potassium are primarily cations while chloride primarily occurs as anion. High concentrations of potassium can be found in the intracellular fluid, while the extracellular fluid contains high levels of sodium and chloride. Cell membranes regulate the transfer of electrolytes to and from the plasma. There is a strong correlation between sodium chloride intake and sodium plasma level. Increased sodium intake results in high sodium concentrations in the plasma.

The aim of this study is to assess the levels of these three electrolytes in plasma. Data were collected within a cross sectional study which was conducted 2010/11 to prepare the Austrian Nutrition Report 2012.
Blood samples were collected from 118 Austrian women and men between the age of 18 and 64 years. Electrolyte levels were analysed with the Ortho Clinical Vitros 250 Chemistry System. For quality control two Vitros Performance Verifier by Ortho-Clinical Diagnostics were used. The intake of these minerals was collected with 24-h-recall, but not evaluated yet.
The mean chloride plasma level of the analysed samples was 107.9 mmol/L ± 9.7 mmol/L and lies within the reference range of 99–110 mmol/L. 72.0 % of the participants had a plasma chloride level within the reference range. 23.7 % had higher plasma chloride concentrations and 4.2 % showed lower levels.
The analysed mean sodium plasma level was 145.6 mmol/L ± 11,1 mmol/L and lies within the reference range of 136–146 mmol/l. 10.2 % of the participants are classified as hyponatremia (<136 mmol/L) and 44.07 % had higher plasma sodium concentrations than 146 mmol/L, which is called hypernatremia. The mean plasma potassium level was 4.5 mmol/L ± 0.7 mmol/L and therefor lies within the recommended reference range of 4.1–4.7 mmol/L. 66 of 118 samples (55.9 %) showed normal potassium levels while 17.0 % occurred to have lower potassium concentrations. 21.1 % showed higher plasma potassium as the normal upper plasma level.
Populations with a generally low plasma level of potassium and high sodium concentrations in the plasma appear to have an increased frequency of hypertension and increase of cardiovascular disease risk. So attention should be given to the dietary intake of sodium chloride.

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Acceptance of Traditional Chinese Medicine in the Treatment of Obesity and Metabolic Disorders in Western Medicine

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Keywords
Obesity, metabolic disorder, Traditional Chinese Medicine, western medicine

Background
Obesity and related metabolic disorders have become an increasing public health problem internationally. Over a billion people are overweight in the world. In Austria, 11 % of adults are obese and 31 % are overweight. In China the prevalence of obesity increased to triple in the last 30 years.

Objective
The purpose of this project was to compare Traditional Chinese Medicine (TCM) and the western medicine especially in the treatment of obesity and metabolic disorders. The focus was set on the survey of acceptance of TCM in the treatment in western medicine.

Methods
Interviews with general practitioners and TCM practitioners were done to get information about the recent acceptance in the treatment of obesity and metabolic disorders. While analyses from the western medicine are based on experimental and scientific methods, TCM is based on Yin and Yang, the Qi theories and the theory of the five elements. The differential diagnosis of obesity and the metabolic syndrome in the western medicine is based on defined body and blood parameters. The causes of the diseases are explained by wrong eating habits, genetic nature, cultural, psychological and social factors and a lack of exercises. The differential diagnosis of obesity and the metabolic syndrome in TCM is based on a weakness of stomach and anthrax as well as a disease of the centre. Western medicine sets the focus on the symptoms. TCM sets the focus on prevention and a holistic medicine to keep and protect the healthy Qi and to integrate the body and the spirit.

Results
The results of the interviews show that general practitioners are becoming increasingly more open minded with respect to TCM especially in the last years. They recommend TCM when they come to the limits with their medicine. For TCM it is essential to start the therapy in an early stage of the disease. Western medicine appears to be more effective at an advanced stage.

Conclusions
We can conclude that the optimal results of treatment can be observed when TCM and western medicine are used as a combined therapy.

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Bile Pigments Protect the DNA in Oral Cells

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Background
Bile pigments are endogenous compounds that are actively produced in humans via the heme catabolism. The importance of bilirubin in humans has more recently been demonstrated in large epidemiological investigations by protecting from cardiovascular events and cancer. However, so far no mechanistic data are available on the BMcyt assay (Buccal micronucleus cytome assay), which is a minimally invasive method for studying DNA damage, chromosomal instability or cell death in high bilirubinic subjects (Gilbert Syndrome, GS).

Methods
In this case-control study with cross-sectional design, buccal samples were taken from 100 subjects, GS and control. Allocation to GS group required serum unconjugated bilirubin levels >1 mg/dL (Controls < 1 mg/dL). Buccal cells were collected from both cheeks of the subjects; the obtained cells were extracted, fixed on slides and stained with light green. In addition to Micronuclei (MNi) and cells containing MNi (MNC), the number of other anomalies such as binucleated cells (BN) and broken eggs (BE), as well as karyorrhexis (KR), karyolysis (KL), condensed chromatin (CC) and pyknosis (P) was evaluated.

Results
There was no significant difference for all parameters between the GS and control group. However, when considering the age impact we could observe that BE ($p < 0.05$) as well as MNi and MNC (p for trend) were lowest in the older GS group (subjects older than 30 years of age). Furthermore, women (23.4 ± 12.5) had almost significantly higher amounts of KR than men (19.9 ± 12.0) ($p < 0.076$).

Conclusion
For the first time buccal cell DNA damage was investigated considering the bilirubin status of human subjects. We could show that with increasing age the protective effects of bilirubin lead to less BE and almost less MNi and MNC. This is the first mechanistic prove of cancer protection by bile pigments in human subjects.

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Ernährung und Nachhaltigkeit: Sind biologische Produkte besser als konventionelle?

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Einführung
Die kürzlich vermehrten Infektionen an EHEC (Enterohämorrhagische Escherichia coli) in Europa, für deren Ausbruch unter anderem Gemüse aus biologischem Anbau unter Verdacht stand, hat zum Entstehen neuerlicher Diskussionen über gesundheitliche Vorteile von Bio-Produkten, im Vergleich zu Lebensmitteln aus konventionellem Anbau, beigetragen. Der Wunsch der Konsumenten nach gesunden und qualitativ hochwertigen und gleichzeitig sicheren Lebensmitteln, ist stetig im Steigen begriffen. Im Rahmen des Projekts Gesunde Ernährung und Nachhaltigkeit (GERN) wird ein Zusammenhang zwischen Gesundheit, Ernährungsgewohnheiten, Anforderungen an die landwirtschaftliche Produktion und Umweltbelastung dargestellt. Unter Berücksichtigung dieses Hintergrunds war ein Teilaspekt, ob man von einem gesundheitlichen Vorteil von biologischen Lebensmitteln im Vergleich zu konventionellen ausgehen kann und ob eine gänzliche Umstellung auf biologische Landwirtschaft in Österreich zu realisieren wäre, falls sich die Österreicher an die geltenden Ernährungsempfehlungen halten würden.

Ergebnisse
Die Unterschiede zwischen biologischer und konventioneller Anbauweise in Bezug auf gesundheitliche Aspekte werden kontrovers diskutiert. Laut AGES (Österreichische Agentur für Gesundheit und Ernährungssicherheit) bestehen zwischen den beiden Anbauarten keine signifikanten Unterschiede in der Schadstoffbelastung. Jedoch werden in anderen Studien höhere Schadstoffbelastungen bei konventionellen Lebensmitteln beobachtet, obgleich innerhalb der gesetzlichen Vorgaben. Auch in Bezug auf ernährungsphysiologische Unterschiede finden sich in der Literatur kontroverse Ergebnisse, beispielsweise beim Zuckergehalt oder Vitamin-C-Gehalt. In biologischen Produkten finden sich aber Hinweise auf einen höheren Anteil an konjugierten Linolensäuren und Omega-3-Fettsäuren in Milch, höhere Proteingehalte beispielsweise in Tomaten sowie eine bessere Verdaulichkeit des Bio-Weizen-Proteins im Vergleich zum konventionellen. Allerdings zeigen zusammenfassende Beurteilungen, dass kein Unterschied hinsichtlich der Nährstoffqualität besteht. Hinsichtlich der notwendigen Fläche zeigt die biologische Landwirtschaft einen erheblichen Mehrbedarf. Da bereits derzeit, bei aktueller Ernährung, Ackerflächen im Ausland benötigt werden, um eine Nahrungsmittelversorgung der österreichischen Bevölkerung sicherzustellen, würde ein weitreichender Umstieg auf biologische Landwirtschaft zu einer verstärkten Abhängigkeit von Ackerflächen im Ausland führen. Selbst bei einer angenommenen empfohlenen Ernährung mit einer damit einhergehenden Flächeneinsparung wäre eine Eigenversorgung der österreichischen Bevölkerung ausschließlich durch biologische Landwirtschaft, wenn auch knapp, nicht

möglich. Es würden weiterhin zusätzlich etwa sechs Prozent der aktuellen Ackerfläche benötigt werden.

Diskussion

Lebensmittel aus biologischer Landwirtschaft sind nicht zwangsläufig ernährungsphysiologisch hochwertiger als jene aus konventioneller. Im Hinblick auf die Schadstoffbelastung kann man jedoch tendenzielle Vorteile von Bioprodukten erkennen. Ein gänzlicher Umstieg auf Bio-Produktion würde sich in Österreich problematisch gestalten, da man aufgrund der geringeren Produktionsintensität mehr Anbaufläche benötigen würde, als zur Verfügung steht.

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Bacterial Bile Pigment Uptake is Concentration Dependent

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Background

For the past two decades numerous studies have ambitiously explored and confirmed anti-mutagenic and anti-oxidative activities of bile pigments in vitro. And also in vivo trials attest potentially beneficial effects (e.g. vasoprotection, anti-inflammation) to those compounds. Relating to that, multiple possible underlying mechanisms of action have been hypothesised and suggested. Surprisingly, nobody has so far focussed on quantifying the cellular bile pigment uptake which in fact forms the fundamental basis of any possible intracellular action.

Methods

Therefore, we aimed to evaluate the amount of bilirubin, biliverdin and conjugated bilirubin (ditaurate) contained in two distinct strains of salmonella typhimurium via HPLC analysis, after 48hrs bile pigment incubation. Uptake data were correlated with observed intracellular effects. These experiments were done in the course of a Salmonella/microsome assay series, originally aiming at the assessment of anti-genotoxic activities of different tetrapyrroles in vitro.

Results

HPLC analyses confirmed highly concentration dependent bile pigment uptake, and for bilirubin and biliverdin significant inverse correlations between uptake and observed anti-genotoxic effects versus 2, 4, 7-Trinitro-9H-fluoren-9-one and 2-amino-1-methyl-6-phenylimidazo[4,5-b]pyridine.

Conclusion

Bile pigment uptake protected bacteria from differently induced mutations in a concentration dependent manner. These novel data represent important and highly interesting observations in terms of planning future research activities, since the direct link between uptake and intracellular effects has now been approved.

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Anti-Genotoxic Properties of Urobilin, Stercobilin and Protoporphyrin in vitro

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Background

Bile pigments are considered strong antioxidants and evidence on their anti-genotoxic capacity is growing. With reference to our previous studies we aimed to test the anti-genotoxic effects of eight (novel) tetrapyrroles against different mutagens in the salmonella/microsome assay.

Methods

Bilirubin, bilirubin ditaurate, biliverdin as well as yet entirely untested tetrapyrroles bilirubin/biliverdin dimethyl ester, urobilin, stercobilin, and protoporphyrin were investigated in salmonella typhimurium strains TA102 and TA98 against multiple classes of mutagens: 2,4,7-Trinitro-9H-fluoren-9-one (synthetic), tertiary-butyl hydroperoxide (pro-oxidant) as well as aflatoxin B1 and 2-amino-1-methyl-6-phenylimidazo[4,5-b]pyridine (both food-borne).

Results

Especially protoporphyrin, urobilin and stercobilin repeatedly demonstrated an enormous anti-mutagenic/anti-oxidative potential. All of them acted significantly anti-genotoxic against multiple classes of mutagens.

Conclusion

The tested tetrapyrroles, which are all of relevance in human metabolism, have proven anti-oxidative and they clearly inhibited genotoxic effects induced by different types of mutagens. Therefore, multiple modes of action can be assumed, but remain vastly unknown to date. This outcome is entirely novel and re-confirms the overall evidence for anti-genotoxic effects of bile pigments in vitro.

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The Physiological Potential of Bilirubin: A Possible Antigenotoxic Effect?

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Background
Recent, epidemiological studies showed protection from cancer in subjects with Gilbert's syndrome (GS, 10–12 % prevalence in the general population), which is characterised by mildly elevated bilirubin concentrations in the blood. Unconjugated bilirubin, a degradiation product of heme, is known as a potent antioxidant in the human antioxidative defense system and its possible antigenotoxic potential is the center of our investigations. The CBMNcyt assay (Cytokinesis blocked micronucleus cytome Assay) is a sensitive and specific method for measuring cancer related micronuclei, Nbuds and Nbridges in lymphocytes and was never investigated in GS so far.

Methods
For this case control study in cross-sectional design, blood samples were taken from 100 subjects. Allocation to GS group required serum unconjugated bilirubin levels >1 mg/dL (Controls < 1 mg/dL). Lymphocytes were extracted from heparinised blood and the CBMNcyt assay was performed. After stopping the cell diviation in binucleated stage and cell staining, micronuclei (Mn), nuclear buds (NBuds) and nucleoplasmic bridges (NPBs) were counted.

Results
There was no significant difference between GS and control in the number of binucleated cells with Mn, NBuds and NPB/1000 binucleated cells. We found slightly (not significant) reduced numbers of Bn with Mn /1000 binucleated cells in GS subjects over 30 years of age with a BMI > 25 (12.83 ± 6.65) compared to controls (15.44 ± 7.94). Furthermore, women (13.33 ± 8.29) had significantly higher amounts of Bn with Mn /1000 binucleated cells than men (8.99 ± 5.60). The number of micronuclei increased with age (0.519**) and the effect was even stronger in women (0.716**).

Conclusion
Although, epidemiological studies showed a protective effect of bilirubin on cancer, we were not able to proof this mechanistically in our fairly young study population. However, the results indicate that an older study population with a higher BMI, which is more susceptible to oxidation processes, might be an interesting target group.

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Gesunde Ernährung und Nachhaltigkeit – Ergebnisse eines Forschungsprojektes im Rahmen des proVISION-Programmes des BMWF

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Das Projekt Gesunde Ernährung und Nachhaltigkeit (GERN) behandelt den Zusammenhang zwischen Gesundheit, Ernährung, Nahrungsmittelproduktion, Ressourcenverbrauch und Umweltbelastungen. Grundlage für die Erfassung des Zusammenhangs zwischen Ernährung und landwirtschaftlicher Produktion, der Erstellung von Stoffbilanzen und Berechnung von Energieverbräuchen sowie der Erfassung der Beeinflussung von Boden, Wasser, Luft und des Ressourcenverbrauches sind Güter- bzw. Sachbilanzen. Als zweiter Schritt wurden Szenarien definiert und diese auf Basis der im Referenz-Zustand quantitativ abgeleiteten Zusammenhänge berechnet. Sämtlichen Szenarien liegt eine angenommene empfohlene Ernährung zugrunde. Es wurde der Begriff „rückschauendes Szenario" geprägt. Damit wird abgebildet, wie sich die geänderten Handlungsweisen (ausgewogene Ernährung) auf das System in der Referenzperiode ausgewirkt hätten.

Nachfolgend einige Projektergebnisse

- Zur Ernährung der österreichischen Bevölkerung wird derzeit deutlich mehr Ackerfläche benötigt (ca. 400 m^2 pro Einwohner) als in Österreich vorhanden ist. Eine Umstellung der Ernährungsgewohnheiten hin zu einer Ernährung, welche den lebensmittelbasierten Empfehlungen der DGE entspricht, würde den Flächenbedarf für die Nahrungsmittelproduktion der österreichischen Bevölkerung um knapp 30 % bzw. 1000 m^2/Einwohner senken. Nicht mehr für die Ernährung benötigte Flächen könnten für Energiegewinnung genutzt werden.
- Der Ressourceneinsatz an Pflanzennährstoffen für die Nahrungsmittelproduktion in Österreich würde sich bei Umsetzung einer ausgewogenen Ernährung für Stickstoff (N) und Phosphor (P) im Vergleich zum Referenzzeitraum um etwa 37 % (7,2 kg N/[E.al]) bzw. etwa 20 % (0,6 kg P/[E.al]) reduzieren.

Die Zusammenstellung und weitere Ergebnisse zeigen, dass eine Ernährungsumstellung der österreichischen Bevölkerung neben den Gesundheitsaspekten auch hinsichtlich Ressourcenverbrauch und Umweltbelastung zu Verbesserungen führen kann.

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Sterol Composition of Steryl Ferulates, Bioactive Compounds in Cereals

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Steryl ferulates are various phytosterols esterified to ferulic acid, found mostly in the outer layer of the cereal kernel. Combining the health promoting properties of sterols and ferulic acid, they possess multiple well established positive health effects. After ingestion, they are thought to hydrolyse into a ferulic acid and a free sterol part in the gut, the latter displacing cholesterol from the micelles, thus decreasing serum cholesterol levels. Further, ferulic acid is a potent antioxidant, consequently, steryl ferulates also possess important antioxidant, anti-inflammatory, antiviral and antitumor properties. Steryl ferulates differ in their sterol moieties and this difference is characteristic for different cereals. Moreover, differences in the sterol structure, namely the presence or absence of two methyl groups in C-4 position (resulting in dimethyl or desmethyl steryl ferulates, respectively) seem to have an influence on the health promoting potential of the ferulated sterol. Desmethyl steryl ferulates have been reported to hydrolyse preferentially over dimethyl steryl ferulates, suggesting that cereals most abundant in desmethyl steryl ferulates are more potent cholesterol lowering agents.
The aim of this study was to analyse the sterol composition of steryl ferulates in various cereals and cereal products. First, lipids were extracted from wheat, wheat bread, wheat bran, corn bran, rice bran, polished rice, cargo rice and wild rice samples. Then after eliminating neutral lipids, steryl ferulates were identified by RP-HPLC. The results for the total steryl ferulate content as well as for the sterol composition of steryl ferulates were in accordance with previous findings, however our study was the first to describe the composition of red and wild rice as well as the composition of both the polished and the brown form of the same cultivar. Our study was also the first in monitoring baking induced changes in the steryl ferulate composition of cereal samples.
Our study confirmed the difference in the sterol composition of different cereals, namely that rice and also wild rice (a species not closely related to rice) contain 66 % and 44 % dimethyl sterols respectively, whereas wheat and corn contain only desmethyl sterols. We also found that enzyme aided baking resulted in a decrease of steryl ferulates, however their sterol composition remained unchanged during processing.

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Ernährungsphysiologische Beurteilung von Fisch in industriell hergestellter Beikost

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Für eine optimale Entwicklung des Säuglings, insbesondere des Gehirns, der Retina und des Immunsystems, spielt die Aufnahme der hoch ungesättigten Docosahexaen-(DHA) und Arachidonfettsäure (AA) eine entscheidende Rolle. Neben Muttermilch stellt vor allem Fisch eine gute Quelle für DHA und AA dar. Deshalb empfiehlt die österreichische Beikostrichtlinie Fischverzehr ab Beginn des fünften Lebensmonats.
Zwischen März und Juni 2010 wurden 670 in Österreich erhältliche Beikostprodukte erfasst und acht Kategorien zugeteilt. Der Kategorie „Menüs" wurden neben vegetarischen und fleischhaltigen Gerichten sechs Menüs mit Fisch zugeordnet.
Produktinformationen wurden über die Hersteller, deren Internetportale und eine ergänzende Recherche im Einzelhandel gesammelt. Danach erfolgte die Berechnung der DHA- und AA-Gehalte in mg/100 g für die im Produkt enthaltenen Fische mithilfe der jeweiligen Konzentrationen aus dem Bundeslebensmittelschlüssel. Anschließend erfolgte eine statistische Auswertung mittels SPSS 17.0.
Die untersuchten Produkte stammten von zwei Herstellern und wurden mit den Altersempfehlungen „nach dem vierten" bzw. „ab dem sechsten Monat" (je ein Produkt), „ab dem achten" bzw. „ab dem zwölften Monat" (je zwei Produkte) gekennzeichnet. Drei Breie enthielten Lachs, zwei Erzeugnisse zeichneten Alaska-Seelachs (Köhler) bzw. Seefisch aus und in einem Produkt wurde Seehecht verarbeitet. Der Fischanteil schwankte zwischen acht und 12,5 % und lieferte im Durchschnitt 71 ± 45 mg DHA und 5 ± 3 mg AA. Während Lachs mit 1.034 mg/100 g den höchsten DHA-Gehalt aufweist, liegt die DHA-Konzentration von Köhler mit 204 mg/100 g deutlich niedriger. Bei einer Portionsgröße von 200 g Brei errechnet sich eine Aufnahme von 50–260 mg DHA über die untersuchten Beikostprodukte. Durch die Zufuhr von ein bis zwei Portionen dieser fischhaltigen Breie pro Woche werden maximal 74 % der von der EFSA als angemessen erachteten tägliche Aufnahmemenge von 100 mg DHA für 7–23 Monate alte Kinder erreicht. In Ergänzung zur DHA-Zufuhr durch Milchnahrung können diese Beikostprodukte einen wichtigen Beitrag zur DHA-Versorgung von Säuglingen leisten. Eine größere Auswahl an industriell hergestellter Beikost mit Fisch wäre daher wünschenswert. Gleichermaßen muss aber auch die Kommunikation der Vorteile von Fisch in der Beikost verstärkt werden.

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MOGI – gesund im Kindergarten

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Einführung

Eine nachhaltige Ernährungserziehung im Kleinkindalter ist für die Prävention ernährungsassoziierter chronischer Erkrankungen von großer Bedeutung, da sich in dieser Lebensphase Verhaltensweisen grundlegend und nachhaltig manifestieren. „MOGI" – Milch-Obst-Gemüse-Interventionsstudie stellt ein Gesundheitsförderungsprojekt für drei- bis sechsjährige Kinder dar, welches zum Ziel hat, die Ernährungssituation durch entsprechende Interventionsmaßnahmen unter Berücksichtigung sozioökonomischer Einflussfaktoren zu verbessern. Da der Konsum von Obst, Gemüse und Milch bzw. Milchprodukten laut Österreichischem Ernährungsbericht 2003 bei Kindern dieses Alters zu gering ist, soll die Aufnahme um eine Portion pro Lebensmittelgruppe erhöht werden.

Methoden

Die Interventionsstudie hat im März 2011 begonnen und wird aktuell noch weitergeführt. Anhand eines Fragebogens wird das Ernährungswissen von Kindern und Eltern vor Beginn und am Ende der Intervention evaluiert. Zudem werden anthropometrische Daten der Kinder erhoben. Im Elternfragebogen wird der sozioökonomische Status (SES) der Familie durch den Family Affluence Scale der WHO ermittelt.
Die zwölfwöchige Intervention dient der Vertiefung des Ernährungswissens zu den Schwerpunktthemen Milch, Obst und Gemüse. Die Partizipation von Kindern, Eltern sowie Pädagoginnen und Pädagogen ermöglicht eine bedarfsorientierte und nachhaltige Maßnahmensetzung.

Ergebnisse

Bis dato haben 137 Kinder an der Studie teilgenommen, 69 Mädchen und 68 Jungen. Davon sind 25 Mädchen und 28 Jungen sozial benachteiligt. Zwischen den sozial Benachteiligten und den sozial nicht Benachteiligten besteht kein signifikanter Unterschied im Wissen über die täglich empfohlene Menge von Obst, Gemüse und Milch bzw. Milchprodukten. Allerdings waren die sozial Benachteiligten häufiger unter jenen, welche die Antwort bei den empfohlenen Portionen für Obst und Gemüse nicht wussten bzw. unsicher waren, während die sozial nicht Benachteiligten in dieser Gruppe unterrepräsentiert waren.

Schlussfolgerung

Unabhängig vom SES ist die Ernährungserziehung im Kindergarten äußerst wichtig. Da das Projekt aktuell noch läuft, können zu Redaktionsschluss keine Ergebnisse zur Evaluation der Interventionsmaßnahmen präsentiert werden.

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Effects of Monounsaturated Fatty Acids on Glycemic Control in Patients with Abnormal Glucose Metabolism: a Systematic Review and Meta-Analysis

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Introduction

In 2008, the American Diabetes Association (ADA) recommended low-carbohydrate or low-fat, calorie restricted diets for weight loss and weight management in overweight and obese patients with type-2 diabetes. However, no consideration of a specific quota of monounsaturated fatty acids (MUFA) is given within the daily recommendations. Therefore, the purpose of our study was to evaluate long term effects of RCTs with duration of at least six months comparing high-MUFA (> 12 % of total energy content, TEC) vs. low-MUFA (≤ 12 % of TEC) diets on glycemic control in participants with abnormal glucose metabolism.

Methods

A wide research strategy was applied to identify as many relevant randomised controlled trials as possible, investigating the management of impaired glucose tolerance (IGT), insulin-resistance (IR) and type-2 diabetes (T2D) and its associated risk factors. Queries were performed in three electronic databases, i.e. MEDLINE, EMBASE, and the Cochrane Trial Register (until May 2011). Nine randomised controlled intervention trials with a total of 1547 participants and running time of at least six months have been included in the meta-analysis. We performed random effects meta-analysis to determine weighted mean differences (WMD) with 95 % confidence intervals (CI) using the software package Review Manager 5.0.25 of the Cochrane Collaboration.

Results

We found a significant between group difference in glycosylated haemoglobin (HbA1c) (WMD: –0.21 %, 95 % CI: –0.40 to –0.02, p = 0.03), favouring the high-MUFA diets. Fasting plasma glucose, fasting plasma insulin as well as HOMA-IR were not affected by the amounts of MUFA in the dietary protocols.

Conclusion

High-MUFA diets appear to be effective in reducing HbA1c and therefore should be recommended in the dietary regimes of patients with abnormal glucose metabolism. Specific recommendations for MUFA are given by the American Heart Association (≤ 15 % of TEC) and by the American Dietetic Association (< 20 % of TEC), but not by the ADA. Therefore, international dietary recommendations directed to treat T2D could bear in mind specific percentages of MUFA within the range of current guidelines.

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