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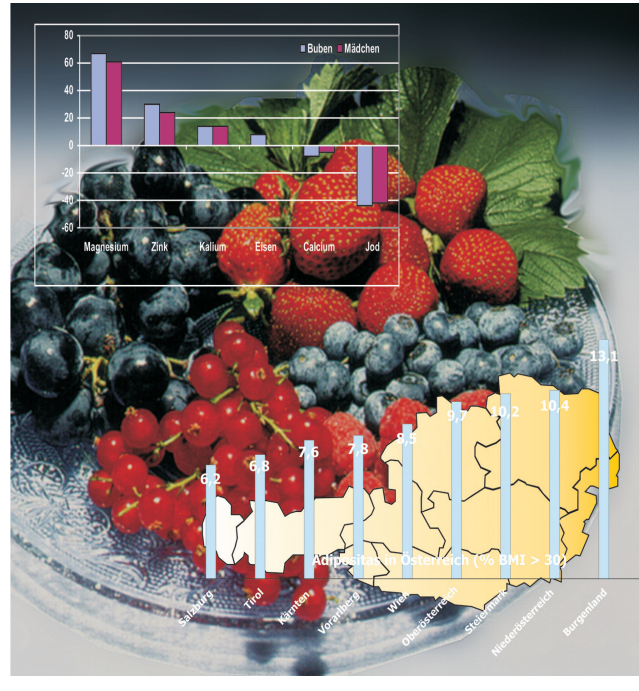
# Austrian Nutrition Report 2003

## English Summary



# Austrian Nutrition Report 2003

Edited by

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# Preface

The nutritional situation in Austria was documented for the first time in an extensive way in form of the Austrian Nutrition Report 1998. The Institute of Nutritional Sciences continued the nutrition monitoring in Austria with the present Austrian Nutrition Report 2003, commissioned by the Austrian Federal Ministry of Health and Women. This facilitates the early recognition of changes in nutritional behaviour, in a favourable and a negative sense, and the establishment of according measures of health policy. Last but not least, the report delivers internationally comparable data on the nutrition situation in Austria.

The report starts with a short overview on the development of food consumption of the last 5-10 years in Austria.

An important focus is the chapter on the nutritional state of different population groups in Austria, also compared to the situation five years ago.

Aspects of food quality and safety are always of broad public interest. In an extensive chapter, actual data on topics like drinking water quality, genetically modified food, organic food, food additives, acrylamide in food, food fortification, etc. are reported.

The variety of available staple foods like bread and cereals, vegetables and fruit, milk and milk products, meat and meat products is the basis of a balanced and health promoting diet. New data on food consumption give a figure of the balance of selection of particular food groups and their importance for nutrition in Austria.

The chapter on public health deals with the development of life expectancy and mortality rates in Austria. It reports also on the association between nutrition and certain chronic diseases.

The final chapter of the Austrian Nutrition Report 2003 is on health promotion and disease prevention and some guidelines for a desirable and health maintaining diet (food based dietary guidelines).

Nutrition information today is available from various sources (print media, tv, internet, commercials, etc.). However, more information also leads to misinformation, mainly when contradictory. The Institute of Nutritional Sciences feels obliged to inform objectively and based on the state of the art of nutritional sciences on the broad spectrum of nutrition.

The present Nutrition Report is an important instrument for those responisble in nutrition and health policy, and also for food manufacturers, to improve the nutritional situation in Austria. Of course, this report shall also be used for the public, and professionals in particular, but also the interested consumer as reliable documentation of the present nutritional situation.

The Austrian Nutrition Report 2003 is based on research projects funded by the Federal Ministry of Health and Women. The Institute of Nutritional Sciences acknowledges the various working groups, who brought in their scientific expertise, and also the many advanced students of nutritional sciences, who tirelessly assisted in field work and data collection. Our gratitude also goes to the outstanding authors and all others, who contributed to the finilisation of this report.

Vienna, October 2003
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# Chapter 1: Food Consumption in Austria - An Outline

The nutritional status of a population is determined by the daily intake of food and nutrients. The chronological observation of food consumption at the national level delivers a general overview on the overall supply of food of the Austrian population. However, this data does not allow gender, age and target population-specific interpretations. Its only purpose is an overview about potential changes in food availability and consumption behaviour. This data collection does not only allow differentiation among the Austrian regions either, but is an important tool for the assessment of national, as well as international trends. Generally, food consumption among the Austrian population has changed during the past years in a positive way (fig. 1). The consumption of vegetables, fruits (excluding citrus fruits) and fish has increased. Altogether the intake of breadcereals (wheat) has increased but simultaneously the consumption of dark bread varieties (of rye), which contain a higher amount of the desirable fibres, has decreased within the same period. The increasing consumption of vegetable oils is very positive considering their high content of unsaturated fatty acids and fat soluble vitamins. As the consumed amount of total fat is generally too high in Austria, less animal products (meat and meat products, high fat content milk products, e.g. butter, cream etc.) should be consumed. The dramatically decreasing intake of pulses is a negative change as this food group shows a high nutritive potential.

In general, the eating habits of the average Austrian are still very traditional and solid. Meat and meat products are still very popular. The average per capita consumption of pork for example is 5 kg per month in Austria. In contrast the fish per capita consumption amounts only to 450 g a month.

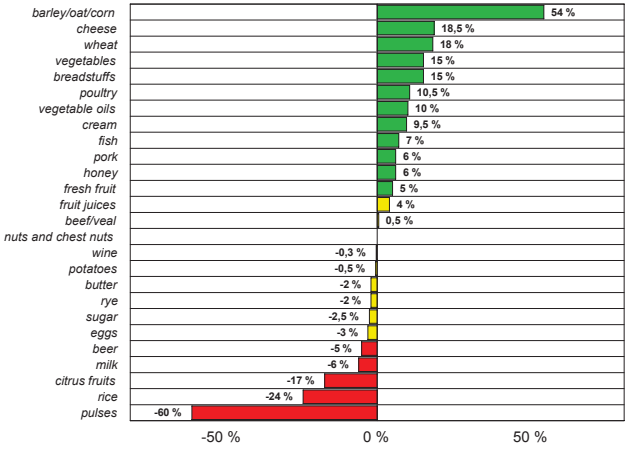
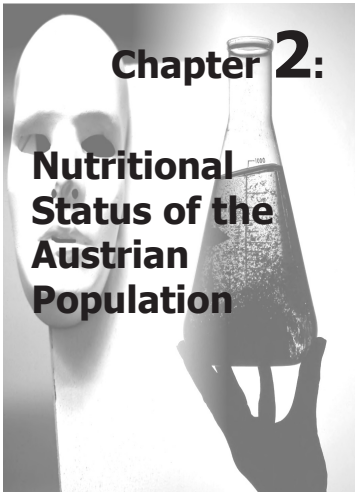



***Fig. 1:*** *Differences in mean consumption of selected food groups since Austria joined to the European Union (observation period from 1994/95 to 2001)*

The basis for this graph are the differences of the average consumption of the years 2000/01 ('A') from the average consumption of the years 1994/95 ('B'). Formula: ((A-B)/A) 100 = % difference. The consumption of eggs and wine is based on the year 1999 ('A').




## Introduction

The aim of the Austrian Study on Nutritional Status (ASNS - Österreichische Studie zum Ernährungsstatus, ÖSES), which started in 1991, is the assessment and documentation of the nutritional status of different population groups in Austria. The first comprehensive results were presented in the Austrian Nutrition Report 1998. In order to be able to describe long-term trends of nutritional status and deliver internationally comparable data, follow-up studies were carried out among several population groups. Updated evaluations were made in 3-6 years old preschoolers (for the first time on a national level), schoolchildren, apprentices (first evaluation), adults, hobby athletes (first evaluation), seniors and pregnant women. For the assessment of food intake the following methods of survey were used (tab. 1).

## Analysis of the Nutrition Surveys

**Energy Intake:**

In industrialized countries and in Austria as well, a sufficient energy intake among the majority of the population can be assumed. The average energy intake among the participants generally corresponded to the current guidelines for low physical activity (PAL, Physical Activity Level = 1.4, D-A-CH 2000).

**BMI in Austria as function of Age and Gender:**

An adequate long-term energy intake results in a body weight within the normal range. For the classification of body weight the BMI is one of the most adequate and frequently used methods:

BMI = body weight [in kg] / (body height [in m])$^2$ [kg/m$^2$]

The BMI of the participants was calculated from the self-reported weights and heights of the different parts of the ASNS:

- Generally more women than men had a BMI within the normal range.
- The prevalence of overweight (BMI>25 kg/m$^2$) and obesity (BMI>30 kg/m$^2$) increased with increasing age. An inverse tendency was observed in people older than 65 years.
- The highest proportion of obesity (11%) was found in male apprentices (15-18 years of age).

| Collective | Evaluation model | Participants (n) |
|---|---|---|
| Preschoolers (3-6 y) | 3-d-weighed record | 151 |
| Elementary school students (7-10 y) | 7-d- weighed record | 326 |
| Junior high school students (11-14 y) | 7-d- weighed record | 209 |
| Apprentices (15-18 y) | 3-d- weighed record | 102 |
| Adults (19-60 y) | 24-h-recall | 2580 |
| Elder people (>55 y) | 24-h-recall | 645 |
| Pregnant women | 24-h-recall | 254 |

***Tab. 1:*** *Study collective and method of collection of food intake data*

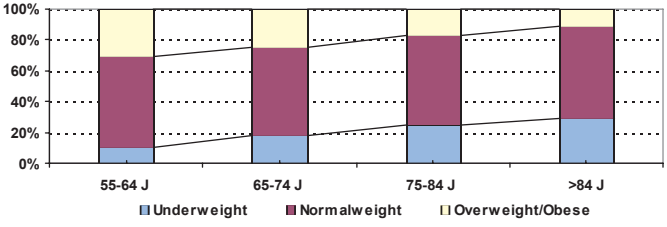



***Fig. 2:*** *BMI of Vienna senior citizens, separated in age groups (in %)*

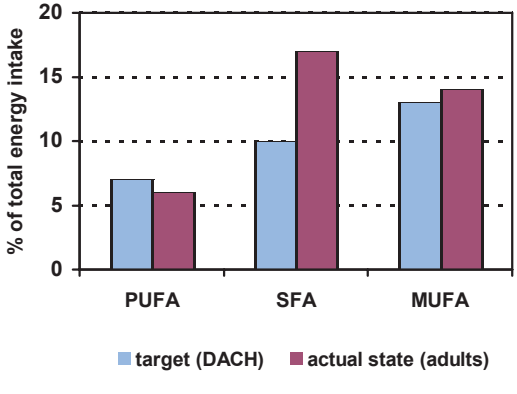
- About 41% of the adult male participants at the age of 20 to 54 years had a BMI higher than 25 kg/m² and were thus overweight. In contrast, only 23% of hobby athletes of the same age range were found to belong to this BMI-group.
- A high prevalence of underweight was mainly found in 7-10 years old girls with 9% (BMI<9th percentile) as well as in men and women older than 65 years (BMI<24) with 18-29%.

To consider:

In elderly people body weight and BMI cannot be evaluated as in younger adults. The prognostic meaning of body weight changes with increasing age and higher BMI-values are, compared to younger adults, associated with a lower mortality risk.

**Intake of Macronutrients:**

Fat is still a critical nutrient in the Austrian diet with regard to the level of intake and its fatty acid composition. Depending on the population group the average fat intake was between 35 and 40% of total energy (%E). Compared to the results of the Austrian Nutrition Report 1998 the fat intake showed a decreasing tendency; however, the fat intake in Austria is still high. Only the group of preschoolers showed a fat intake which corresponded with the D-A-CH guidelines. The composition of the fat consumed is very important for health maintenance as well. With regard to that, the intake




*PUFA….polyunsaturated fatty acids*
*MUFA….monounsaturated fatty acids*
*SFA….saturated fatty acids*

***Fig. 3:*** *Desirable fat intake for persons with light to medium-heavy work and actual intake in Austrian adults*

| Age group | LA | | α-LA | | AA | EPA | DHA |
|---|---|---|---|---|---|---|---|
| | (g/d) | (%E)[1] | (g/d) | (%E)[2] | (g/d) | (g/d) | (g/d) |
| 3-6 y., m | 4,9 | 3,3 | 0,8 | 0,5 | 0,1 | 0,02 | 0,08 |
| f | 5,2 | 3,4 | 0,7 | 0,5 | 0,1 | 0,02 | 0,08 |
| 7-10 y., m | 6,2 | 3,4 | 0,8 | 0,4 | 0,1 | 0,02 | 0,07 |
| f | 5,6 | 3,5 | 0,7 | 0,4 | 0,1 | 0,02 | 0,07 |
| 11-14, m | 8,9 | 4,2 | 1,2 | 0,6 | 0,2 | 0,03 | 0,1 |
| f | 7,6 | 4,1 | 1 | 0,5 | 0,2 | 0,03 | 0,09 |
| 15-18*, m | 9,7 | 3,4 | 1,2 | 0,4 | 0,2 | 0,03 | 0,09 |
| f | 9 | 4 | 1 | 0,5 | 0,2 | 0,03 | 0,1 |
| 19-65, m | 12,6 | 4,5 | 1,5 | 0,5 | 0,3 | 0,08 | 0,2 |
| f | 9,9 | 4,4 | 1,3 | 0,6 | 0,3 | 0,07 | 0,2 |

[1] D-A-CH reference value: 2.5%E; [2] D-A-CH reference value: 0.5%E; %E…% of total energy; LA…linoleic acid; α-LA…α-linolenic acid; AA…arachidonic acid; EPA…eicosapentaenoic acid; DHA…docosahexaenoic acid; m…male; f…female, *apprentices

***Tab. 2:*** *Average daily intake of polyunsaturated fatty acids among different age groups in Austria*

of saturated fatty acids (SFA) in Austria is considered to be too high (15-20 %E) and the intake of polyunsaturated fatty acids (PUFA) is too low (~6%E) (fig. 3).

The supply of the essential n-6- and n-3-longchained polyunsaturated fatty acids is sufficient (tab. 2). However, the current ratio of n-6- to n-3 fatty acids (8:1) should be lowered (ideal: 5:1). This recommendation could easily be realised if plant oils rich in n-6 fatty acids (e.g. sunflower oil, corn oil) are partly replaced by plant oils rich in n-3 fatty acids (e.g. rapeseed oil, soybean oil) in use in household as well as in the food industry.

A too high cholesterol intake (>300 mg/d) has already been observed in schoolchildren.

The protein intake is more than sufficient as the recommendations have been exceeded for years irrespective of age and gender. Only the age group of people older than 84 years had a protein intake which was slightly higher than the recommendations.

The high protein intake corresponds to the general eating pattern in industrialised countries, in which the consumption of animal products (meat and meat products, milk and milk products) is too high. About two-thirds of the total protein intake is of animal sources. This high proportion is unfavourable as a high intake of animal protein is associated with a simultaneously too high intake of fat, especially saturated fatty acids, cholesterol and purines (except protein from eggs and milk). An increase in vegetable products in the daily diet would lead to a better proportion of nutrients.

The high fat and protein intake results in a too low carbohydrate intake in most age groups. This is especially so for the intake of starchy foods such as white grains, pulses and potatoes, which are rich in essential nutrients and biologically active secondary plant food components, but their consumption is insufficient. As a result of this constellation the recommended dietary fibre intake of at least 30 g a day cannot be reached.

***Tab. 3:*** *Trends in energy and macro-nutrient intake among Austrian adults (1998-2002)*

| | Female | Male |
|---|---|---|
| Energy | ↑ | ↑ |
| Protein | ↔ | ↓ |
| Carbohydrates | ↔ | ↑ |
| Sugar | ↓ | ↑↑ |
| Dietary fibres | ↑ | ↑↑ |
| Fat | ↓ | ↓ |
| Saturated fatty acids | ↓ | ↑ |
| Cholesterol | ↔ | ↔ |
| Alcohol | ↑↑ | ↑ |

Compared to the Austrian Nutrition Report 1998, the alcohol intake of women has increased drastically. Men aged 25-64 years had an average alcohol consumption of about 5%E, women of the same age group reached an average intake of about 4%E (see page 8).

In tab. 3 the relative changes concerning the intake of energy and macronutrients of Austrian adults are illustrated. The current data are compared with those from the Austrian Nutrition Report 1998.

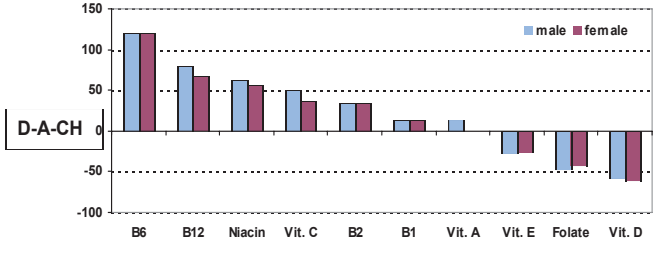
**Intake of Micronutrients:**

The average intake of some micronutrients (vitamins, minerals and trace elements) in several population groups is below the recommendations. An example is given in fig. 4 for 3 to 6 years old preschoolers.

In respect to supply, and regarding the relevance for health maintenance, it is possible to propose categories of declining significance of several nutrients:

- Critical supply, urgent call for action: Among all population groups, folate, iodine and calcium have to be treated with special attention, because of the low intake concerning the reference values. Further, vitamin D intake is not sufficient in the majority of the Austrian population. Older people suffering from atrophic gastritis are also at risk regarding vitamin $B_{12}$ absorption. Iron is a critical nutrient especially in women of child-bearing age. The supply of vitamin A and vitamin $B_6$ is critical among lactating women as well. Further special attention is to be paid to the excessive sodium (chloride) intake in some genotypes at high risk.
- Supply with borderline values among some population groups, mid-term ameliorations desirable:
  People > 65 y.: vitamin C, vitamin E, vitamin $B_1$ and $B_2$ (fem.), magnesium
  People > 86 y.: zinc (male)
  Pregnant: vitamin E, magnesium

***Fig. 4:*** *Deviations (in %) of the average daily vitamin intake from the D-A-CH reference values in male and female Austrian preschoolers (3-6 years)*




***Vitamin K*** *has not been exactly analysed yet*

Apprentices (15-18 y.): vitamin C (male), vitamin E, vitamin $B_1$ and $B_2$, magnesium
- Sufficient supply, no intervention necessary: niacin, biotin, pantothenic acid, potassium, phosphorous, manganese, copper.
- Not yet exactly analysed: vitamin K, fluoride, selenium and carotenoids.

Tab. 4 shows the relative changes in intake of micronutrients among elder people in Vienna. Therefore the current data were compared to those of the Austrian Nutrition Report 1998.

Unintended weight losses are quite frequent in the elderly people and the risk of protein malnutrition is elevated. A common cause for this is lack of appetite. Fig. 5 shows the correlation between medicine taking, number of taken medicines and appetite.

| | Relative changes |
|---|---|
| Vitamin A[1] | ↓↓ |
| Vitamin D | ↑↑ |
| Vitamin E[2] | ↓↓ |
| Vitamin $B_1$ | ↓ |
| Vitamin $B_2$ | ↔ |
| Vitamin $B_6$ | ↑ |
| Folsäure[3] | ↓↓ |
| Vitamin $B_{12}$ | ↓↓ |
| Calcium | ↔ |
| Potassium | ↔ |
| Magnesium | ↔ |
| Iron | ↓↓ |
| Iodine | ↓↓ |
| Zinc | ↑↑ |

[1] retinol-equivalent = 1 mg retinol = 6 mg all-trans-β-carotin;
[2] RRR-α-tocopherol-equivalent = mg α-tocopherol + mg β-tocopherol · 0.5 + mg γ-tocopherol · 0.25 + mg α-tocotrienol · 0.33;
[3] folate-equivalent = 1 µg folate = 0.5 µg pteroyl-monoglutamic-acid (PGA)

↑↑ (↓↓) higher (lower) - more than 9%
↑ (↓) higher (lower) - lower than 9%
↔ almost unchanged (< 5%)

***Tab. 4:*** *Trends (1998-2002) in intake of micronutrients among elder people in Vienna nursing homes*

**Food consumption patterns:**

Among several population groups the consumption of different food groups was assessed too. The results showed that the intake of foods with a high nutrient density was mainly insufficient (e.g. vegetables, bread and cereals, milk and milk products etc.). Generally, the consumption of vegetable products was too low. In contrast, the intake of meat and meat products was high among all age groups; men consumed these products more often than women. The nutrient status could be optimised if the following recommendations were followed: vegetables and fruit intake increased to several times a day; whole grain products should replace white bread; milk and milk products, especially low fat

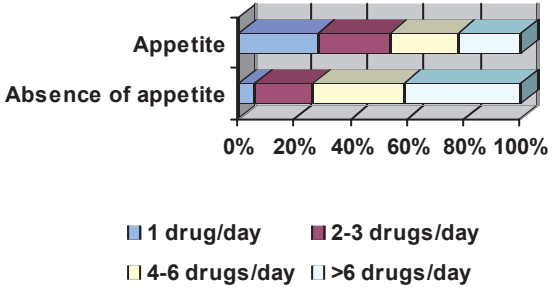



***Fig. 5:*** *Effect of medication on appetite of elderly people in Vienna*

***Tab. 5:*** *Average daily intake of beverages in Austrian adults (n=746)*

| Beverage (ml/d) | Amount (M ± SD) |
|---|---|
| Tap water | 711 ± 787 |
| Mineral water | 442 ± 572 |
| Coffee | 261 ± 259 |
| Alcoholic beverages | 204 ± 352 |
| Tea | 190 ± 321 |
| Other beverages* | 150 ± 239 |
| Soft drinks | 114 ± 264 |
| Fruit and vegetable juices | 102 ± 242 |
| Milk and milk drinks | 36 ± 109 |
| Light-soft drinks | 7 ± 56 |
| Syrup | 6 ± 22 |
| *e.g. sport drinks, energy drinks | |

products, should be consumed daily and fish should be consumed 1 to 2 times a week. The consumption of meat and meat products should in contrast be reduced. These recommendations are particularly valid for men as their consumption habits are generally more unfavourable then those of women.

The guideline value for a desirable beverage intake of non-caffeinated and non-alcoholic drinks (1000-1500 ml/d) generally has been attained by the Austrian adults (tab. 5).

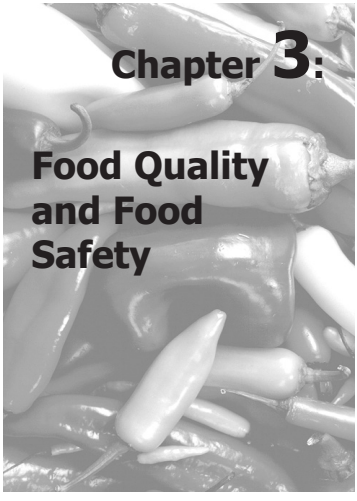
**Selected critical areas of concern in the Austrians' nutrition:**

Tab. 6 summarises critical areas in regard to the intake of selected macronutrients among different population groups in Austria.

***Tab. 6:*** *Selected critical areas in nutrition habits among different Austrian population groups, male and female, mean daily intake*

| Age group | Sugar[1] (%E) | | Dietary fibres[2] g/d) | | SFA[3] (%E) | | Cholesterol[4] (mg/d) | | Alcohol[5] (%E) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | m | f | m | f | m | f | m | f | m | f |
| 3-6 y. | 15 | 15 | 12 | 12 | 16 | 17 | 220 | 206 | - | - |
| 7-9 y. | 12 | 12 | 14 | 11 | 17 | 18 | 296 | 263 | - | - |
| 10-12 y. | 11 | 12 | 14 | 15 | 16 | 16 | 292 | 263 | - | - |
| 13-14 y. | 12 | 12 | 16 | 14 | 16 | 17 | 357 | 267 | - | - |
| 15-18 y. | 16 | 18 | 14 | 15 | 15 | 16 | 367 | 262 | 4,5 | 0,7 |
| 19-24 y. | 10 | 12 | 19 | 19 | 15 | 15 | 411 | 323 | 4 | 2 |
| 25-50 y. | 10 | 11 | 20 | 19 | 15 | 15 | 436 | 306 | 5 | 4 |
| 51-64 y. | 9 | 10 | 21 | 19 | 16 | 16 | 440 | 333 | 5 | 3 |
| 65-74 y.* | 8 | 9 | 23 | 20 | 17 | 17 | 323 | 325 | 2,0 | 1,2 |
| 75-84 y.* | 7 | 9 | 22 | 18 | 20 | 19 | 377 | 300 | 2,3 | 0,8 |
| >84 y.* | 11 | 9 | 15 | 16 | 20 | 20 | 354 | 337 | 2,0 | 0,8 |
| Hobby athletes* | 10 | 9 | 19 | 20 | 15 | 16 | 379 | 294 | 3,5 | 1,8 |
| Pregnant women | - | 14 | - | 21 | - | 16 | - | 340 | - | 0,2 |
| Lactating women** | - | 16 | - | 18 | - | | - | 401 | - | 1,0 |

Guidelines: [1]moderate consumption; [2]at least 30 g/d in adults; [3]max. 10 %E; [4]max. 300 mg/d; [5]moderate consumption and not daily; %E…percent of total energy; SFA…..saturated fatty acids;
*Eastern Austria, ** data from 1998




## Food Control in Austria: aims at consumer protection

The European Union makes big efforts in harmonising the official food control procedures of its member states. On the basis of the White Paper of Food Safety of the European Commission (2000), a draft is being developed which should form the basis for standardised food control procedures. These procedures can then be used by the different national authorities of the EU.

Animal feed is now, along with foods, included in the general control concept.

In addition to official controls, another principle is emphasised: the responsibility of the producer and the trailer for their own products in terms of fulfilling the standards instructed in the food law of the EU.

In order to ensure a rapid exchange of information concerning food and feeding stuff between the national authorities and the European Commission a rapid alert system exists which should allow beside other information, the reconstruction of the trading pathway of several charges containing health endangering goods.

Functions concerning risk assessment on a scientific basis are undertaken by the European Food Safety Authority (EFSA) at the level of the EU and by the "Österreichische Agentur für Gesundheit und Ernährungssicherheit GmbH" (Austrian Agency for Health and Food Safety GmbH; AGES) at the national level.

The structure of the official food control in Austria hasn't changed since the publication of the Austrian Nutrition Report 1998.

## Quality of Animal Products: No reason for Concern

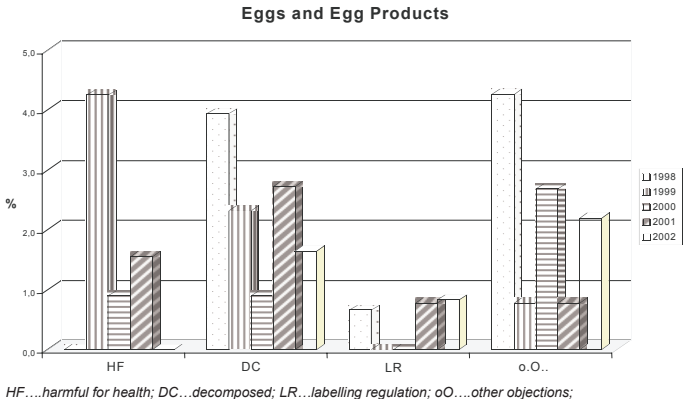
About 5000-7000 samples of the category "foods of animal origin" (meat and meat products, fish, molluscs and their products, milk and milk products, eggs and egg products) were examined each year in the period of 1998-2002 in the former "Bundesanstalt für Lebensmitteluntersuchung und -forschung Wien".

The results of the examination of meat and meat products corresponded, regarding to their composition, with the food regulations.

Due to current occasions, a main emphasis was placed on residues of dioxin, antibiotics and hormones in the period of 1998-2002. In the examined samples no contaminations were found.

Fish and shellfish are routinely examined for heavy metals. No significant changes in lead, cadmium and mercury concentrations were found during the years of 1998-2002. Occasionally the concentrations of mercury in sharks and of cadmium in squids slightly exceeded the upper levels.

Further fish, shellfish and poultry from the Far East were tested for nitrofuran residues and chloramphenicol. Nitrofuran could not be detected




*HF….harmful for health; DC…decomposed; LR…labelling regulation; oO….other objections;*

***Fig. 6:*** *Lower rate of objections for egg and egg products as "harmful for health"; "decomposed", and "other objections" resp., for the period of 1998-2002*

in any sample whereas the upper level of chloramphenicol was exceeded in some cases.

The BSE crisis started during the observation period and resulted in 2001 in a sudden increase of examinations of meat products for the content of central nervous system and mechanically recovered meat. No sample of central nervous tissue could be found, but at the beginning mechanically recovered meat was found in some of the samples. This was changed by the codex guidelines which prohibits the use of this kind of meat.

## Risk Analysis in Foods

After the recent food scandals (BSE, chickens contaminated with dioxin, import of hormone cattle, illegal use of antibiotics, avian plague etc.) food safety became a subject with high priority. As a basis for all measures for food safety the new union legislation prescribes the use of risk analysis. The concept of risk analysis includes three connected processes: risk assessment, risk management and risk communication. Risk assessment is accomplished in four steps: hazard identification, hazard characterisation, appraisal of exposure and risk characterisation.

The aim of the risk management is the choice of eligible regulatory options for prevention and minimisation of exposition of the population respectively. Efficient risk management requires a permanent dialog between the experts of the risk assessment and the administrative and decision makers who are responsible for risk management. Concerned economic sectors, consumer protection organisations and other NGOs (= non-governmental organisations) should be included in decision making as well. Official decisions have to be transparent, plausible and comprehensible to the public. These interactions taken in the scope of risk analysis are comprised in the term risk communication.

## Food Safety: Some examples

Risk assessment in the food sector is regulated in the "Österreichische Gesundheits- und Ernährungssicherheitsgesetz" (Austrian law for health and

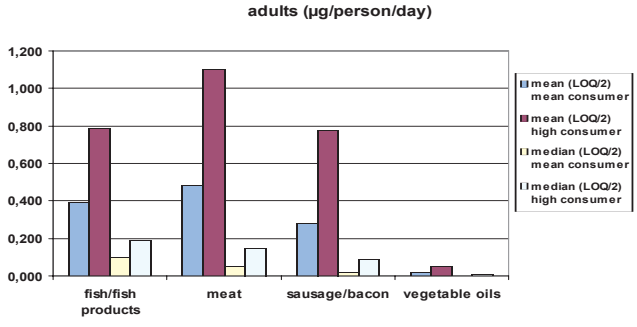



***Fig. 7:*** *Intake of benzo[a]-pyren in adults*

food safety) as a core competence of the Austrian agency for health and food safety (AGES).

The problematic of pesticide residues in plant foods, the existence of polycyclic aromatic hydrocarbons as well as the contamination with selected mycotoxins is presented in this chapter. Interim results of exposure assessment in this field are summarised as follows:

- In the monitoring programme coordinated by the EU (since 1996) as well as in the national monitoring programme (since 1997) the number of analysed samples and of parameters per sample has increased significantly.
- Residues of plant protection agent in edibles showed that both the number of samples with exceed of upper levels and of those without exceed of upper levels have increased between 1997 and 2002.
- The intake of polycyclic aromatic hydrocarbons in the Austrian population occurs mainly through consumption of smoked meat and meat products.
- The tolerable maximal daily dose for patulin (a mycotoxin) is 400 ng/kg body weight. In relation to body weight children show the highest intakes of this mycotoxin which are however still far below the critical value.
- The average intake of desoxynivalenol (a mycotoxin) was about 0.3 µg/kg body weight and for zearalenon (another mycotoxin) about 0.2 µg/kg body weight. This is only a trickle of the current upper level of 1 µg/kg body weight and per day.

Risk assessment includes in addition to the above mentioned, chemical analysis and microbiological examinations as well.

## Quality of Drinking Water: Excellent in Austria

Around 99% of the Austrian drinking water originates from ground water and only 1% from surface water (rivers and lakes). The bigger part of Austrian households is connected to a public water supply network. About 1 million Austrians obtain their water from private sources and wells. The domestic water consumption per capita per day is 140 to 150 litres. Examinations of ground water are accomplished in the Bundesländer following uniform procedures on the basis of the "Wassergüte-Erhebungsverordnung" (WGEV). Numerous institutions and experts periodically examine the quality of ground water. The emphasis is placed

***Tab. 7:*** *Average values of nitrate in public water supply in Austria*

| region | Nitrate (mg/l) |
|---|---|
| Burgenland | 24.6 |
| Oberösterreich | 24.1 |
| Niederösterreich | 23.0 |
| Steiermark | 14.0 |
| Kärnten | 10.0 |
| Salzburg | 5.0 |
| Wien | 4.7 |
| Vorarlberg | 3.9 |
| Tirol | 2.3 |
| Guideline value: 25 mg/l | |

on chemical parameters like nitrate or atrazin. The official regulations for drinking water are established on the food law and the drinking water decree, where parameters and their values are determined. The parameter values rely on the guideline values of the WHO (World Health Organisation) and are to be strictly followed. Contamination with pathogenic germs can be easily eliminated with disinfection procedures. Another problem posed is the content of heavy metals, nitrate, nitrite, pesticides etc. in drinking water. The risk of charge of nitrate through over-fertilisation is particularly given in agriculture areas of Eastern Austria (Tullnerfeld, Marchfeld).

In general the water quality in Austria is exceptionally good. An amelioration of microbiological analysis as well as the establishment of an independent centre for compilation, coordination and evaluation of water controls could further the aims.

## Organic Foods (Bio Products): Increasing Demand

The demand for organic foods is permanently increasing in many industrial countries and thus in Austria as well. The estimated market share will be 5-10% in 2025. The bigger part of Austrians occasionally consumes bio products. The average consumer of bio products is today older than 20 years ago, has an average educational level, a higher income and mostly lives in a household with 2-5 members. The main purchasing motives are "health-conscious nutrition", "environment protection" and "taste".

Biological plant food products usually have lower residues (e.g. nitrate, pesticides) than those from conventional agriculture. The difference in the content of both "Bio" and conventional foods in essential nutrients, in secondary plant food components and dietary fibre are mostly not significant. Generally it can be stated that organic products are not healthier than conventional products, concerning nutrient content.

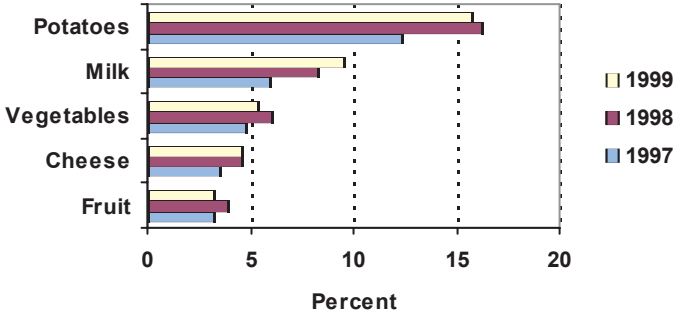



***Fig. 8:*** *Proportion of bio products in selected food groups*

The ranking of nutrition risks is often misjudged by the consumers. Environmental contaminants and additives are not the primary risk factors in nutrition, but unfavourable nutritional habits, insufficient hygiene and natural toxic substances. Keywords like "healthier" should be used cautiously especially in regard to contaminants and harmful substances. Foods free from residues (e.g. nitrate, pesticides etc.) are regarded by the consumer as the norm but not the exception. The basis for realisable health promotion and risk reduction of chronic diseases is a balanced diet with a high proportion of vegetable products and dietary fibres. The preference of organic products does not only mean a refusal to conventional food production but contributes to a sustainable ecological balance. One of the main purchasing motives is "environment protection" and can be affirmed.

Finally, the question if organic foods also achieve the expectation of a "better taste" can be answered positively. In so called degustation tests, in which the sensory quality of a food is judged, organic foods are generally evaluated as having a better taste.

## Genetically Modified Foods: Still Low Acceptance

Although Europeans usually have a high acceptance for new technologies (e.g. computer, telecommunication, solar energy etc.) the bigger part of them - especially the Austrians - do not accept the application of gene technology in the field of agriculture and food production. The explanations therefore are that this technology is "insecure", "ecologically critical" and "unnatural". The Institute of Nutritional Sciences of the University of Vienna carried out surveys concerning gene technology and its application in the food sector in 1996, 2000 and 2002. The general knowledge about biological and gene technology has not improved significantly during these 7 years but can be considered as remarkable. In a pan-European survey - the "Eruobarometer, 2002" - about this subject, the Austrian population was located in the midfield.

The main source of information was the mass media (TV, newspapers, magazines etc.). The proportion of those who did not feel having a sufficient knowledge about genetically modified foods was about the same (85%) in all three Austrian surveys.

The disposition to buy genetically modified foods has increased but was still less than 20% in the last survey of 2002 (fig. 4).

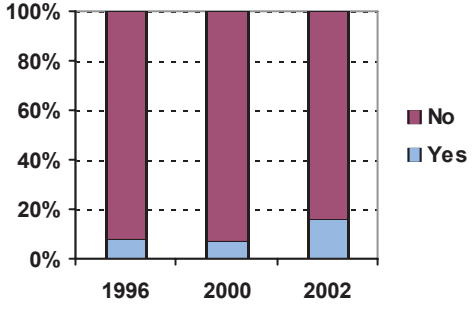



***Fig. 9:*** *Trends (1996-2002) in disposition to buy genetically modified foods in Austria*

The consumer acceptance would increase if genetically modified foods brought about a demonstrable and comprehensible benefit. Labelling of genetically modified foods or products containing genetically modified ingredients is very important for consumers. More than 90% of the participants of all three surveys claimed an adequate labelling of such products. It should be informative and should allow the possibility of choice. The bigger part of the interviewed persons also required additional information about differences between genetically modified foods and conventional foods.

In the new regulations of the EU for genetically modified products, which will become effective in 2003, some demands of consumers and organisations for consumer protection were considered. As a direct consequence, the de-facto-moratorium for genetically modified plants from 1998 probably will be abandoned even if some countries and their populations still argue for this convention.

## Food Fortification: Big Proportion of Vitamin Supply

The interest in fortified food constantly increases among consumers as well as food producers. According to this, the range of fortified products in the market is getting bigger. The Institute of Nutritional Sciences of the University of Vienna thus carried out some studies in the past years about this subject. An evaluation in supermarkets from December 1997 until May 1998 showed that 73% of nearly 500 different fortified products existing in the Austrian market were fortified with vitamin C. Vitamin C was thus the most frequently used nutrient although the vitamin C status can be evaluated as good. Other vitamins and minerals were used less often. Most fortified foods were not adapted to the needs of special target groups. The bigger part (~60%) of the participating adults (n=312) was sceptical about food fortification. Explanatory statements for justifying this rejection were "unnaturalness" of such products and a "sufficient healthy nutrition available". Arguments for their purchase were "well-being" and the

***Tab. 8:*** *Average daily intake of micro-nutrients from fortified foods in % of the D-A-CH reference values (age group 25-<51 years)*

| | Total collective (n=1700) in % | | Total collective (n=1700) in % |
|---|---|---|---|
| Vitamin C | 40 | Iron | 10 |
| Vitamin $B_6$ | 37 | Copper | 8 |
| Niacin | 29 | Calcium | 8 |
| Vitamin $B_1$ | 27 | Magnesium | 7 |
| Vitamin $B_2$ | 23 | Zinc | 4 |
| Pantothenic acid | 22 | Iodine | 2* |
| Vitamin $B_{12}$ | 20 | Fluoride | 1 |
| Vitamin E | 17 | | |
| Vitamin A | 11 | | |
| Folic acid | 10 | | |
| Vitamin D | 2 | | |
| *exc. salt fortified with iodine | | | |

"elimination of…" eventually existing "…deficiencies". Another survey (n=1700) recently carried out in Austria showed a higher acceptance of fortified foods. About 50% of the participants indicated to buy such products. Without any doubt fortified foods are an effective tool for increasing the intake of some vitamins. The study population met e.g. 40% of the vitamin C requirements from fortified products (tab. 8).

Fortification of foods mostly occurs arbitrary and special needs of eventual groups at risk, such as elderly people, are rarely considered. The fortification with micronutrients, for which an increase of intake would be desirable (e.g. folic acid), is too marginal. Other nutrients (e.g. niacin) are added in such a high amount which exceeds by far the required amount. However, the risk of an overdose of added nutrients is not given under the consumption habits of currently provided fortified foods.

## Baby Food Products: A Remarkable Potential for Many Nutrients

The results of evaluations showed that all baby food products, especially those made of vegetables, contained a sufficient amount of carotenoids as well as vitamin A activity (retinol equivalents). Some carrot preparations showed values of about 4.6 mg retinol equivalent/jar (1 jar = 190, 220 or 250g) which exceeded the dietary reference intake (D-A-CH, 2000) for infants at the age of 4-12 months (0.6 mg retinol equivalent/d) by far. Although it is assumed that a high intake of carotenoids does not cause a problem for health such as hypervitaminosis A, these products should not be consumed in abundance. Analyses further showed that vegetable products contained more carotenoids (except lycopene) and also more vitamin A activity than fruit or cereal products. Cases have been described where hypercarotenosis occurred after the intake of normal amounts of commercial baby food. Products on the basis of fruit (including apricots) and cereals showed a balanced content of both carotenoid groups, i.e. pro-vitamin A and non-pro-vitamin A carotenoids. This underlines the frequently underestimated meaning of carotenoids from fruit and endorses the inclusion of fruit pap in infant nutrition. Further, recent insights, which confirm a better bioavailability of carotenoids from orange fruit than those from vegetables, argue for an increased intake of fruit products.

Finally it has to be mentioned that the analysed products were good sources of pro-vitamin-A-carotenoids and thus good supplementary food in addition to breast milk. On the other hand they are due to their content of non-pro-vitamin-A-carotenoids able to contribute to the anti-oxidative defence against free radicals in the body.

As a result of high vitamin E-contents and vitamin E/PUFA-ratio of 1.9-3.4 (mg/g), baby food products are good complementary vitamin E sources in addition to breast milk and formula milk for infants at the age of 5 months and older. They raise the total intake of vitamin E (~15-30%) and thus contribute to the prevention of lipid peroxidation.

In regard to the recommendations for vitamin K intake of infants at the age of 4-12 months (10 µg/d) and the low vitamin K contents of breast milk (0.5 µg/100 g) all vegetable products for infants can highly contribute to the vitamin K supply. In consideration of analysed spinach samples, which

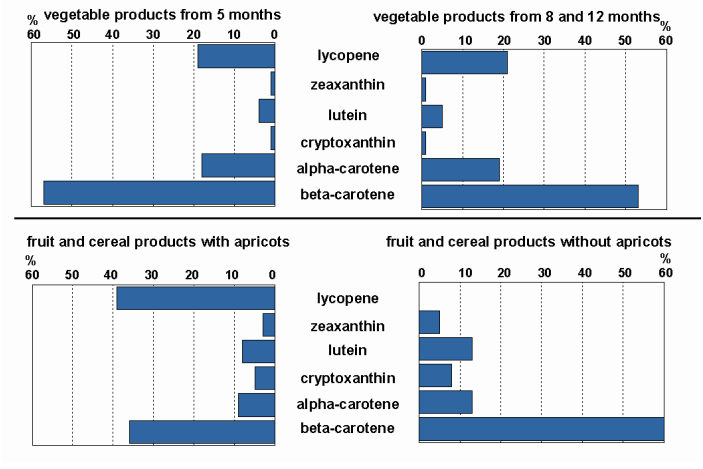



***Fig. 10:*** *Carotenoid profile in different groups of baby food products*

contained an average of 700 µg vitamin K/100 g, the intake could be considerably increased.

The examined baby juices can also be considered as important potential suppliers of numerous nutrients such as water soluble vitamins and carotenoids. Vitamin C and carotenoids contribute to vitamin supply but also possess anti-oxidative qualities. That means that through these products, the baby obtains a considerable part of anti-oxidative substances. Although fruit and vegetables are not the best sources of vitamins of the B group, the possible contribution of juices to vitamin $B_1$, $B_2$ and $B_6$ supply in infants should not be underestimated.

## Light Products: Who Is Able To Look Through?

In order to test the acceptance and consumption of "light" products, the Institute of Nutritional Sciences carried out a survey in 2002 in Vienna, Upper Austria, Tyrol and South Tyrol with the aid of questionnaires. In our

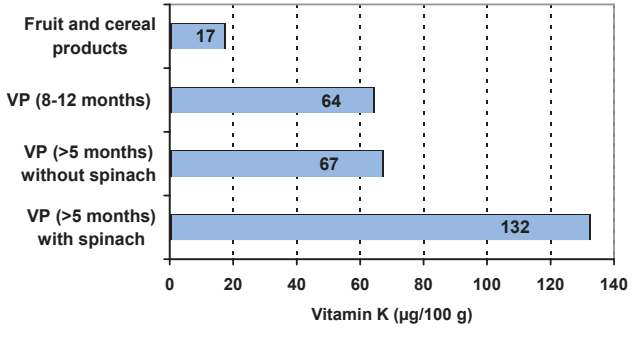



***Fig. 11:*** *Comparison of vitamin K contents of different baby food products*

*VP……vegetable products*

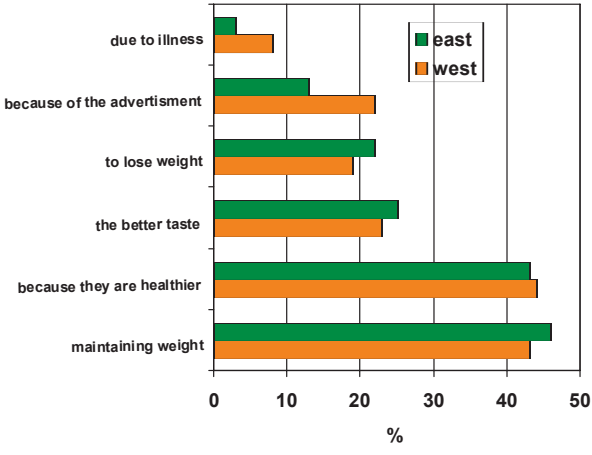



***Fig. 12:*** *Purchasing motives for "light" products*

society, where the proportion of overweight people is continuously increasing, "light" products become more and more important. One out of two interviewed persons stated to regularly consume light products. Women, obese people and people with a higher educational level constituted the major part of consumers of these products. The main reasons for the consumption of light-food products are that they are healthier and help maintaining weight. Most participants regard light-foods as "typical products of our affluent society", one third thinks that they are redundant and expensive. The most famous light products are milk and milk products, cheese, fruit juices and oils. The most important selection criteria for food purchase are taste, health and costs. Light-products can be supportive for a weight reduction if reasonably used and if simultaneously eating habits are modified toward a higher consumption of cereal products, fruit and vegetables which are natural "light" products.

## Food Aditives: Mostly Necessary and Thoroughly Tested for Safety

Currently, 296 additives are authorised in the EU following the principle of a positive list. For many of these substances limitations for application and portions are given. For health preventive reasons they are only permitted to be used in specified foods and only to a certain upper level.

### Risk appraisal with the ADI-concept:

The upper level can be identical with the concentrations calculated from the ADI (Acceptable Daily Intake)-values. It is, however, generally much lower because basically the concentrations, which are necessary in order to attain the desirable effect, are defined as upper level. The evaluation of the intake of food additives is accomplished in a EU-wide harmonised "tire concept". Within 3 steps the intake is evaluated with increasing accuracy. If the estimated intake of an additive exceeds the ADI in one of these steps,

***Tab. 9:*** *Degree of exposure to additives in Austrian preschoolers (3-6 years), additive intake (mg/day) > ADI after step 2 (data from analysis and/or of the producer are available)*

| Additive | MV > ADIt[1] | 95.P. > ADIt[1] | Quotient 95. P./ADIt[1] |
|---|---|---|---|
| Colouring | – | + | 1,3-1,5 |
| Yellow orange S (E 110) | – | + | 1,4 |
| Real carmine(E 120) | – | + | 1,3 |
| Green S (E 142) | – | + | 1,4 |
| Brilliant black BN (E 151) | – | + | 1,5 |
| Sorbates (E 200, 202, 203) | – | + | 2,5-3,1 |
| Benzoates (E 210-213) | + | + | 2,9-9,2 |
| Sulphur dioxide (E 220) | – | + | 3,3 |
| Sulfites (E 221-224; E 225-228) | + | + | 6,7 |
| Nitrites (E 249-250) | + | + | 1,8-5,7 |
| Phosphates (E 338-341, E 450-452) | + | + | 2,6-3,0 |

[1]total Acceptable Daily Intake based on the average body weight of 20.7 kg; intake under (–) and over (+) the mean value and the 95th percentile (= high consumer) respectively

the next steps will be evaluated more exactly. If necessary, changes of the legal regulations could be made due to the results.

### Degree of exposure to food additives:

In Austria food additives monitoring has been carried out by the Institute of Nutritional Sciences three times up to now (1996, 1998 and 2002). The results of the first two evaluations (carried out with people older than 6 years) were presented in the Austrian Nutrition Report 1998. It could be shown that the intake of most food additives is under the ADI. After step 3 only the ADI of sulphur dioxide and the group of sulphites was exceeded at the 95th percentile (= high consumer). A further 9 additives exceeded the ADI after step 2 which complies with a "worst case" situation.

In the study made in 2002, the intake of food additives was particularly evaluated for children at the age of 3-6 years after step 2 and where possible as well step 3. Altogether 90 food additives were examined. In 10 additives and additive groups respectively (tab. 9) the ADI was exceeded after the 3rd step at the 95th percentile. In a further 14 additives the intake was higher than the ADI after step two at the 95th percentile.

Recent risk appraisals showed that the exposures of additives were greatly overestimated as upper levels were used for their estimations. Analysis data or indications of the producer would be desirable in order to enable a more accurate calculation of food additive intake.

The ADI includes broad safety margins. Thus, a casual exceeding of the ADI values is not critical for health. An intake of food additives over the ADI during a longer period is still not desirable.

Due to the strict regulation and the accurate examinations, food additives are a safe element of our nutrition. They allow a huge variety and consistent quality of the European food offer.

## Acrylamide: No Acute Danger, Exposure Can Be Reduced

Acrylamide (AA) is a toxic substance which, among other things, provokes neurotoxic effects and which is carcinogenic in animal experiments. Cigarette smoke is one source (beside many others) for AA exposure. In intensively heated starchy food AA has been detected as well.

The NOAEL (no observed adverse effect level) for chronic toxicity regarding neuropathy is 0.5 mg/kg body weight. In rats a higher prevalence of benign and malignant tumours was found at a dose of 2 mg/kg body weight (BW)/day over a period of two years. Acrylamide is in high concentrations in vivo genotoxic for somatic and germ cells. The FAO/WHO Consultation ranges AA in the group 2A of the IARC-classification: probably carcinogenic to humans.

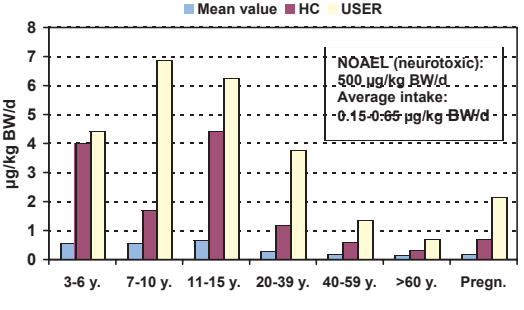
It is assumed that foods make a measurable contribution to total exposure of AA. Different eating patterns lead to different quantities of exposure. In the course of a first risk appraisal the Institute of Nutritional Sciences of the University of Vienna carried out a study including already existing and published outcomes. This study was made in order to evaluate the average exposure of the Austrian population with acrylamide.

The data about food intake were obtained from the Austrian Study on Nutritional Status (ASNS). 14 food groups potentially rich in acrylamide (including coffee) were taken for calculating total exposure. Data about AA content of the concerned edibles were taken from measurement results of the "Bundesamt für Gesundheit der Schweiz" (BAG).

According to the population group the average daily intake of AA over food in Austria was 0.15-0.65 µg/kg BW. The exposure of AA over food intake is, regarding neurotoxicity (NOAEL: 500 µg/kg BW/day), inoffensive.

As a result of a high preference of potato crisps, chips and salty snacks, the highest AA exposure was found in children, in absolute amounts as well as in relation to body weight. This confirms the assumption that particular eating habits influence the amount of AA intake.

Finally some questions regarding AA content in edibles have to be solved yet. Until then realistic measures have to be taken in order to minimise the AA content in edibles. If general recommendations towards a balanced diet (e.g. the 10 rules of the German Nutrition Society, DGE) are followed the AA exposure can be decreased. Further, starchy potato and cereal products




*HC…high consumers (=95th percentile); USER…only individuals who consumed the relevant food; BW…body weight; Pregn…pregnant women; NOAEL…no observed adverse effect level*

***Fig. 13:*** *Exposure of acrylamide (µg/kg BW/d) through 14 relevant food groups in Austrian population groups*

(e.g. toasted bread, croquettes) should not be prepared using too much heat and not heated too long. The food industry is trying to lower the acrylamide content of their products.

## Nitrate, main contribution from consumption of vegetables

Nitrate appears almost always in food and drinking water, either from its use as food additive but also to a considerable amount from other sources (vegetables, drinking water, etc). Nitrite is formed by reduction of nitrate (e.g. by enteral bacteria).

Nitrate exposition is a considerable health problem. In particular, the potential formation of cancerogenous nitrosamines in the stomach from the combination of secondary amines with exogenous oder endogenous nitrite is important.

For the estimation of the nitrate exposition of the Austrian population data was used from private analysis of the "Landwirtschaftlichen Gemeinschaft Wiener Gärtner (LGV)" for vegetables and of the "Bundesanstalt für Lebensmitteluntersuchung und Forschung (BALUF)" for EU regulated food sampling criteria for other foods. Data on nitrate from foods with legally regulated nitrate additives resulted from evaluations of the Institute of Nutritional Sciences of the University of Vienna within the research project on food additive exposure in Austria. Extensive data is avalaible for nitrate from drinking water, however, the present guideline for nitrate (< 25 mg/l) was used since the contribution of drinking water suppliers was not accessable and the values showed high variations.

Following the linkage of nitrate concentrations of food with the Austrian data on food intake (from the Austrian Study of Nutritional Status), the nitrate exposure in Austria was calculated seperately for sex and age groups. For the risk assessment the results where compared with the ADIt-value (total acceptable daily intake) of 0-5 mg/lkg body weight adjusted to the according mean body weights.

The total nitrate exposure of single population groups was at the 95. percentile (= high consumer) between 132 and 486 mg/d (highest intake for 46-55 year old adults). At this level of exposure, the ADI is exploited by 93% on average. In the group of 25-65 year old adults the ADI is exceeded by 20-30%. Considerable sex specific differences are observed: male adults at the 95. percentile exceed the ADI by a maximum of 15% (16-25 years old), whereas female adults show excess exposures of 56% (46-55 years old). Adult women are therefore to be considered as risk group for excessive nitrate exposure.

The nitrate exposure in Austria is within the range of other European countries. Similarly, vegetables is the main contributor with a total of 62% (on average 42 mg/d) to nitrate intake. Vegetables however also contain inhibitors of nitrosylation (vitamins C, E, polyphenoles, etc.), which are most likely the explanation for negative correlations between vegetable intake and cancer risk from epidemiological studies. In second position is drinking water (total 25% or 17 mg/d). The intake of nitrate from additives (13%, appr. 9 mg/d) is lower than expected.

The excess exposures above ADI of high consumers appears acceptable for now, although improved quality management and a reduction of legal limits for contaminated foods would guarantee a lower exposure in total.

## Heavy metals (lead, cadmium), no concern for exposure from food

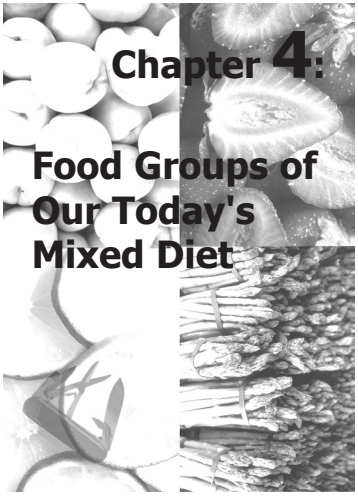
Usually, the elements lead (Pb), cadmium (Cd) and mercury (Hg) are considered as heavy metals when assessing the exposure from food. Heavy metals from foods are ingested directly or indirectly by the food chain and are partly accumulated in the organism.

A risk assessment was carried out for lead and cadmium as they are part of the most abundant heavy metals and have to be considered as highly toxic. Lead and cadmium concentrations of single food groups (with the most recent legally accepted upper limits) where combined with the Austrian data on food consumption of several population groups (from the Austrian Study of Nutritional Status).

For lead, the calculated exposure of high consumers (= 95th percentile) reached a maximum of 38,5% of the tolerable upper limit. According to FAO/WHO, the provisional tolerable weekly intake (PTWI) for lead is 1500 µg for an adult of 60 kg body weight.

Cadmium exposure for high consumers at the 95th percentile ranges from 0,19-0,73 µg/kg body weight and day for the different population groups, where 6-9 years old showed the highest values. The PTWI-value is the reference value for the risk assessment, which has been derived from the toxicological upper limit provided by JECFA 1985 of 7 µg/kg body weight for better comparability. For consumers at the 95th percentile a cadmium exposure was found from 20% (> 65 years old) to 73% (6-9 years old) of PTDI. Children at 6-9 years of age have to be regarded as risk groups with considerable intakes above the Austrian mean value. The toxic limit of intake however is not exceeded by any Austrian population group, not even from high consumers. Therefore, the present PTWI for cadmium appears to be sufficient for the protection of risk groups.

On the basis of the present results no concern exists for the exposure of cadmium and lead from food. Special nutrition behaviour (excessive intake of specific food groups) however may lead to negative effects of heavy metals. In particular, a longterm one-sided diet with preference of offals, contaminated "natural" vegetable food, animal fats and certain fish species may enhance the risk without clearly quantifiable extent.




## Bread and Cereal Products, Health Potential Not Utilised Fully

Regarding bread consumption, Austria lies within the European average. According to the Austrian Study on Nutritional Status (ASNS) the Austrian mean intake of bread and pastry - mainly of superfine flour - is 119 g per capita and day. This only meets half of the amount recommended by the German Nutrition Society (DGE).

An augmentation of bread consumption (without additional intake of butter, cheese, sausage etc.), especially of dark bread varieties and wholemeal bread, would increase the supply of some micronutrients (B vitamins, vitamin E, magnesium, iron etc.) as well as the intake of dietary fibre to a desirable level. In regard to the fact that bread contains approximately 1.3 g table salt per 100 g, the supply of iodine could be improved as well, but only under the precondition of a more widespread usage of salt fortified with iodine. Recently accomplished assessments about eating habits of Vienna preschoolers (3-6 years) showed a preference for products made of superfine flour. Many of the interviewed children declared that they were not familiar with wholemeal bread. The preferred breakfast cereals are cornflakes and fortified cereals. The children hardly were familiar with oat flakes either and rarely consumed them respectively. In many countries fortification of bread and cereal products is the norm and helps in improving the supply of many vitamins (e.g. folic acid), minerals (e.g. calcium) and trace elements (e.g. selenium). In Austria this subject is still being discussed. Concerning fortification of foods, the nutritional purpose of such an undertaking should be in the foreground instead of economic aspects.

***Tab. 10:*** *Average daily bread and pastry consumption in the Austrian population, separated in age groups (female and male)*

| Collective | female (g/d) | male (g/d) |
|---|---|---|
| Children and adolescents | 92 | 121 |
| Adults | 131 | 157 |
| Elder people | 113 | 116 |
| Pregnant women | 101 | - |
| Average | 119 | |

## Fruit and Vegetables, Powerful as Group

The analysis of the daily fruit consumption of the Austrian population can be called very positive. Pregnant women and children at the age of 11-14 years consumed on daily basis the biggest amount of fruit. Preschoolers and elder people showed a sufficient intake of fruit as well. A higher amount of fruit would be desirable for children at the age of 7-10 years, adolescents and adults. The favourite fruit varieties of the Austrians are apples, pears and bananas. The highest amount of pitfruit and bananas was observed among preschoolers and pregnant women. Elder people prefer pitfruit as well. Children aged 11-14 years favour citrus fruit which nearly cover the total daily requirements. The biggest portion of vitamin C in pregnant women is derived from vegetables.

The average daily vegetable intake of the examined collective was, independent from gender and age, insufficient. The highest amounts of vegetables were consumed among pregnant women. Apart from children aged 11-14 years and elder people, women showed a higher fruit and vegetable intake among all age groups. The influence of a positive example of parents is bigger than that of restrictions and interdictions.

| Collective | Fruits (g/d) | Vegetables (g/d) |
|---|---|---|
| 3-6 years | 177 ± 162 | 48 ± 61 |
| 7-10 years | 156 ± 196 | 73 ± 90 |
| 11-14 years | 255 ± 295 | 72 ± 100 |
| 15-18 years* | 145 ± 171 | 78 ± 56 |
| 19-60 years | 183 ± 227 | 148 ± 134 |
| >55 years** | 240 ± 200 | 145 ± 122 |
| Pregnant women | 291 ± 296 | 168 ± 148 |

*apprentices; **Vienna only

***Tab. 11:*** *Average daily fruit and vegetable intake (M ± SD) of the Austrian population, separated in age groups*

## Milk and Milk Products, Main Source for Calcium Supply

The recommended amounts of milk and milk products were not achieved by any of the interviewed population groups (tab. 12).

The biggest portion of calcium intake (>50%) was still taken through this food group (tab. 13). This was the result of the evaluations of food intake which were within the scope of the Austrian Study on Nutritional Status (ASNS) made by the Institute of Nutritional Sciences of the University of Vienna. The lowest intake of milk was found in 15-18 years old apprentices, who only consumed 39% of the recommended amount, followed by 11-14 years old children with 55%. In contrast, elder people reached more than 80% of the recommendations for milk and milk products. On the basis of the evaluated intake data the daily fat intake through milk and milk products was calculated. The results showed that the fat intake with milk and milk products was about one third of the guideline value for total fat intake. Further, about 6-7 %E (% of total energy) of the daily intake of saturated fatty acids was derived from this food group.

Altogether an increase in intake of milk, cheese, yogurt, buttermilk etc would be desirable. In order to keep the fat intake low, fat reduced products should be preferred. In regard to osteoporosis prophylaxis, the calcium supply could be improved by a higher daily intake of these products. Due to the fact that in Austria calcium is a critical nutrient, a better utilization of this food group is recommended.

| Collective | Amount consumed (g/d) | Recommendation (g/d) | Intake in % of recommendation |
|---|---|---|---|
| 3-6 years | 281 | 350 | 80 |
| 7-10 years | 283 | 400 | 71 |
| 11-14 years | 213 | 420 | 51 |
| 15-18 years* | 193 | 500 | 39 |
| 19-60 years | 213 | 340 | 63 |
| >55 years** | 275 | 340 | 81 |
| Pregnant women | 260 | 300-400 | 74 |

*apprentices; **Vienna only

***Tab. 12:*** *Average daily intake of milk and milk products in the Austrian population, separated in age groups*

***Tab. 13:*** *Calcium intake (mean values) derived from milk and milk products (mg/d) and the relative proportion (%) of total calcium intake*

| Collective | Ca total intake | Ca derived from milk[1] | Ca derived from cheese | Ca derived from milk + cheese in % of total intake |
|---|---|---|---|---|
| 3-6 years | 655 | 244 | 208 | 69 |
| 7-10 years | 639 | 246 | 210 | 71 |
| 11-14 years | 629 | 185 | 158 | 55 |
| 15-18 years[2] | 697 | 168 | 143 | 45 |
| 19-60 years | 938 | 185 | 171 | 38 |
| >55 years[3] | 758 | 239 | 204 | 58 |
| Pregnant women | 893 | 226 | 193 | 47 |
| Average | 744 | 213 | 184 | 53 |

[1]incl. yogurt, curd, cream etc. [2]apprentices; [3]Vienna only; Ca....calcium

## Meat and Meat Products, Important to Know: Quality More Important than Quantity

The average daily per capita intake of meat and meat products in Austria is, according to the different age groups, about 50-150 g which delivers about 40 g protein and 40 g fat. This food group contains numerous B vitamins, minerals and trace elements. Considering this, meat is a food with high nutrient density (fat content<15%), with a medium energy content of approximately 180 kcal (750 kJ) per 100 g and is thus part of a balanced diet. The total exclusion of meat is in regard of a sufficient iron supply critical among certain population groups, e.g. young women. Further, meat considerably contributes to the supply of zinc, vitamin $B_{12}$, vitamin $B_6$ and, from pork, vitamin $B_1$. These facts support the recommendations for the consumption of meat and meat products of 2-3 portions per week (1 portion ~ 200 g). In Austria the actual intake is, according to age group, between 200 and 300% of the recommendation (tab. 5).

The evaluations of food intake made by the Institute of Nutritional Sciences of the University of Vienna showed that only the intakes of pregnant women and preschoolers were within the desirable references.

A result of this high intake of meat and meat products consequently leads to a high intake of fat, saturated fatty acids, cholesterol, salt and energy. Thus it would be desirable to reduce the average consumption of this food group in Austria.

The consumers as well as the producers should mind the principle "quality before quantity". The quality of this food group would be further

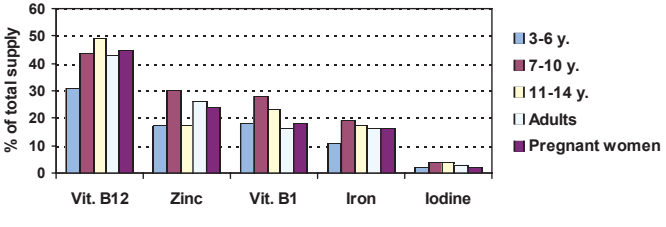



***Fig. 14:*** *Contribution of meat and meat products to the supply of selected micronutrients in Austria*

| Collective | actual intake (g/d) | Recommendation (g/d) | Intake in % of recommendation |
|---|---|---|---|
| 3-6 years | 50 | 45 | 111 |
| 7-9 years | 130 | 50 | 260 |
| 10-14 years | 122 | 60 | 203 |
| 15-18 years* | 151 | 90 | 168 |
| 19-60 years | 130 | 43-86 | 300 |
| >55 years** | 93 | 43-86 | 216 |
| Pregnant women | 104 | 105 | 99 |
| *apprentices; **Vienna only | | | |

***Tab. 14:*** *Average daily intake of meat and meat products in the Austrian population, separated in age groups*

increased if for the production of meat products (sausages) salt fortified with iodine was used.

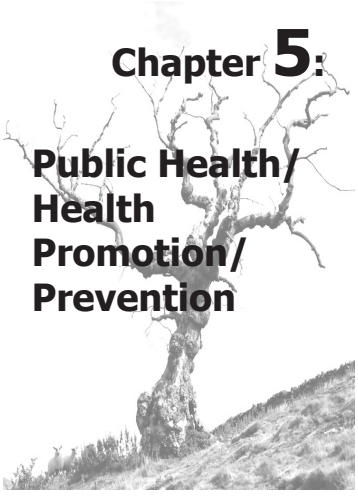
## Sugar, Stagnation of Intake on a High Level

The sugar intake in Austria has remained static on a relatively high level during the last couple of years. Depending on gender and age, it is between 6 and 19% of total energy intake.

The 25%-limitation of the Institute of Medicine (USA) has not been trespassed by any age group. The 10%-limitation of the WHO has not been realised in all of the examined age groups. Nearly all adults had sugar intakes of about 10 %E or below, children and adolescents generally exceeded this limit. The highest sucrose intake was found in preschoolers (3-6 years) and apprentices (15-18 years). Therefore, the intake of sugar is significantly higher in children and adolescents than in adults or elder people. Principally, no big differences between female and male participants could be observed, although girls and women tended to have a slightly higher intake. The intake decreases with increasing age. Only among people over 75 years could a slight increase in sucrose intake could be found, although the variance is big among the oldest male participants.

| | Committee/Organisation | Recommendation |
|---|---|---|
| 1990 | WHO Study Group | 0-10% of total energy |
| 1991 | United Kingdom | 60 g/day or 10% of total energy |
| 1995 | Germany | <10% of total energy intake |
| 1996 | Scandinavia (Nordic Nutrition Recommendation) | <10% of total energy for adults with low energy intake (<8 MJ/Tag) and children |
| 1995 | FAO/WHO Consultation, Cyprus | No limitations given |
| 1997 | FAO/WHO Consultation on Carbohydrate in Human Nutrition | Avoid excessive intakes, but no limitations, diabetics: <10% of total energy intake is acceptable on certain condition |
| 2000 | D-A-CH-Referenzwerte | Moderate intake |
| 2002 | Food and Nutrition Board | 25%-border, limitations in usual eating habits factually cancelled |
| 2003 | WHO-Report | Reuptake of the 10%-limitation |

***Tab. 15:*** *Nutritional recommendations of the last years for the limitation of sugar intake*



# Chapter 5: Public Health/ Health Promotion/ Prevention

## Diseases and Mortality Associated with Nutrition - East-West Gradient in Cardiovascular Diseases and Obesity

Diseases associated with nutrition with more or less manifold genesis are a considerable cause for morbidity and mortality. Cardiovascular diseases (CVD) and cancer are responsible for more than 76% of deaths. Among women, the proportion of CVD and cerebrovascular diseases is higher, but the proportion of cancer is lower than in men. The risk of developing cancer among men is nearly 39% higher than for women. The most frequent cancers in men are lung and prostate cancer and cancer of the colon, among women breast cancer, cancer of the colon and lung cancer. Deaths due to endocrine and metabolic disease are in 92% of the cases attributable to diabetes mellitus.

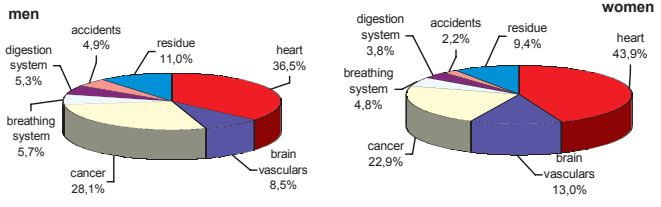



***Fig. 15:*** *Cause of death in Austrian men and women (2001)*

According to the international trend the prevalence of obesity in Austria has increased as well. 37% of Austrians are overweight and 9.1% are obese. Statistics show an East-West decline within Austria. In Western Austria life expectancy is higher than in the East of Austria, the mortality risk from CVD and the prevalence of obesity are also lower.

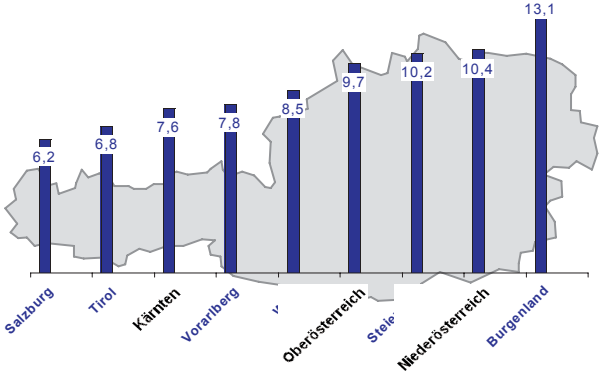



***Fig. 16:*** *Epidemiology of obesity in Austria (1999) in percent*

## Cardiovascular Risk Factors and Nutrition

In addition to hyperlipidaemia, hypertension and diabetes, homocysteinaemia – an intermediate product of the methionine metabolism – is more and more being recognised as a further nutritionally influenceable risk factor for CVD. Homocysteine status was examined in healthy Austrians as well as in patients with CVD. The evaluated number of people with homocysteinaemia in Austria is high showing that this parameter is quite an important risk factor for CVD in Austria as well. The dimension of this factor cannot be accurately estimated before the completion of the currently carried out study. Supplementations of folic acid, vitamin $B_{12}$ and vitamin $B_6$ are included in this study. It is still reasonable to measure homocysteine status in persons at risk and patients of CVD respectively, as a set of lifestyle factors are known which could lower homocysteine levels. These are absence of nicotine, regular physical activity and a diet with sufficient intakes of folic acid, vitamin $B_{12}$ and vitamin $B_6$.

## Nutrition in HIV Positives

In Austria more than 1.2 million people are tested for HIV (= human immunodeficiency virus) each year. Half a million of these tests are made in the course of blood donation. According to the source, the estimated number of HIV positive people is between 9,000 and 15,000.

Among HIV positives the risk of undernourishment is given. Undernourishment and the wasting syndrome were highly prevalent in HIV patients at the start of HAART (= highly active antiretroviral therapy). Since the initiation of HAART, the prevalence of a Body Mass Index (BMI) less than 20 kg/m² has decreased significantly. Most patients gained some weight after the beginning of this treatment. Distinctive nutritional problems are more prevalent in advanced cases.

## Diabetes Mellitus

Globally the incidence and prevalence of diabetes mellitus, a glucose tolerance dysfunction, is increasing. The fact that not only in industrial countries but also in the most populous countries of the world, the so called developing countries, as well as in younger people the prevalence of diabetes is increasing, is very alarming. The prevalence of diabetes in Austria (2.1%) is quite low compared to many other industrial countries but is still increasing. In the year 2000, around 47,190 diabetes patients were treated in Austrian hospitals of whom 24,674 were women and 22,516 were men. In 2001 1,460 deaths (565 men, 895 women) due to diabetes mellitus were registered in Austria. These are 14.3 men and 21.4 women per 100,000 people alive.

For these reasons, diabetes mellitus is a big challenge for the health care systems and all organisations and persons active in the field of public health. Primary prevention through health and nutrition promotion should be preferred to curative therapy.

Diabetes mellitus type 1 is an inheritable autoimmune disease which is barely influenced by external factors. In contrast, diabetes mellitus type 2

is highly dependent on influenceable risk factors which are primarily obesity, lack of physical activity and unfavourable nutritional habits. Systematic avoidance and reduction of these risk factors are an effective form of prevention. In therapy of diabetes mellitus, modification of nutrition, oral anti-diabetics, insulin and physical activity - partially or in combination - are applied.

Placebo controlled studies, which have been published since 1990 and where physical activity and nutrition programmes have been included, showed the effectiveness of such programmes in therapy and prevention of diabetes mellitus. The glycaemic control as well as the blood lipid profile could be improved. Further, combined nutrition and physical activity programmes had the ability to decrease the mortality risk, the risk of late consequences, the progression of insulin resistance and psychological factors. Arising glucose tolerance dysfunctions which may lead to diabetes mellitus can be prevented or delayed.


## "Fonds Gesundes Österreich", Practice and People Orientated

The Fonds Gesundes Österreich started its activities in 1998 bases on the law for health promotion. As a national institution for contacts and promotion, the Fonds Gesundes Österreich has supported more than 450 projects and actions for health promotion and primary prevention. Activities in the field of life style, such as nutrition and physical activity, are the main issues of focus. For these activities the Fonds Gesundes Österreich annually receives 7.25 million Euros which are taken from purchase taxes (of the federation, federal states, communities and cities).

The major task of the Fonds is the promotion of regional, people and practice oriented projects of health promotion as well as promotion of better health behaviour and healthier life circumstances. The main focus is the fortification of well-being and health among all population groups.

One important point in health promotion is the prevention of overweight and obesity which was the main focus of some research programmes. In terms of the Ottawa Charter the development of long-term programmes, which should bring about behaviour changes and contribute to health promotion, is a major aim. A demonstrative example therefore is the "Gesunde Betriebsküche - Healthy Factory Canteen". Representatives of all establishment levels are incorporated in planning and conception of the project which revises and redesigns the existing food offer. The kitchen staff is trained and the employees of the company are incorporated in the project events.

In addition to project support, the Fonds Gesundes Österreich addresses the population with health messages in the form of media campaigns. This

| Fields of activity of the Fonds Gesundes Österreich |
|---|
| • Empowerment of primary-preventive, practice-oriented projects which are based on a comprehensive health concept |
| • Support of the capacity building of health promotion |
| • Support of application-oriented research projects and studies for advancements of health promotion and the comprehensive primary prevention as well as epidemiology, evaluation and quality assurance in these fields |
| • Investment in further training of the people operating in the field of health promotion and comprehensive primary prevention |
| • Promotion of the networking and investment in capacity development of networks in the area of health promotion |
| • Information, education and accompanying public-effective activities for enhancing the awareness of the population for health promotion, comprehensive primary prevention and selected health related aspects |

***Tab. 16:*** *Fields of activity of the Fonds Gesundes Österreich*

should provoke a rethinking towards better health behaviour. For information on nutrition, the Fonds Gesundes Österreich offers a free nutrition brochure to all interested persons. Further, a nutrition-hotline was installed in 1999 for general or specific questions around the subject of nutrition. Accompanying campaign activities, such as actions in factory canteens should animate responsible staff to offer more fat reduced and meat reduced food, more vegetables and salad. By that, needful structures can be created and employees can eat more health consciously.

## Health Promotion in Austria

With the "Ottawa Charter for Health Promotion" from 1986 an important step was made towards the goal of enabling the population a life of maximal health. In Austria the legal basis for the realisation of the aims and objectives in this area was established by the adoption of the "Gesundheitsförderungs-gesetz" (GfG) 1998. The entry of Vienna to the "Gesunde Städte" (healthy cities)-project 1988 was the beginning of numerous projects and initiatives for the amelioration of the health situation in the city. One of the projects within the scope of the health promotion plan for Vienna was the "Netzwerk Ernährung" (network nutrition), which was commissioned by the Municipality of Vienna and developed by the Institute of Nutritional Sciences Vienna during 3 years as a pilot project. By means of different methods, such as newsletter, homepage, workshops and symposia, the dissemination of scientifically funded nutrition information was supported. One important function of the "Netzwerk Ernährung" was connecting and supporting already existing structures in the area of nutritional consultations.

In the course of a survey made by the Institute of Nutritional Sciences of the University of Vienna the offer of nutritional information in the World Wide Web was evaluated. The number of websites with nutritional issues is increasing; the contents of most of these do however not underlie controls and can thus not be recommended without restrictions (fig. 17). By means of search engines websites concerning the keyword "nutrition" were sought. Of the 76 examined Austrian websites 61 were from an institution or

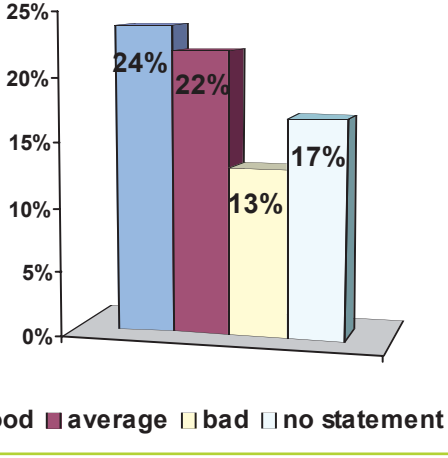



***Fig. 17:*** *Quality evaluation of Austrian websites dealing with nutrition*

organisation, 12 from a food, pharmaceutical or commercial company and 3 of the fitness sector. Not even the half of the analysed websites indicated the name of the composers or their profession. The quality of the contents could only be valuated as "good" in 24% of these websites. Not only had the correctness of the statements but also their accuracy need to be improved. The medium internet constitutes a huge but unstructured and uncontrolled source of information. A reason for that is that most websites were created by marketing or media experts and not by or with the help of nutritionists.

## REVOST - Reiner Ernährung- und Vorsorgestudie, a regional example

Heart attack and stroke are the main causes of death in our western society. Pathological processes and risk factors associated with their development have been shown to begin during childhood. Obesity plays a central role in the development of risk factors like hyperinsulinemia, hypertension, hyperlipidemia and type 2 diabetes mellitus.

The Childhood Group of the International Obesity Task Force (IOTF) and the European Childhood Obesity Group (ECOG) propose the use of the Body Mass Index as a defining instrument for overweight and obesity in children.

In adults we use clear cut off points for the definition of overweight and obesity; in children it is necessary to consider age- and sex-dependent changes.

From 1995-2003 children at the age of 10-18 years had been monitored in a routine setting at a grammar school near Graz/Austria. These data are an example for the prevalent problem of obesity and malnutrition and strengthen the need for action in health promoting projects in childhood.

The highest prevalence of overweight and obesity was found in 10-year-old children; 15.9% (male) and 13.2% (female) who had a BMI over the 90th percentile.

Also the prevalence of obesity was highest in this age group. Among the study population obesity was detected in 1-2% of the examined pupils. Therefore, this low rat of obesity can be further explained by the generally normal range of laboratory parameters (blood lipids, uric acid and blood glucose).

A BMI below the 10th percentile fulfils the weight criteria (ICD-10) for anorexia nervosa and was also prevalent in children. The highest prevalence of underweight was found in male 16 years old (15.2%) and among female 15 years old (10.9%) respectively.

## Food based dietary guidelines, more easily realisable and practical

In contrast to nutrient based guidelines, food based dietary guidelines are an appropriate health policy measure for the improvement of nutrition. According to the recommendations of the FAO those guidelines should be adopted to the several issues of national, regional, cultural and linguistic characteristics.

In relevance to the results from the present nutrition report for Austria the following seven guidelines for a healthy diet are presented:

1. Enjoy a variety of foods
2. Eat more carbohydrate rich food and meals – eat less fried foods
3. Eat plenty of fruit and vegetables – take 5 a day
4. Eat less fat and fat rich foods
5. Drink a lot but choose your drinks reasonable
6. Enjoy your foods
7. Stay active and fit with phyiscal activity

These food based dietary guidelines for Austria are meant to contribute to an improvement of nutrition of all Austrians for a better health promotion. This offers the chance to clearly reduce the incidence of many nutrition associated diseases, thus contributing to the reduction of health system costs and – probably being the most important – to an improvement of over all quality of life.

As scientific evidence in general, food based guidelines also underlie several developments making them not fixed for ever. Principle changes for the given guidelines however are not to be expected in the future. Basing on changes of the population structure it can be expected, that specific guidelines for specific groups of the population have to be developed and established. This will be one of the main tasks of nutritional sciences for the coming years.

# An Outlook – Proposals to Optimize the Nutritional Situation in Austria

The aim of the Austrian Nutrition Report 2003 is not only the description of the actual nutritional situation in Austria, but also a proposal for ameliorating unfavourable eating habits. Taking into account the results of the previous sections, priority should be given to the following goals:

**• Goal – correcting the described inadequacies in current dietary habits**

These are on the basis of the population level:

- high energy intake correlating to the actual low energy expenditure
- high fat intake
- unbalanced composition of fat: high intake of saturated fatty acids (of animal origin) and low intake of vegetable oils as well as the unfavourable ratio of n-6 : n-3-unsaturated fatty acids
- low intake of dietary fibres
- low intake of folate, iodine, calcium

options for the realisation of this goal:

+ enhanced formulation/implementation of Food based dietary guidelines (e.g. 5-a-day, food guide pyramid, moderate sugar consumption, less fat and fatty foods etc.)
+ selective fortification of food (e.g. with folic acid, calcium)
+ improvement of the availability of specific nutrients at the level of food processing, e.g. the overall usage of iodized salt, also in the production of bread, cheese, sausage etc.

**• Goal – improvement of nutrition knowledge**

The nutrition knowledge of several population groups (e.g. apprentices) needs serious improvement. Thus, it is advisable to create a network of nutrition information in Austria with the aim to form the message of nutrition in a science based, objective and clear manner.

**• Goal – advancement of health consciousness**

The results of the analysis of the dietary habits are still showing the need for advancement of health consciousness. Hence, current health campaigns (partly under the directive of the "Fonds Gesundes Österreich") should be additionally enforced.

**• Goal – comprehensive description of the nutritional status**

Besides the intake surveys, laboratory and biochemical assessment of the nutritional status should also be aimed at in the next nutrition report. Thus it will be possible to describe the situation of particular population groups even more comprehensively and accurately. Due to financial reasons this was not possible in the present report.

**• Goal – to emphasise the health promoting and disease preventing potential of nutrition**

The Austrian Nutrition Report 2003 shows the present nutritional status in Austria and offers starting points for the improvement of the described deficiencies. From the report the following goals for nutrition policy can be substantiated:

- elimination of the described forms of malnutrition
- improvement of nutritional knowledge
- improvement of health consciousness
- complete report on nutritional status
- emphasize the preventive potential of nutrition and inform target oriented on the role of nutrition in health management

available from (€ 10,– excl. p &p):
**Institute of Nutritional Sciences**
**University of Vienna**
**Althanstr. 14, A-1090 Vienna**
**Tel.: +43-1/4277-54904**