



# EPP-Congress 2006

*Bled  
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## ***How to disarm meat consumption opponents***

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## **Position of the American Dietetic Association: Total diet approach to communicating food and nutrition information**

- If consumed in moderation with appropriate portion size and combined with regular physical activity, all foods can fit into a healthful diet.
- The value of a food should be determined within the context of the total diet because classifying foods as "good" or "bad" may foster unhealthy eating behaviours.



***Classifying meat as "good" or "bad" may foster unhealthy eating behaviours!***

## ***How to disarm meat consumption opponents - meat and healthy eating behaviour***

- Evolutionary aspects of meat consumption
- Nutrient composition of meat and contribution of meat to nutrient intakes
- Health aspects of meat consumption

# ***Evolutionary aspects of meat consumption***

- ancestors of human species (about 7,5 to 4,5 million years ago)
  - └─> gave up vegetarianism (mainly frutarianism)
- early *Homo habilis* (2 million years ago, stone tools)
- *Homo erectus* (1.8 to 1.6 million years ago)
  - └─> high meat intake
- *Homo sapiens* (400.000 years ago)
  - └─> more than half of the food in the diet was of plant origin
- *Homo sapiens sapiens* (40.000 years ago - Palaeolithic)
  - └─> 913 g meat/day
  - └─> 1697 g food of plant origin
  - └─> animal foods provided 65 % energy sources
  - └─> plant foods provided 35 % energy sources

(Eaton, *Lipids*, 1992; Eaton and Konner, *New Engl J Med*, 1985;  
Eaton et al., *Eur. J. Clin. Nutr*, 1997; Cordain et al., *Eur. J. Clin. Nutr*, 2002)

ancestors of human species (about 7.5 to 4.5 million years ago)

In at least 4.5 million years long period of the evolution  
the human being has become omnivorous and  
has developed a suitable structure and constitution  
of digestion and metabolism

## ***Digestive adaptations to omnivorous diet***

- Human dentition is adapted for omnivorous diet composed of plant and animal food
- Human stomach is histologically more similar to dog than to the stomach of omnivorous animals
- Human digestive tract has a relatively small volume
- Large intestine presents a relatively small part of the digestive tract - omnivorous nature

*(Konarzewski, Ernährung/Nutrition, 2002)*



To provide proper balance of energy and nutrients  
humans have to consume food with:

- ↑ digestibility
- ↑ concentration of nutrients



man



dog



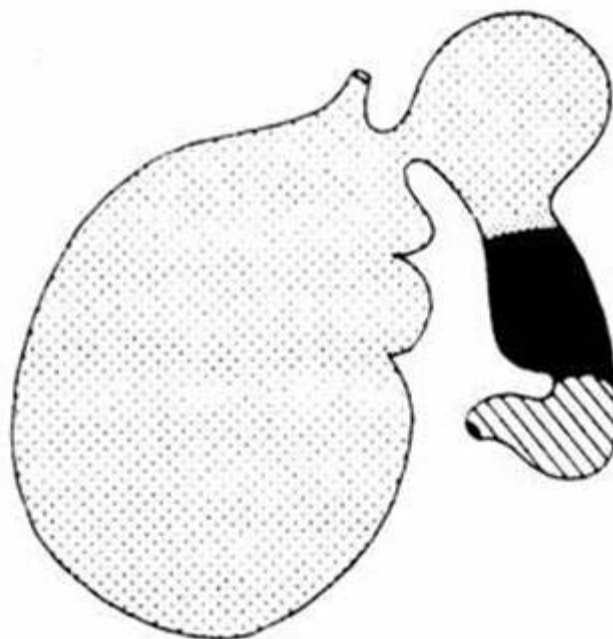
pig



horse



rat



ox



Stratified sq. nonglandular



Cardiac



Proper gastric



Pyloric

## ***Metabolic adaptations to omnivorous diet***

- *Vitamin B<sub>12</sub>*
  - synthesised in sufficient amounts in herbivorous animals
  - carnivorous animals are unable to meet their B<sub>12</sub> requirements and are completely dependant upon meat intake
  - human microbial fermentation is not sufficient to meet B<sub>12</sub> requirements
- *Taurine*
  - Herbivorous animals are able to synthesise this AA in large amounts, carnivorous are not
  - Human has much less efficient synthesise then the herbivores
- *Essential fatty acids*
  - vegetables contain insufficient amounts to support growth of nervous tissue
  - animal fats contain high amounts of PUFAs
- *Vitamin C*
  - loss of ability to synthesise vitamin C clearly suggests that plants have always constituted significant part of our diets

## Consequently

*We are all descendants of hunter-gatherers (40.000 year ago in Palaeolithic)  
who were dependant upon wild plants and animals*



*As such our digestion and metabolism are preadapted to a omnivorous diet,  
that is a diet that includes meat*



*Thus, vegetarian diet cannot be regarded as natural diet for humans*

*(Konarzewski, Ernährung/Nutrition, 2002)*

***Nutrient composition of meat and  
contribution of meat to nutrient intakes***

- Meat (especially red) provides many important nutrients, particularly:
  - essential amino acids
  - n-3 LC-PUFAs (EPA, DHA), CLA
  - Fe
  - Zn
  - Se
  - vitamin A
  - vitamin D
  - vitamin B<sub>12</sub>, folate and other B vitamins
  
- Additionally, nutrients in meat have in contrast to vegetable very high bioavailability and/or biological value



Thus meat contributes a significant proportion of total intake of some very often deficient nutrients

*(Williamson et al., Nutr Bull, 2005)*

Meat is very important in the nutrition of the most vulnerable groups of population:

- women of child-bearing age
- pregnant women
- lactating mothers
- children
- elderly



The consumption of red meat, as apart of balanced and varied diet, should be actively encouraged

*(Hill, Eur. J. Clin. Nut., 2002; Hallberg, Eu J Clin Nut, 2002)*

Total exclusion of meat is in regard of a sufficient Fe supply critical among certain population groups, e.g. young women

*(Elmadfa, Austrian Nutrition Report 2003, 2003)*

The effects of a lactoovovegetarian and omnivorous diet on changes of skeletal muscle mass in older men under 12 week strenuous training conditions

*(Campbell et al., 1999)*

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Type of diet:	Laktoovovegetarian	Omnivorous
Protein supply	equal	
Meat proteins in the diet	0 %	50 %
Muscle mass increase	7,3 %	16,2 %

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T  
S  
C  
T  
F  
M  
M

It is not possible to attribute favourable results  
in the omnivorous diet to meat proteins  
(the quality of milk proteins is equal or even superior)



**Meat complements a diet in a more complex way**



Meat adds up a different and wider spectrum of nutrients,  
which are needed as co-factors in the formation of muscle tissue  
(vitamins, trace elements)

## *Consequently*

- Meat is rich in essential nutrients that are in low concentration and poorly available in foods of plant origin
- Meat makes a significant contribution to nutrient intake for most individuals
- Meat complements plant foods in the diet and assures a safe way of meeting dietary recommendations
- Meat is low in fat since in last 20 years there was a substantial reductions in the fat content of carcass meat
- Meat adds up to a diet the needed diversity and taste

## ***Health aspects of meat consumption***

***Meat is often related to diseases of “civilization”:***

- overweight
- increased blood pressure
- diabetes
- gout
- cardiovascular disease (CVD)
- cancerous diseases (colorectal cancer...)

# DIET, NUTRITION AND THE PREVENTION OF CHRONIC DISEASES

Report of a  
Joint WHO/FAO Expert Consultation



World Health Organization

Geneva 2003

## Summary of the strength of evidence for obesity, type 2 diabetes, cardiovascular disease (CVD), cancer, dental disease and osteoporosis<sup>a</sup>

	Obesity	Type 2 diabetes	CVD	Cancer	Dental disease	Osteoporosis
Meat and fish						
Preserved meat				P <sup>↑</sup>		
Chinese-style salted fish				C <sup>↑</sup>		

C<sup>↑</sup>: Convincing increasing risk; C<sup>↓</sup>: Convincing decreasing risk; C-NR: Convincing, no relationship; P<sup>↑</sup>: Probable increasing risk; P<sup>↓</sup>: Probable decreasing risk; P-NR: Probable, no relationship; EPA: eicosapentaenoic acid; DHA: docosahexaenoic acid; NSP: non-starch polysaccharides.

<sup>i</sup> For colorectal cancer.

<sup>j</sup> For nasopharyngeal cancer.

## ***Meat and obesity***

Meat-eaters have higher BMI than vegetarians

*(Key et al., Proc Nutr Soc, 1999)*

The reason is not meat intake but the fact that vegetarians are generally more health oriented:

- consuming more fruit and vegetables (low energy food)
- have higher level of physical activity
- ...

*(Williamson et al., Br. Nutr. Foun. Nutr. Bull., 2005)*

## ***Meat and cardiovascular disease (CVD)***

Read meat contains:

- saturated FAs that might ↑ blood cholesterol
  - n-3 PUFAs, MUFAs and other nutrients (Se and B vitamins) with cardioprotective benefits
- 
- Feeding trials have demonstrated that lean meat is:
    - not hypercholesterolemic
    - not blood pressure rising
    - not have any negative effect on thrombotic risk factors
  - Cohort studies have not been able to distinguish between the effects of different types of meat



Lean meat can be promoted as part of healthy diet for primary and secondary CVD prevention

*(Williamson et al., Br. Nutr. Foun. Nutr. Bull., 2005)*

Meat is an important source of n-3 PUFAs that have cardioprotective effects



The content of n-3 PUFAs is possible to increase by appropriate animal nutrition

The effect of normal and n-3 FAs (soya oil) enriched pork meat on the concentration of free FAs and plasma lipids in healthy women

*(Stewart et al., Am J Clin Nutr 2001)*

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	Blood plasma	
	Control	n-3
Saturated FA, %	43 <sup>a</sup>	36 <sup>b</sup>
PUFA, %	21 <sup>a</sup>	33 <sup>b</sup>
Total cholesterol (mmol/l)	4,0 <sup>a</sup>	3,4 <sup>b</sup>
LDL (mmol/l)	2,3 <sup>a</sup>	1,8 <sup>b</sup>
HDL (mmol/l)	1,3	1,2

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## ***Meat and type II diabetes***

There is no evidence that red meat cannot be recommended as part of a healthy balanced diet for people with type II diabetes

### ***In addition:***

- Evolutionary studies suggest that we are not adapted to high carbohydrate diet and to food sources with very high carbohydrate digestibility (high glycaemic index). Such diets lead to type II diabetes  
*(Colagiuri and Miller, Eu J Clin Nut, 2002)*
- An energy restricted, high protein, low-fat diet that includes lean red meat may help improve overall glucose control in type II diabetes  
*(Gannon et al., Am J Clin Nut, 2003)*

## Meat and cancer

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<sup>i</sup> For colorectal cancer.

<sup>j</sup> For nasopharyngeal cancer.

## Meat and cancer

Pooled analyses of prospective studies by Marques-Vidal (*Clinical Nutrition*, 2005)



Most studies did not find any significant relationship among meat intake and CRC:

- red meat: 4 out of 20 found significant relationship
- processed meat: 4 out of 11 found significant relationship
- white meat: 2 out of 11 found significant relationship



High consumption of red meat and especially processed meat may increase CRC risk

EPIC (European Prospective Investigation into Cancer and Nutrition)  
largest prospective study ever undertaken to investigate the relationship  
between cancer and diet (520.000 participants, 10 European countries):

- Red meat and white meat intake are not significantly associated with increased CRC incidence
- Processed meat intake is significantly associated with increased CRC incidence (higher intakes with increased risk)
- High intake of red and processed meat (> 160 g per day) is associated with increased risk - not significant after adjustment for other covariates (BMI, energy intake, smoking, alcohol, fibre and folate intake, physical activity)

*(Norat et al., J Nat Canc Inst, 2005)*

*Results from these studies are often confounded by factors such as:*

- The complex nature of the diet makes it very difficult to measure the level of food and nutrient intake
- The ones with high meat consumption have very often other characteristics that could contribute to risk of developing cancer like life-style factors: smoking, low physical activity...
- It is very hard to find out the independent effect of individual dietary factors, as dietary patterns tend to cluster (individuals with high intake of (processed) meat have also low consumption of fruit and vegetables)

*(Cosgrove et al., Br J Nutr, 2005;  
Williamson et al., Nutr bull 2005;  
O'Hanlon, Lancet Oncology, 2006)*

*Hirayama (1990):*

Meat intake is positively associated with CRC in those who never eat fruit and vegetables

*Singh and Fraser (1998):*

Positive relation between meat intake and CRC in those with high meat intake + low legumes intake + high BMI

*Hirayama (1990):*

There is an inverse association between meat intake and CRC risk for those who consume green yellow vegetables daily

## ***Hence:***

The positive relation between the consumption of meat and frequency of cancer is most likely not related to the composition of meat but to the fact that high meat intake replaces some foodstuffs and protective substances in the diet (vegetables and non-refined cereal products...)

## ***This may explain:***

- why in many Mediterranean countries that have higher meat intake than in northern EU countries the incidence of CRC is lower
- why red meat intake appears to be a risk factor only in highest intake groups (more than 140 g per day) - at that level it would displace the (protective) plant foods from the diet

## **Consequently**

- Moderate intake of lean (red) meat has no negative effect on health. There is no scientific justification for eliminating meat from the diet.

*(Hill, Eur. J. Clin. Nut., 2002)*

- Lean red meat is unlikely to significantly increase the risk of CRC when consumed in moderation and as a part of healthy, balanced diet that includes plenty of fiber from fruit, vegetables, legumes and wholegrain cereals

*(Williamson et al., Nutr. bull. 2005)*

## Consequently

- Although the relation between meat intake and CRC is weak should those with very high red and processed meat consumption reduce meat intake
  - <140 g red and processed meat per day *(UK Department of Health, 1998)*
  - < 80 g red meat (including products made from these meats) per day  
*(World Cancer Research Foundation and American Institute for Cancer Research, 2006)*
- Average red and processed meat intake in most countries are still below the level thought to increase the risk of CRC.

Therefore there is only a small proportion of high consumers of meat and meat products that may need to consider a reduction in consumption

*(Williamson et al. Br. Nutr. Foun. Nutr. bull. 2005)*

(Average daily intakes of red meat in EU range from 40 g in UK to 74 g in Spain, average intakes in processed meat range from 10 g in Greece to 83 g in Germany)

## ***Conclusion***

***What to say to opponents of meat consumption?***

## *What to say to opponents of meat consumption?*

*Classifying meat as "good" or "bad" may foster unhealthy eating behaviours!*

*Meat has to be evaluated in the context of total diet!*

## ***To those who say "do not eat meat":***

- Our digestive system and metabolism are evolutionary preadapted to a omnivorous diet that includes also meat. Because of that vegetarian diet cannot be regarded as natural diet for humans
- Meat is rich in essential nutrients that are in low concentration and poorly available in foods of plant origin. Meat makes a significant contribution to nutrient intake for most individuals
- Meat complements plant foods in the diet and assures a safe way of meeting dietary recommendations
- Meat is low in fat! In last 20 years there was a substantial reductions in the fat content of carcass meat
- Moderate intake of lean (red) meat has no negative effect on health. There is no scientific justification for eliminating meat from the diet
- Total exclusion of meat is in regard of a sufficient Fe supply critical among certain population groups

## ***To those who say "eat less meat":***

- Lean red meat is unlikely to significantly increase the risk of CRC when consumed in moderation and as a part of healthy, balanced diet that includes plenty of fiber from fruit, vegetables, legumes and wholegrain cereals
- Although the relation between meat intake and CRC is weak should those with very high red and processed meat consumption reduce meat intake and increase fruit, vegetables, legumes and wholegrain cereals intake
- Average red and processed meat intake in most countries are still below the level thought to increase the risk of CRC
- Since the evidence for any role of meat in colon carcinogenesis is so weak, and since such a high proportion of women of child-bearing age are iron deficient, the consumption of red meat, as a part of balanced and varied diet, should be actively encouraged

## ***To those who say "eat less meat":***

- Average red and processed meat intake in most countries are still below the level thought to increase the risk of CRC
- Since such a high proportion of women of child-bearing age are iron deficient, the consumption of red meat, as a part of balanced and varied diet, should be actively encouraged
- Therefore it should be advised that:
  - those with very high red and processed meat consumption should reduce meat intake and increase fruit, vegetables, legumes and wholegrain cereals intake
  - those with very low red meat consumption should increase meat intake

Therefore, as recommended in healthy eating advice around the world,  
lean red meat, consumed in moderation, can be promoted  
as part of a healthy balanced diet!