

# *Nutrition Epidemiology*



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# *Chronology of application of the science of nutrition*

- 2300 B.C., China: *salt and cerebrovascular disease*
- 47 B.C., Scribonius Largus: *importance of diet in general health*
- 25 B.C., Celsus: *classified foodstuffs and emphasized their role in maintaining health*
- 1542 A.D., Andrew Borde: *A Dyetary of Health: factors affecting the health of man*
- 1628 A.D., William Harvey: *publication on circulation of the blood based on convincing experiments*

# *Chronology of application of the science of nutrition*



- 15th century, Albeek from Unitchov: *excessive intake of fats and energy as a cause of premature death*

# *Diseases related to nutrition (developed countries)*

<b>CVD</b> 55% deaths (5.3 million)	<b>Cancers</b> 25% deaths (2.4 million)	<b>Cirrhosis</b> 1.8% deaths (178thousands)
<b>Osteoporosis</b> 9% population	<b>NIDDM</b> 2.4 % population	<b>Caries</b> 93% popul.
<b>Obesity</b> 12% men 15-20% women	<b>Food allergies</b> 7% population	<b>Cataract</b> 18% 65-75 yrs 46% 75-85 yrs

# *Diseases related to nutrition (developing countries)*

PEM	Kwashiorkor	Dysentery
Vit. A deficiency	IDA	IDD
Cholera	Hepatom (aflatoxins)	Hepatitis A

# *Nutrition status at the beginning of the 3rd millennium*

- 520 million of severely malnourished
- 15 - 20 million victims of hunger a year
- 300 million suffer by deficiency of vitamin A
- 3.5 billion suffer from IDA
- 853 million suffer from IDD
- 75% of total population live in developing countries, but they consume only 15% available energy
- 1 billion drink contaminated water

# *Nutrition status in the beginning of the 3rd millennium*

- 11-15 million children die because of hunger
- 250 thousand children get blind because of deficiency of vitamin A
- 50% anaemic children (SE 52% vs. NW 10%)
- 15 million children < 5 yrs get sick from contaminated water
- More than 40% of all death in developing countries are among children < 5 yrs
- 54% from them are related to undernutrition

# *CVD in the Czech republic*

- 1982: SMR 840.2 men and 546.6 women
- 1995: SMR 708.0 men and 454.9 women
  
- 1986: SMR IM 239.0 men and 233.0 women
- 1995: SMR IM 175.4 men and 77.9 women
  
- 1986: SMR Cer.d. 258.5 men and 203.2 women
- 1995: SMR Cer.d. 176.3 men and 134.8 women



# *Role of Nutrition Epidemiology*

- Problem detection – epidemiologic studies
- Development of methods of dietary assessment
- Definition of nutrition needs at the population level
- Formulation of dietary recommendations
- Implementation of dietary guidelines
- Influence of research trends
- Education of professionals

# *Development of dietary assessment methods*

- Recall
- Record  
(weighting, estimation)
- Double portions
- FFQ
- Dietary history
- Dietary habits
- Food balance sheets
- Inventory method
- Food supply

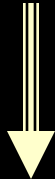
*Exact result of any dietary assessment method?*

**People eat.**

# *Model of influence dietary behaviour at the population level*



- Knowledge



- Attitude



- Behaviour

- Behaviour



- Attitude



- Knowledge

# *Attributes of dietary guidelines*

- Based on scientific background
- Analysis of local dietary habits
- Social and cultural acceptance
- Limited number of recommendations (the most relevant from the prospective of population health)
- Easy to understand and remember, attractive, motivating to compliance and real behaviour changes

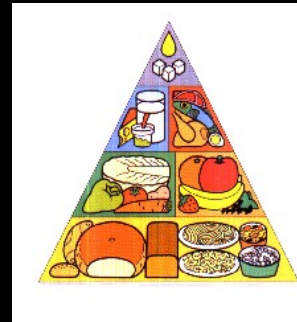
# *Dietary guidelines in terms of nutrients and energy*



Živiny		Modul A	Modul B	Modul C
Energie		7466	10758	14049
	kJ			
Bílkoviny		90.6	126.8	163.2
	g			
Tuky		44.6	63.2	81.9
	g			
Sacharidy		262.1	384.4	506.6
	g			
Vápník		977	1287	1599
	mg			
Železo		21.4	30.7	40.1
	mg			
Draslík		2753	4302	5552
	mg			
Vláknina		25.2	36.6	47.9
	g			
Vitámín A		1617	2177	2735
	ug			
Vitámín B1		1.9	2.7	3.8
	mg			
Vitámín B2		1.5	1.9	2.5
	mg			
Vitámín B6		2.2	3.2	4.2
	mg			
Vitámín B12		6.5	9.5	12.6
	mg			
Vitámín C		107	150	191
	mg			
Vitámín E		14.6	21.3	28.2
	mg			
% tuku z celkové energie		23	22	22

# *Dietary guidelines for the Czech republic*

- Cereals, bread, rice, pasta: 3-6 servings
- Vegetables: 3-5 servings (a 100 g)
- Fruit: 2-4 servings (a 100 g)
- Milk and milk products:  
2-3 servings (equiv. 300 mg Ca)
- Meat, poultry, fish, eggs, pulses:  
1-3 servings
- Others: 1+1 servings (equivalent of 10 g fat or sugar)



## *Serving size*

- Cereals, pasta, bread, rice:
  - 1 slice of bread (60 g)
  - 1 cup of rice or pasta (125 g)
  - 1 cup musli
- Vegetable
  - 1 piece approx. 100 g
- Fruit
  - 1 piece cca 100 g

# *Serving size*

- Milk and milk products
  - 1 glass of milk - 300 ml
  - 1 cup of yogurt approx. 180 ml
  - 1 serving of „average“ cheese - 55 g
- *Each serving is equivalent of 300 mg calcium*



# *Serving size*



Fish, poultry, pulses, meat,...

- 80 g or
- 1 cup of pulses
- boiled egg yolk

# *Preventive programmes*



- High risk strategy
- Population strategy

# *Recommended physical activity*

- Minimum 3 times a week
- Aerobic exercise
- Minimum 20 minutes
  
- + regular walking 1 hr daily



# *Evidence about non pharmacological intervention*

- Physical activity

3 times a week, 30-40 minutes

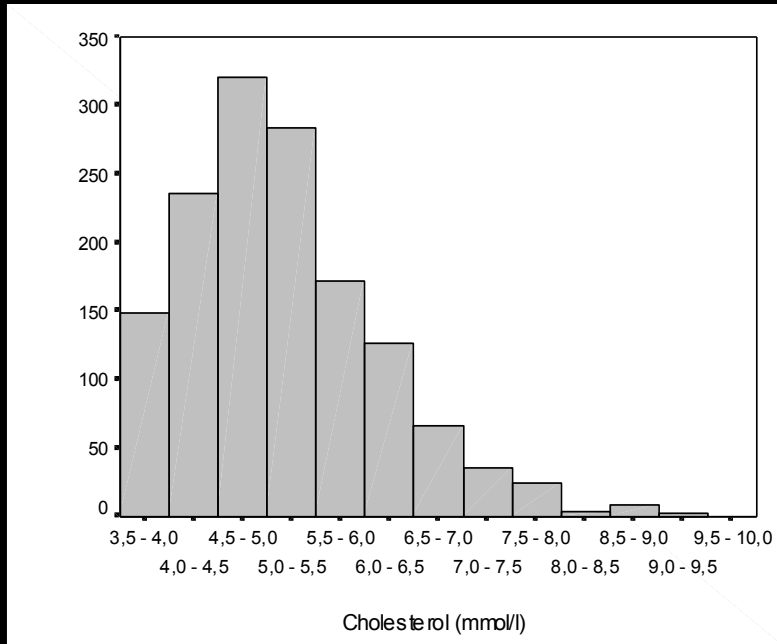
aerobic, i.e. lactates  $< 4$  mmol/l

by intensity  $> 7$  kcal/min HDL-cholesterol increases,

$> 9$  kcal/min total serum cholesterol decreases

Relation of physical activity to total cholesterol, HDL-cholesterol, atherogenic index is linear, and to the level of TG logarithmic

# *Assessed sample before intervention*



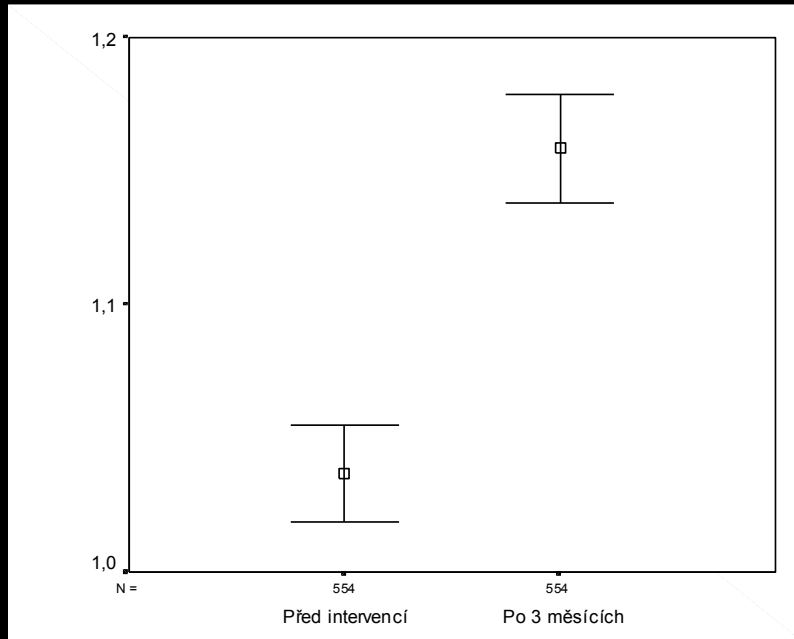
- Sample 1426 person, 882 men, 544 women
- Age  $39,3 \pm 10,7$  years
- T-chol  $>5,2$  mmol/l in 38,8% sample

# *Intervented sample*

- 279 person
- 168 women, 111 men
- Age  $43,5 \pm 10,3$  yrs

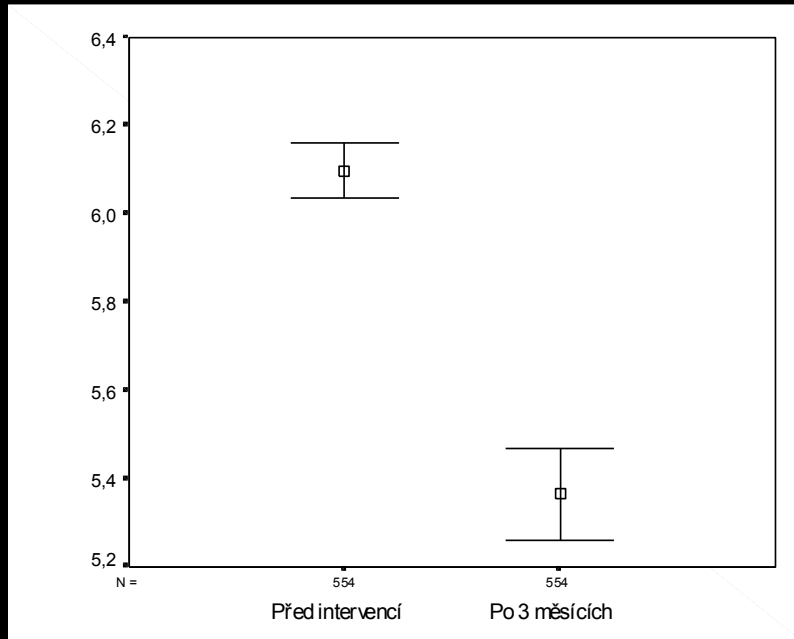


# Changes of HDL-chol before and after intervention



- Before intervention  
 $1,04 \pm 0,13$  mmol/l
- After intervention  
 $1,16 \pm 0,14$  mmol/l
- $P < 0,001$

# Changes of t-chol before and after intervention



- Before intervention  
 $6,1 \pm 0,75$  mmol/l
- After intervention  
 $5,36 \pm 1,24$  mmol/l
- $P < 0,001$



# *Cholesterol decreasing nutrients*

- MUFA
- PUFA
- Sitostanol
- Campestanol
- Guar gum
- Pectin
- Fytosterols
- Stilbenols



# *Cholesterol decreasing nutrients*



- Beta- caroten
- Lycopene
- Cycloartenol
- Beta-sitosterol
- Sitostanol
- Saponins
- Mevinolin
- Niacin ?

# *Cholesterol decreasing foods*

- Vegetables
- Fruits
- Soya
- Peanuts
- Corn
- Cereals
- Psyllium
- China green tea

# *Cholesterol increasing foods*

- Fats with high content SFA
- Non filtered coffee (cafestol)
- Animal sources with high content of cholesterol.... (offals, eggs, skin, butter, ...)

# *CINDI Dietary Guidelines – CVD prevention*



## Twelve steps of healthy eating:

1. Eat a nutritious diet based on a variety of foods originating mainly from plants rather than mainly from animal origin

# *CINDI Dietary Guidelines – CVD prevention*



2. Eat bread, grains, pasta, rice or potatoes several times per day
3. Eat a variety of vegetables and fruits, preferably fresh and local, several times per day (at least 400 g per day)

# *CINDI Dietary Guidelines – CVD prevention*

4. Maintain body weight between the recommended limits (BMI between 20-25) by taking moderate levels of physical activity, preferably daily
5. Control fat intake (not more than 30% of daily energy) and replace most saturated fats with unsaturated vegetable oils or soft margarines

# *CINDI Dietary Guidelines – CVD prevention*



6. Replace fatty meat and meat products with beans, legumes, lentils, fish, poultry or lean meat.
7. Use low fat milk and dairy products (kefir, sour milk, yoghurt and cheese) that are low in both fat and salt.



# *CINDI Dietary Guidelines – CVD prevention*

8. Select foods which are low in sugar and eat refined sugar sparingly, limiting the frequency of sugary drinks and sweets.
9. Choose a low salt diet. Total salt intake should not be more than one teaspoon (5 gr) per day, including the salt in bread, processed, cured and preserved foods. (Universal salt iodization where iodine deficiency is endemic).

# *CINDI Dietary Guidelines – CVD prevention*

10. If consumed, limit alcohol intake to no more than 2 drinks (each containing 10 gr of alcohol) per day.
  
11. Prepare food in a safe and hygienic way. Steam, bake, boil or microwave to help reduce the amount of added fats, oils, salt and sugars.

# *CINDI Dietary Guidelines – CVD prevention*

12. Promote exclusive breast feeding for about 6 months and recommended the introduction of appropriate foods at correct intervals during the first years of life.

## *Epilogue:*

Man has to eat foods which he likes.

But he should learn to like these foods, which are good and healthy for him.

