



# How to engage the consumer?

## EPP Congress 2024

**Rôles of meat in  
human nutrition**

**Philippe Legrand**





# Rôles of meat in human nutrition

**Philippe Legrand**



# Importance of animal products to ensure human nutritional requirements

**Pr. Philippe LEGRAND**

Laboratoire de Biochimie et Nutrition Humaine  
Agrocampus, Rennes  
*Institut NuMeCan (Nutrition Métabolisme Cancer)*  
*UMR INSERM 1241*  
*Membre de l'Académie d'Agriculture de France*



*Congrès de « European Pig Producers », 29 Mai 2024,  
Nantes*

## Physiological basis for proteins requirements

- Essential amino-acids,
- Regularity with time
- Total mass intake (protein),



**Tight Flow**

- large differences with age and physiological status
- Covered needs by foods (what is a « good » protein ?)

## Global quantitative aspects

Non essential amino-acids DOES NOT mean we synthesize them « de novo »  
(like fatty acids from glucose)

But from amino-acids as NH<sub>2</sub> donors



adequate requested mass of total amino-acids

However protein content is much lower in vegetal sources of proteins

- Meat : 50 to 70 % protein in dry mass
- Soja : 30 % protein in dry mass (max)

*So eating meat (or animal products) appears hier as a security for protein mass required,*

*And « vegetalisation » implies to eat more vegetal protein sources*

## Physiological basis for proteins requirements

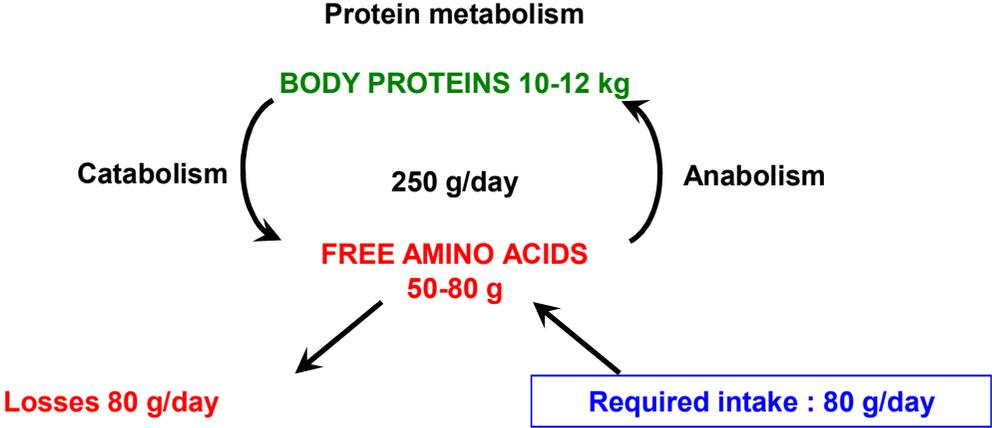
- Essential amino-acids,
- Regularity with time
- Total mass intake (protein),



**Tight Flow**

- large differences with age and physiological status
- Covered needs by foods (what is a « good » protein ?)

**Protein Needs**



**➔ TIGHT FLOW**

## Physiological basis for proteins requirements

- Essential amino-acids,
- Regularity with time
- Total mass intake (protein),



**Tight Flow**

- **large differences with age and physiological status**
- Covered needs by foods (what is a « good » protein ?)

**Infant, child, adolescent = GROWTH**

1. Search of positive protein balance (différent from adult with zero balance)
2. Need is much higher than in adult, when expressed in g protein/ kg body weight/day  
Infant : 4 times the one of adult;  
Child (10-12 y) : 1,8 times the one of adult

Essential AA : infant 8 times the one of adult, child (10-12 y) : 3 times...

Essential amino-acid requirements in mg/kg body weight of human subjects  
of various age

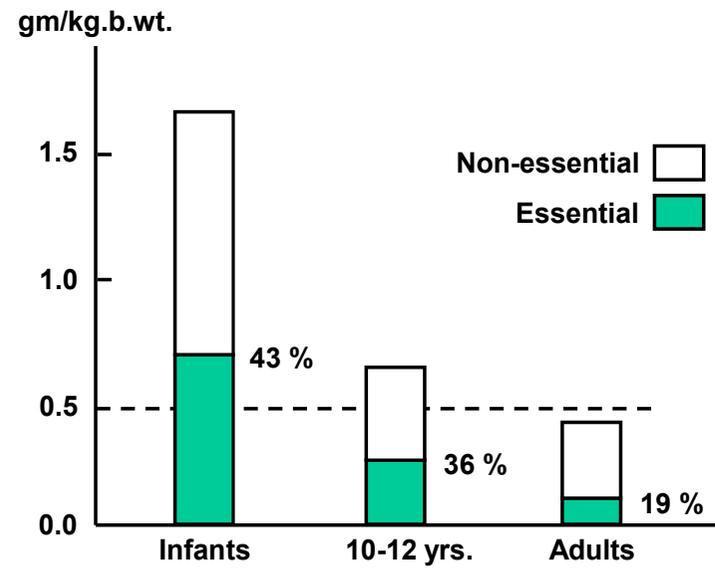
Requirement	Infant	Child, 10-12 yr.	Adult man	Adult woman
Histidine	(25)	-	-	-
Isoleucine	111	28	10	10
Leucine	133	49	11	13
Lysine	96	59	9	10
Met. & Cys.	30	27	14	13
Phe. & Tyr.	90	27	14	13
Threonine	66	34	6	7
Tryptophan	19	4	3	3
Valine	93	33	14	11
<b>Total EAA (excl. histidine)</b>	<b>680</b>	<b>261</b>	<b>81</b>	<b>80</b>

(Munro et al 1988)

## Infant, child, adolescent = GROWTH

1. Search of positive protein balance (différent from adult with zero balance)
2. Need is much higher than in adult, expressed in g protein/ kg body weight/day  
Infant : 4 times the one of adult;  
Child (10-12 y) : 1,8 times the one of adult  
  
Essential AA : infant 8 times the one of adult, child (10-12 y) : 3 times...
3. Proportion of essential AA higher than in adult

Average requirements for total protein and EAA by human subjects of various age



(Munro et al 1988)

**Infant, child, adolescent = GROWTH**

1. Search of positive protein balance (différent from adult with zero balance)
2. Need is much higher than in adult, expressed in g protein/ kg body weight/day  
Infant : 4 times the one of adult;  
Child (10-12 y) : 1,8 times the one of adult  
  
Essential AA : infant 8 times the one of adult, child (10-12 y) : 3 times...
3. Proportion of essential AA higher than in adult
4. One additional essential AA : Histidin

## RECOMMENDATIONS % total energy

**PROTEINS :**      **12-20%**                      **(mean intake : 17%)**

**For 2000 kcal :**      **60-100 g**                      **(85 g)**

*(OMS minimum : 50-70 g)*

*Adult in good health !!!*

*Pregnancy : + 10-20 g/j*

*Lactation : + 20 g/j*

*Aging : .....deficiency*

## Physiological basis for proteins requirements

- Total mass intake (protein),
- Essential amino-acids,
- Regularity with time



**Tight Flow**

- large differences with age and physiological status

- Covered needs by foods : what is a « good » protein ?

## What is a good protein ?

- Good digestibility

$$\frac{\text{N intake} - \text{N fecal} \times 100}{\text{N intake}}$$

- Biological Value: protein efficiency to ensure total protein need + essential AA

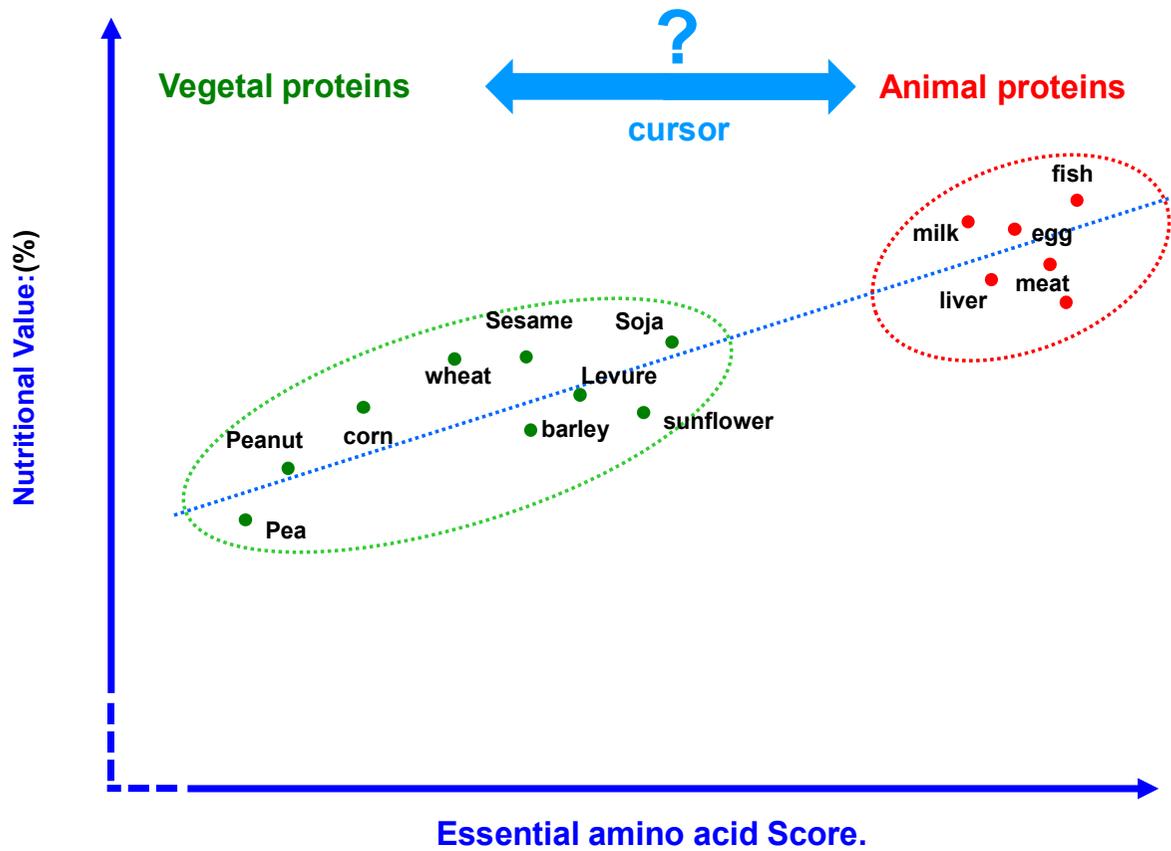
- .  $\frac{\text{N absorbed} - \text{N excreted} \times 100}{\text{N absorbed}}$

- . Essential amino acid (EAA) Score .

$$\frac{\text{mg one essential AA in 1g tested protein} \times 100}{\text{mg this essential AA in 1g de refereced protein}}$$

- . Digestible Indispensable Amino Acid Score (DIAAS)

Biological value and EAA score



*Carpenter (1951) et Block et Mitchell (1972) Munro (1988)*

## Ratio animal proteins/ vegetal proteins

In Europe : 67 % AP and 33 % VP

When considering models with both : requirements and sustainability :

- 50 % AP and 50 % VP (*Barré, 2018*)

### **ADULT**

(*Barré, 2018, Vieux, Darmon et al 2021*)

And don't forget :

Now in developing countries : 25 % AP and 75 % VP

➡ Want and must increase AP to 50%

**CAUTION, nutritional role of animal products  
is not limited to proteins!!!**

## ANIMAL PRODUCTS ARE SPECIFIC SOURCES OF OTHER ESSENTIAL NUTRIENTS

- **Vitamin B12**, (*deficiency in vegetarians*)
- **Fer**, (*25 % women are in deficiency at childbearing age*)
- **Vitamin D**, (*deficiency in the general population > 45 ans in winter months*)
- **Iodin, Zinc**, (*deficiency in the general population*)
- **DHA (omega-3)**, (*deficiency in the general population*)
- **Vitamin A**
- **Calcium**, (*deficiency in the general population, women*)
- .....

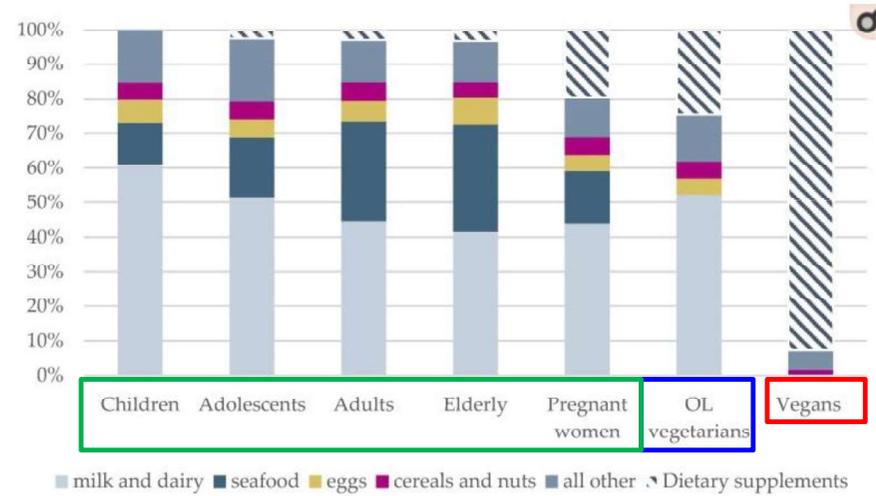


***Apart B12, this occurs in general omnivorous population, be aware if decreasing animal products, which provide these nutrients....***

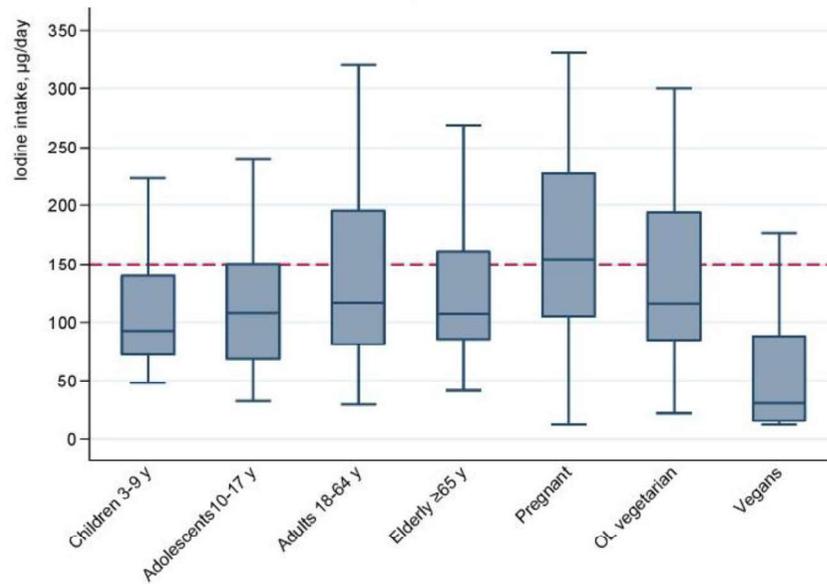
***.....especially in children and youngs***

# Iodin

**55-80 % is provided by animal products (fish)**



The contribution (%) to total iodine from food groups and dietary supplements in children, adolescents, adults, the elderly, pregnant women, ovo-lacto (OL) vegetarians and vegans.

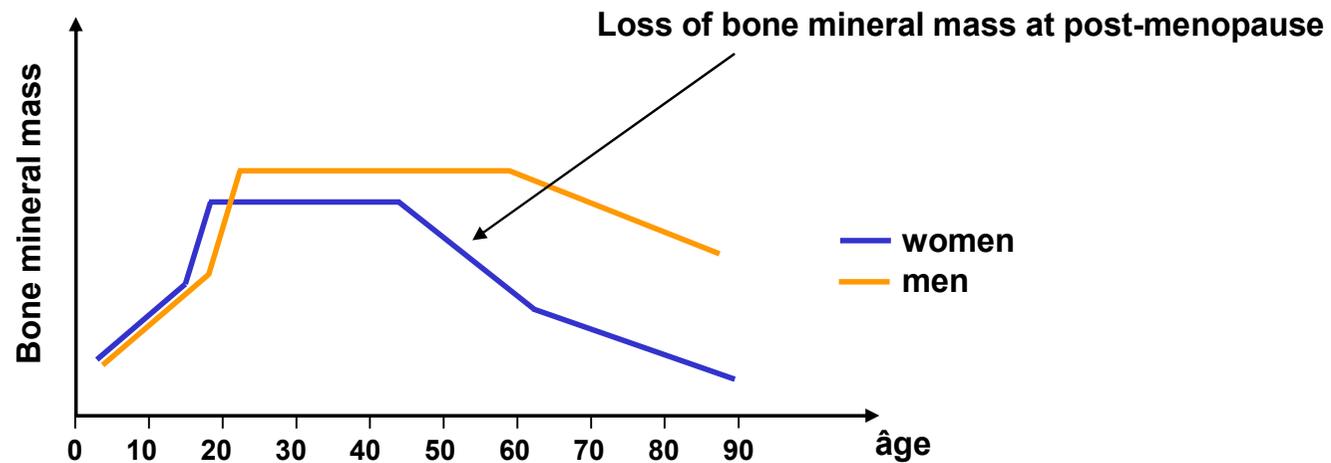


← **Recommended intake**



## Importance of dairy source for Calcium requirement

### Osteoporosis risk



ANC 950 mg/d\*

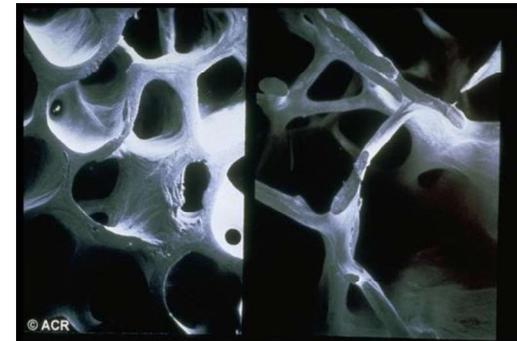
Nutritional intakes < 450mg/d without dairy products  
produits laitiers

To reach recommendations without dairy products :

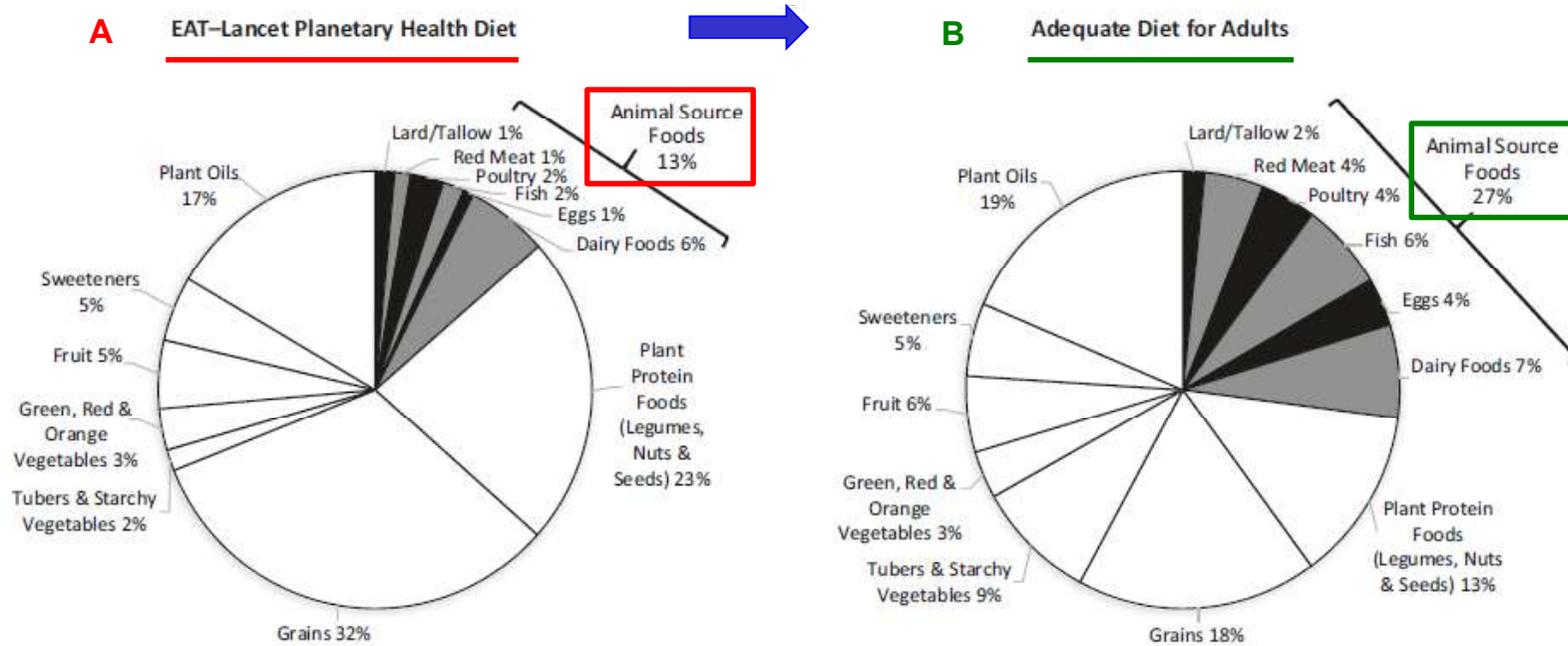
500g parsley; 1kg chickpea; 2.5 kg chinese cabbage;

400g almonds = 2500 kcal !!

\*up to 1200 mg/d before 24 years

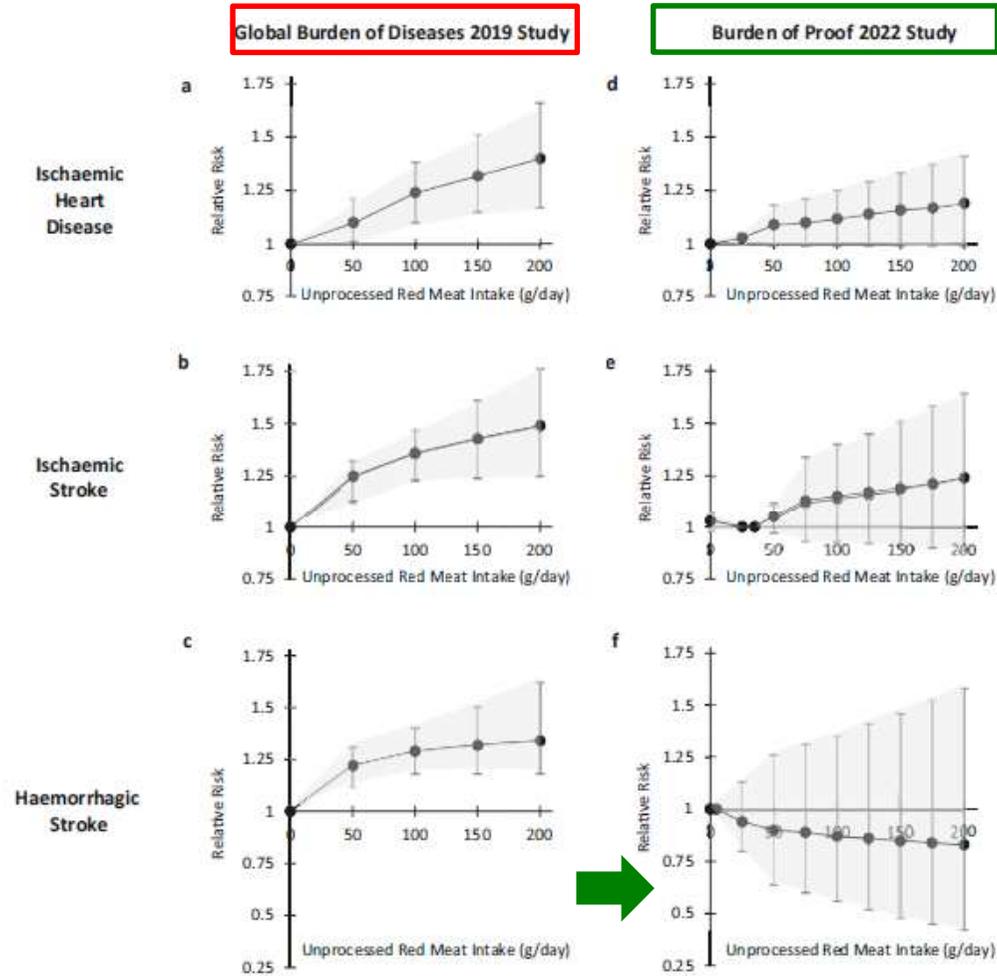


Quantities of foods recommended by the EAT-Lancet and the adequate diet for adults



- Data not valid (no publication peer review)
- Burden of proof (BoP new methods...)
- Bias
- No association (unprocessed red meat) with CVD
- In agreement with recent cohort studies....

## Association between unprocessed red meat consumption and CVD diseases



**Result inversion !**

Stanton A, 2024, *npj Science of food*, 8:10

+20 % stroke in vegetarians, Tong et al., *BMJ* 2019

Deleterious aspects ?

IRON from haemoglobin ?

?



A balanced diet with calcium (dairy) and anti-oxidants (vegetables or oils) suppressed any risk of red meat for colon cancer

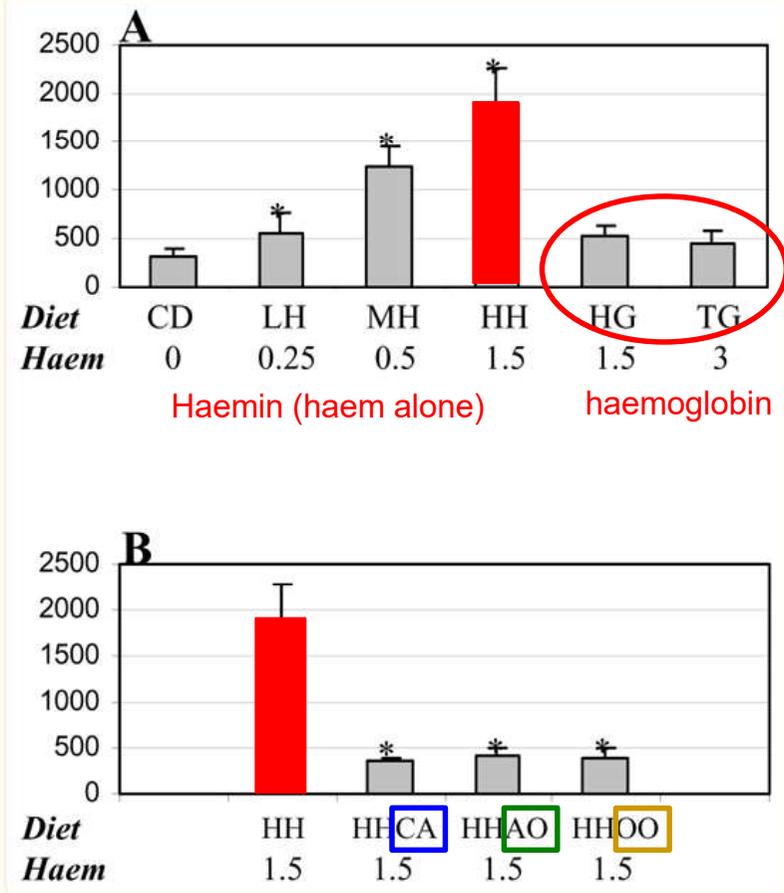


Figure 2

Number of aberrant crypts in the colon of rats after 100 days on experimental diets. A: Effect of haemin (LH, MH, HH) and haemoglobin (HG, TG); B: Effect of calcium (CA) anti-oxidants (AO) and olive oil (OO) in a high-haemin context.

\*: significantly different from control diet CD (panel A) or from HH diet (panel B) ( $p < 0.01$ , by Dunnett's test). **Haem** concentration in diets ( $\mu\text{mol/g}$ )

(Pierre F et al., 2003)

# Health and Diets

*% persons suffering chronical illnesses*

	Vegetarian	Omnivorous fruits and vegetables ++	Omnivorous no excess of meat	Omnivorous a lot of meat	<i>p</i>
Asthma	4.8	3.3	3.9	4.5	0.772
Allergy	30.6	18.2	20.3	16.7	0.000
Diabetes	2.7	4.2	2.4	2.4	0.455
Infraction	1.5	1.5	0.9	0.6	0.610
Bronchitis	3.9	3.6	2.4	3.0	0.701
Osteoporosis	6.4	4.8	3.6	5.8	0.415
Cancers	4.8	3.3	1.2	1.8	0.022
Migraine	15.8	11.8	9.1	12.1	0.074
Mental illnesses*	9.4	4.8	5.8	4.5	0.036
Others	8.8	5.5	5.8	6.7	0.308

\*anxiety and nervous breakdown

*Austrian Health survey, 1320 personnes, Burkert et al., Plos/One, 2014*

## **Conclusion**

Meat (red and white), fish, egg and milk are important components of a balanced diet for plenty of essential nutrients and protein as well, especially in growth, aging, pregnancy and breastfeeding..... AND MALNUTRITION

## Conclusion

Meat (red and white), fish, egg and milk are important components of a balanced diet for plenty of essential nutrients and protein as well, especially in growth, aging, pregnancy and breastfeeding..... AND MALNUTRITION

# Thanks for your attention

