Journées Francophones de Nutrition

SYMPOSIUM

SYNDIFrais
PRODUITS LAITIERS FRAIS

Les yaourts : une diversité à recommander

Bruxelles - Mercredi 10 décembre 2014

L'INTÉRÊT DES YAOURTS DANS LES RÉGIMES SANS LACTOSE

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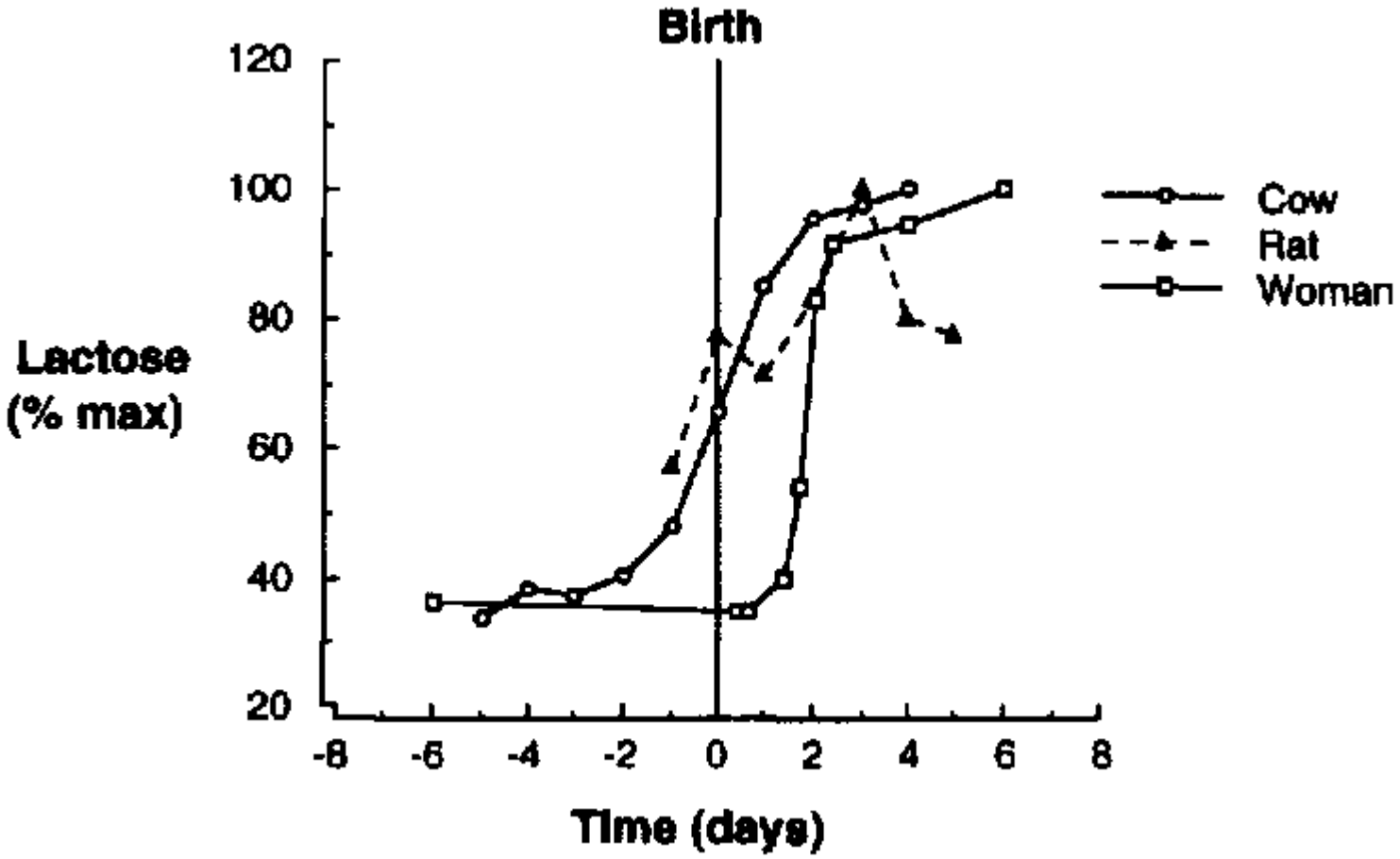
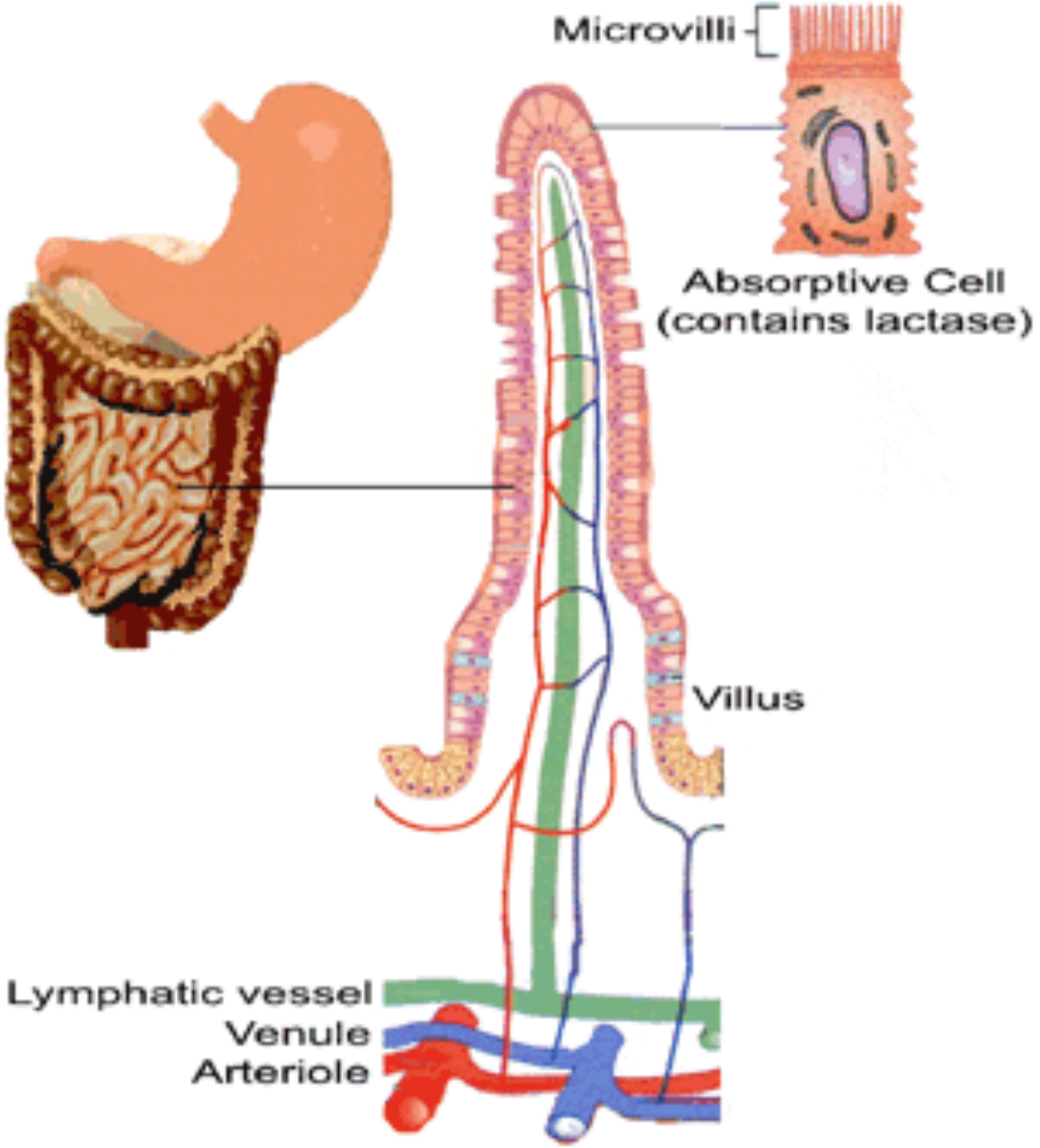
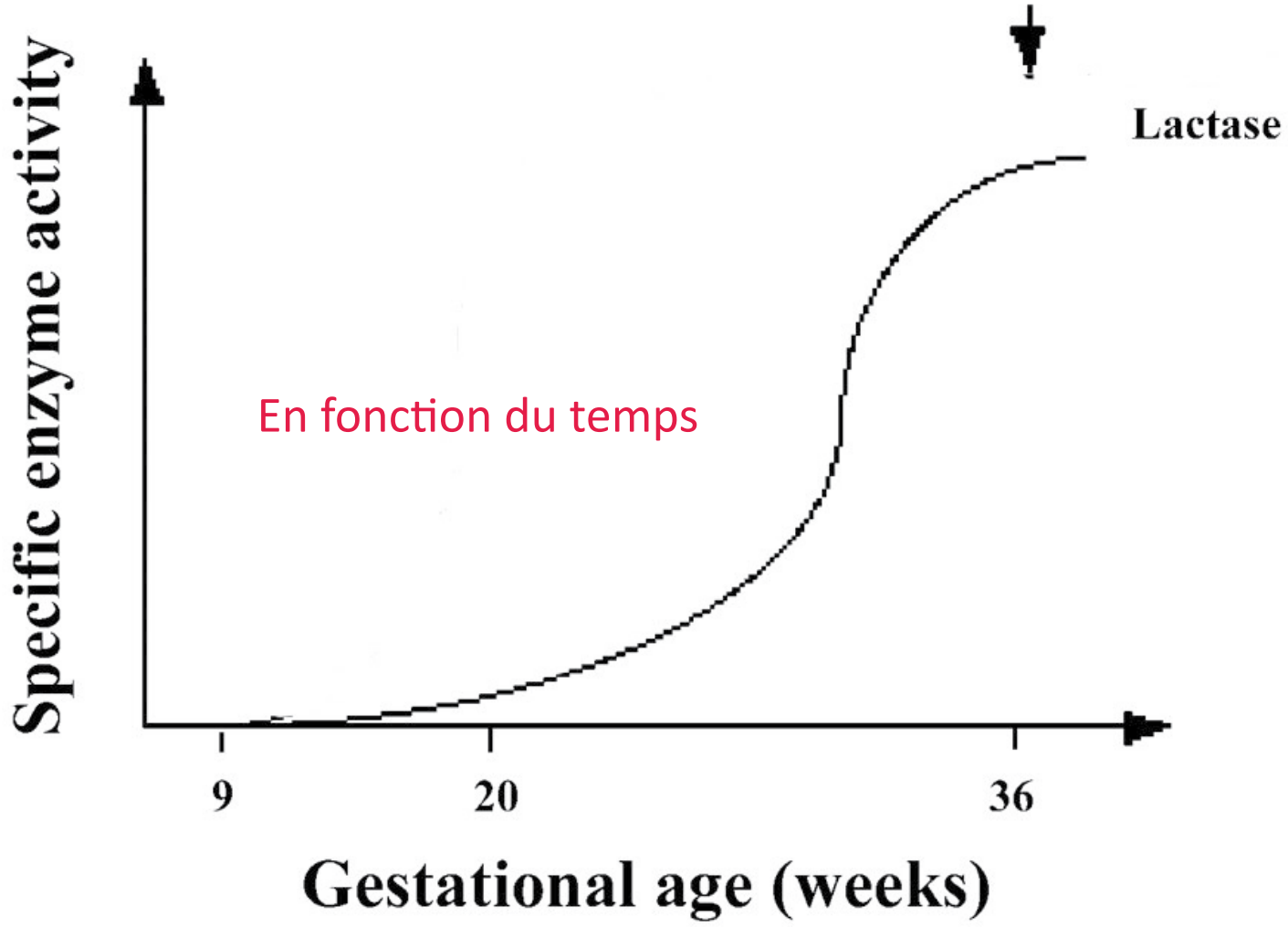
LA LACTASE

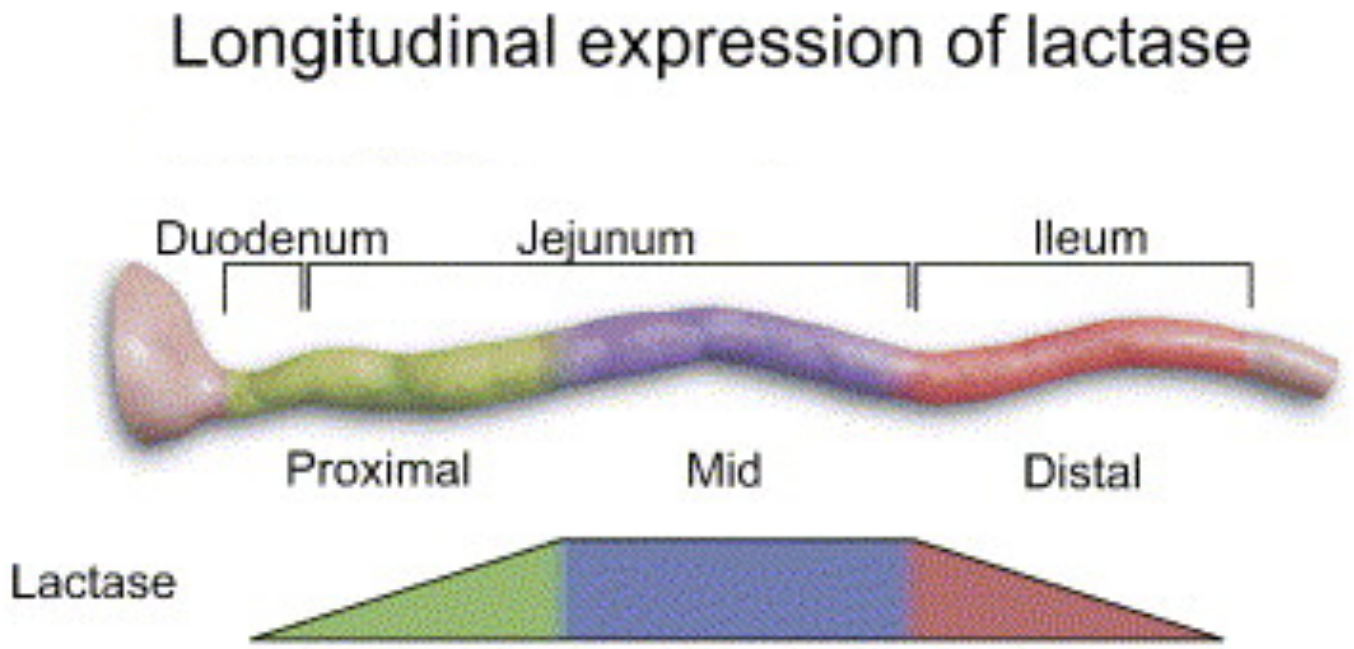
Composition moyenne du lait de femme		
	g/l	%E
Lactose	70	40
Lipides	42	54
Protéines	8	5



Hartmann, Owens, Cox, Kent. 1996

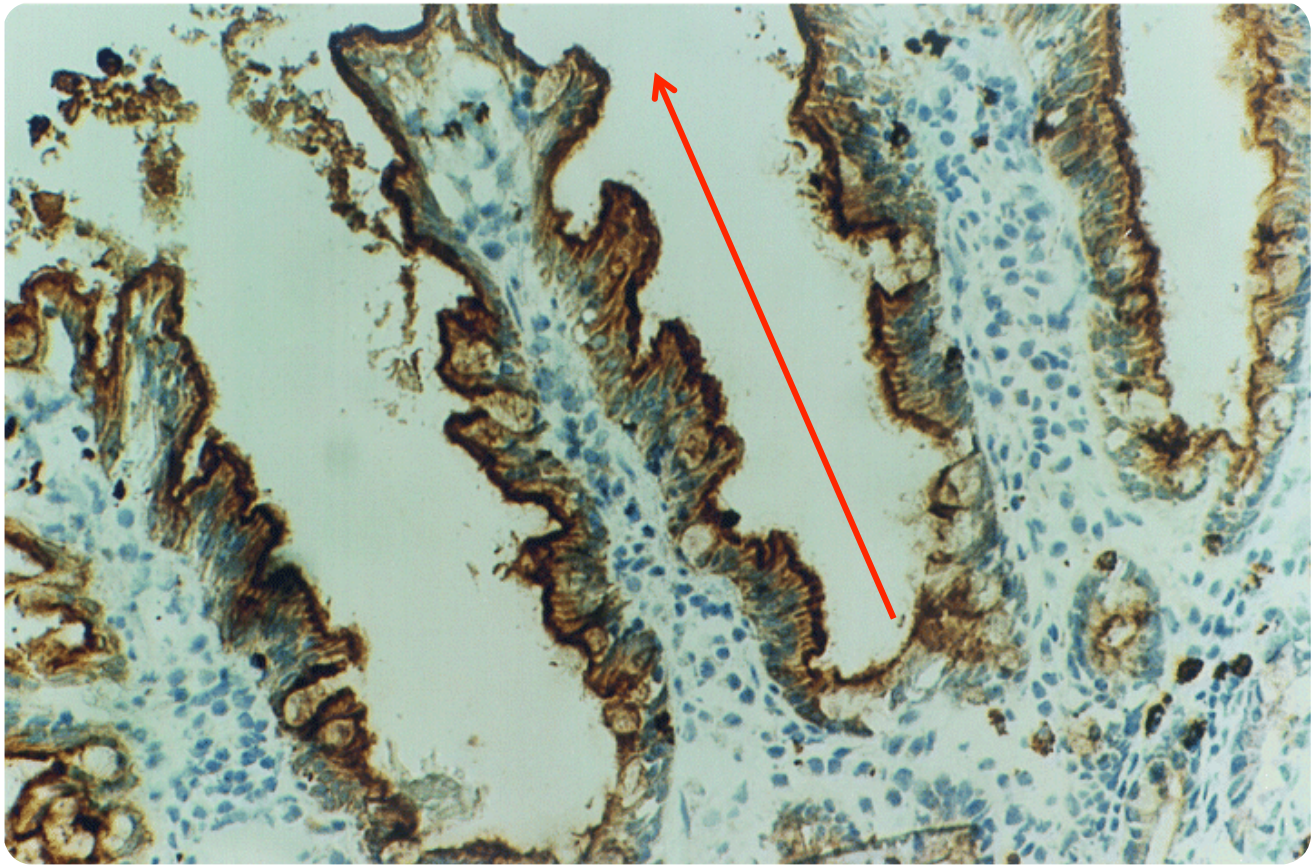

Microvilli
Absorptive Cell
(contains lactase)
Villus
Lymphatic vessel
Venule
Arteriole


Specific enzyme activity
Lactase
En fonction du temps
9
20
36
Gestational age (weeks)

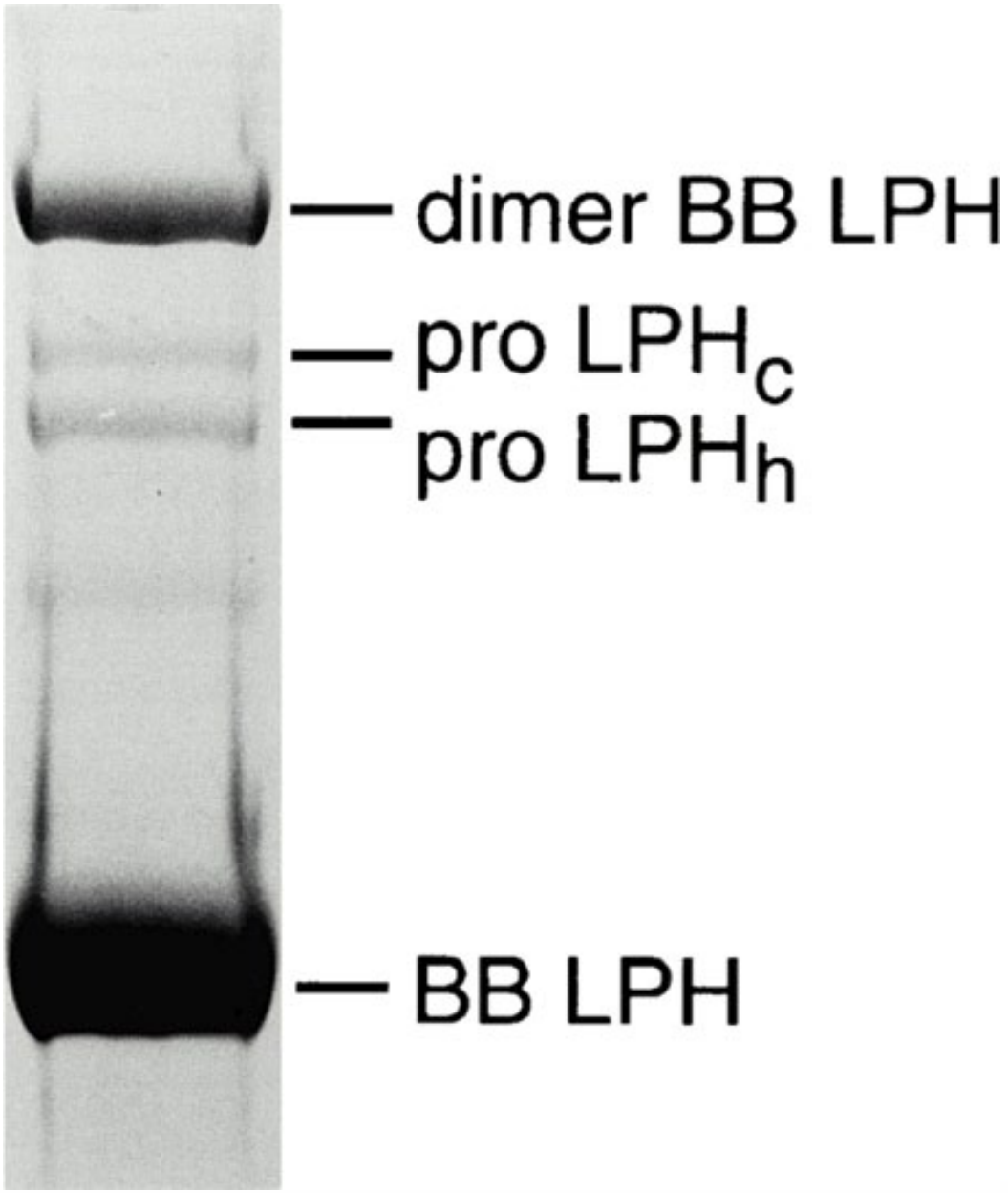


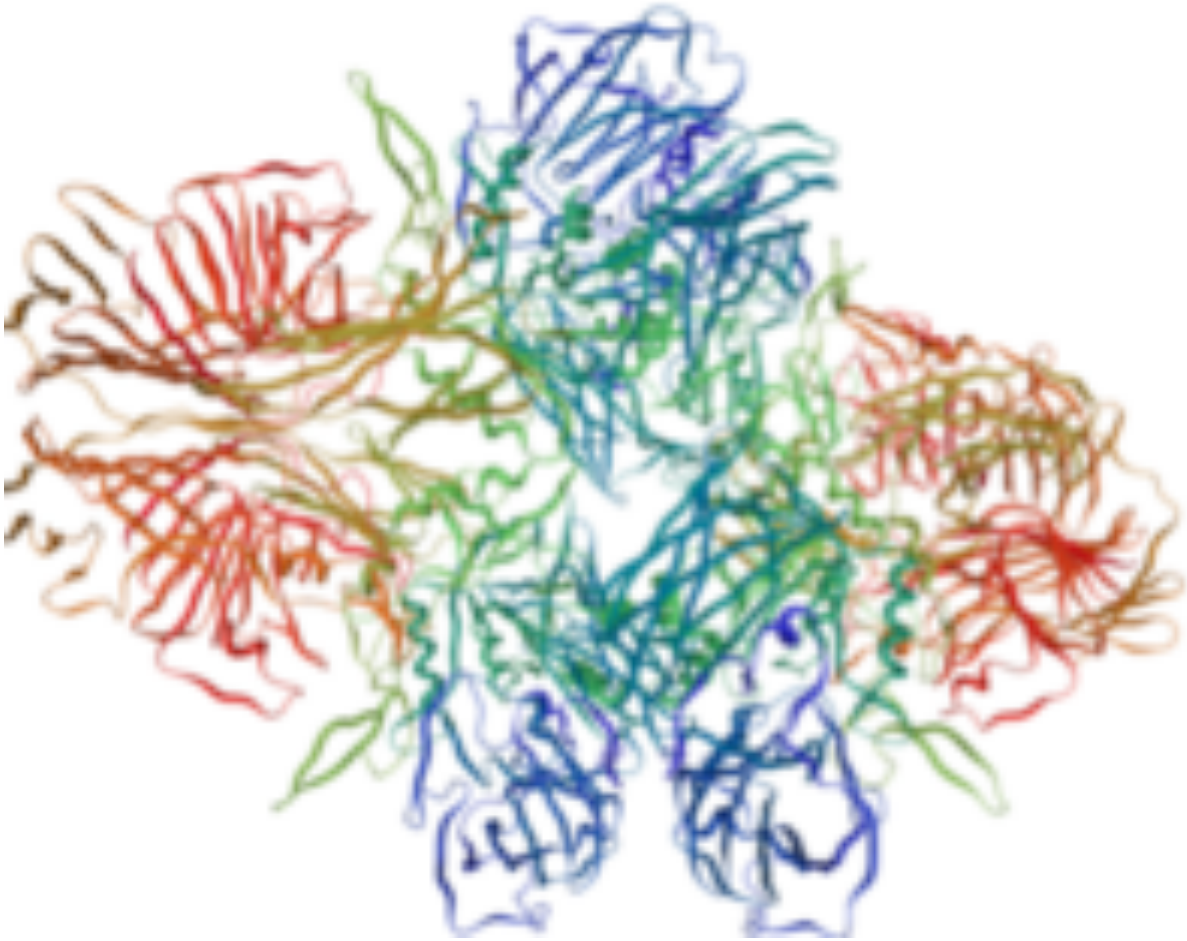
En fonction du segment

En fonction de l'axe crypte - villosité

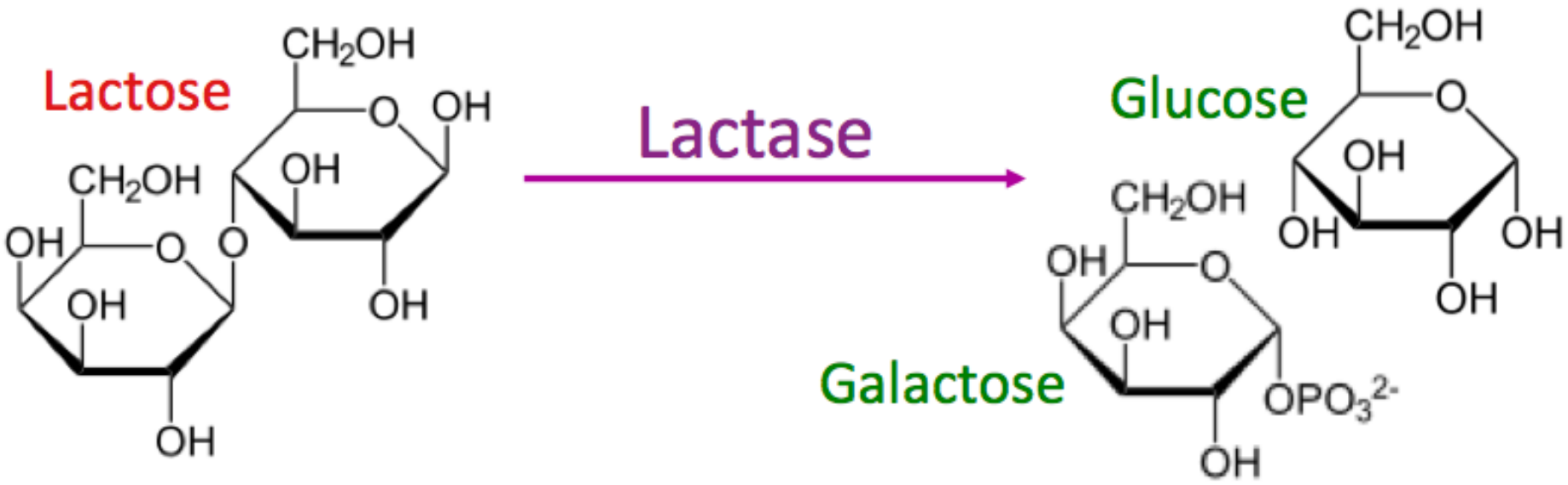


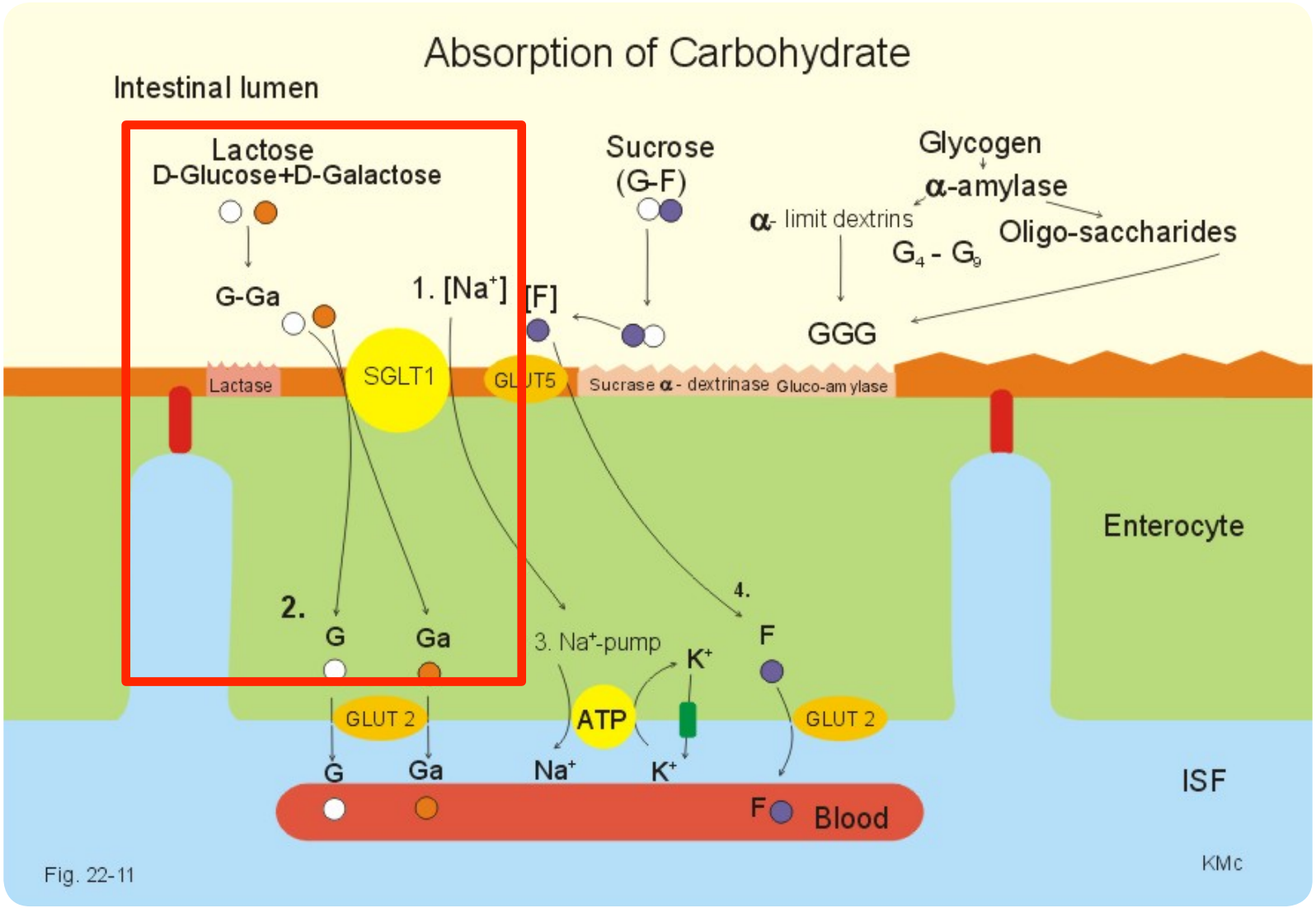
AC anti-lactase


dimer BB LPH
pro LPH$_c$
pro LPH$_h$
BB LPH

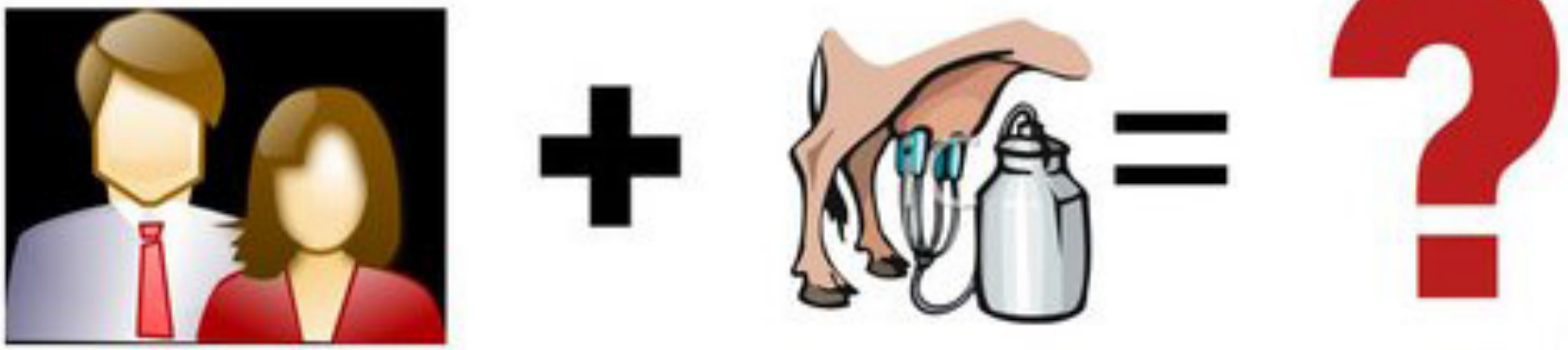


Modèle moléculaire de la lactase


Lactose
Lactase
Glucose
Galactose


Absorption of Carbohydrate
Intestinal lumen
Lactose
D-Glucose+D-Galactose
G-Ga
1. [Na+]
[F]
Sucrose
(G-F)
Glycogen
α-amylase
α- limit dextrins
Oligo-saccharides
G4 - G9
GGG
Lactase
SGLT1
GLUT5
Sucrase α- dextrinase
Gluco-amylase
Enterocyte
2.
G
Ga
3. Na+-pump
4.
F
K+
ATP
GLUT 2
GLUT 2
G
Ga
Na+
K+
F
Blood
ISF
KMc
Fig. 22-11

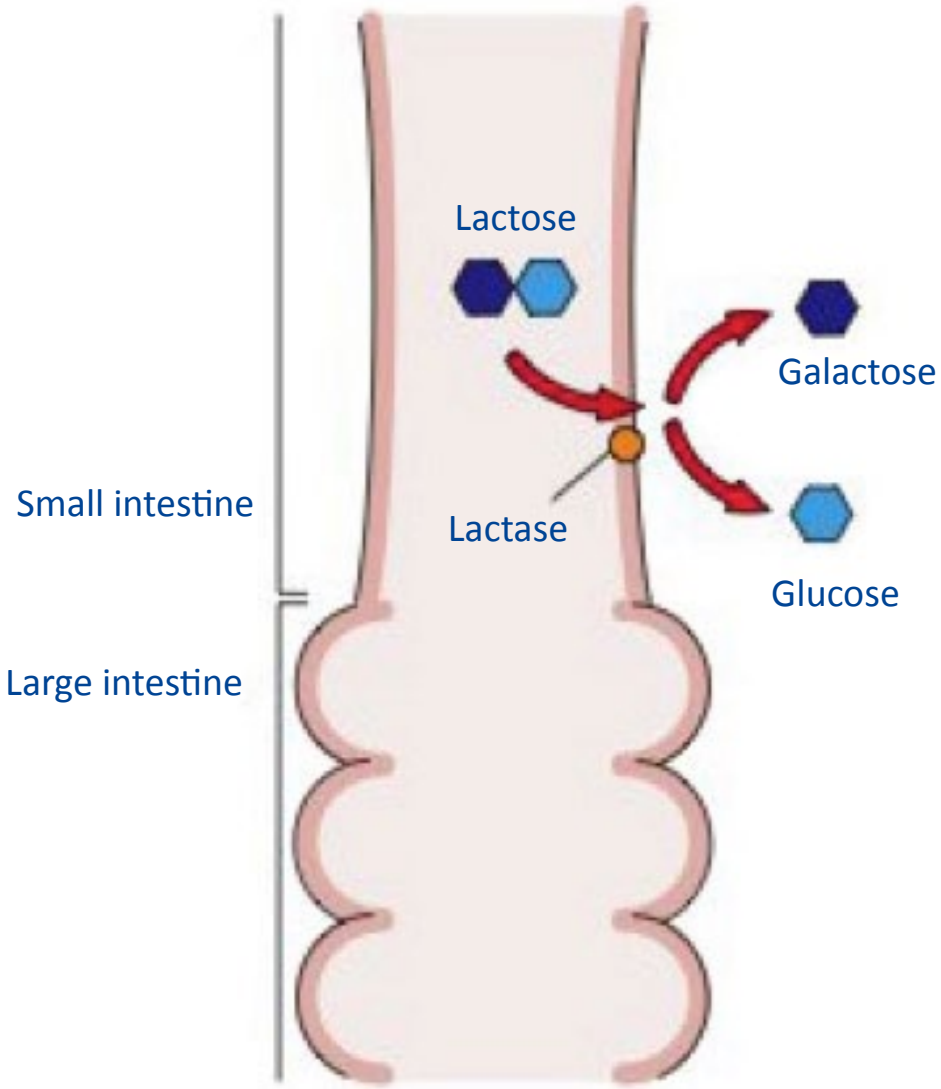

Growth

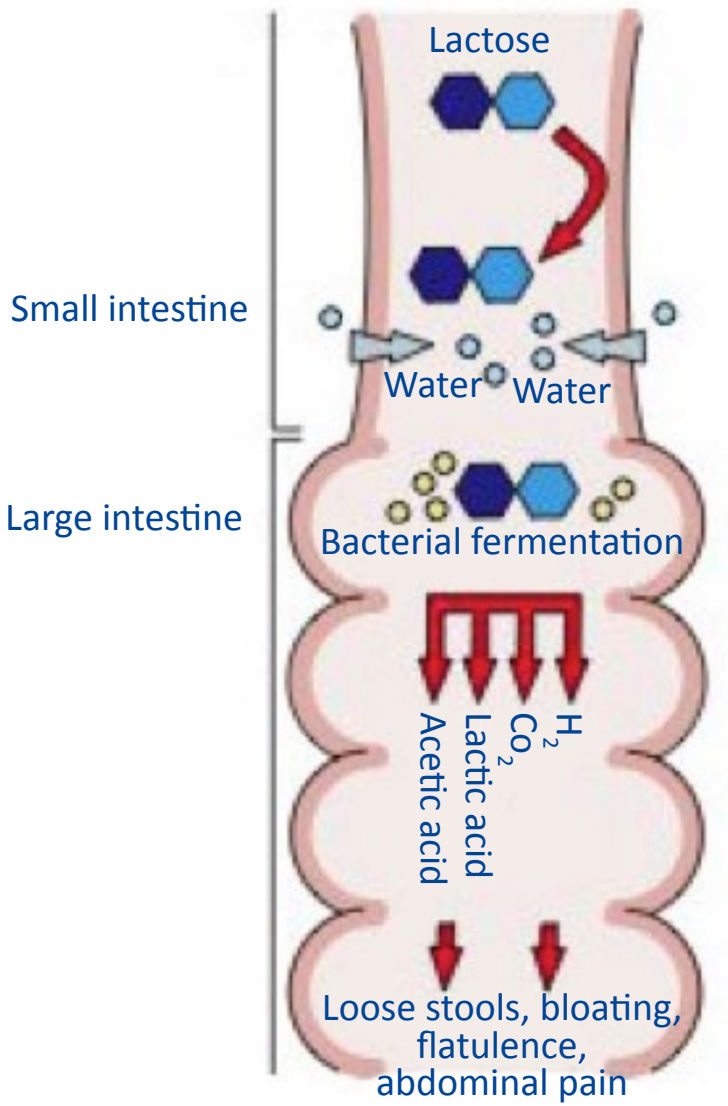


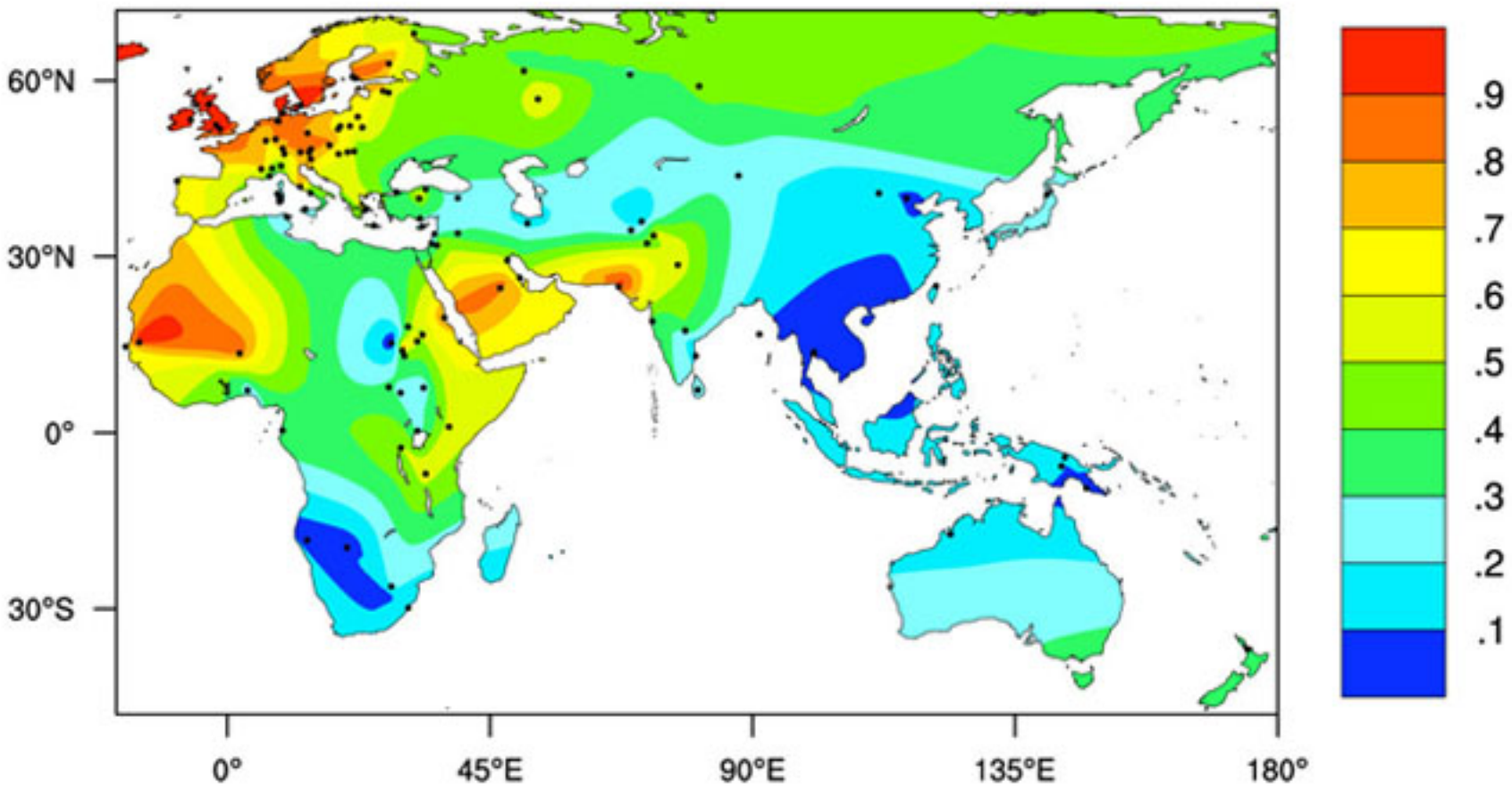
Dans la plupart des populations du monde, l'activité spécifique de la lactase intestinale n'est plus que de 5 à 10% de celle du jeune enfant.

La lactase non persistance (NLP) concerne environ 70 % de la population adulte dans le monde.

Composition moyenne du lait de vache		
	g/l	%E
Lactose	50	29
Lipides	40	51
Protéines	35	20


Lactose
Galactose
Small intestine
Lactase
Glucose
Large intestine


Lactose
Small intestine
Water
Water
Large intestine
Bacterial fermentation
H2
CO2
Lactic acid
Acetic acid
Loose stools, bloating,
flatulence,
abdominal pain



Itan et al. BMC Evolutionary Biology 2010, 10:36

DAIRY DIASPORA

Dairying practices spread from the Middle East to Europe as part of the Neolithic transition from hunting and gathering to agriculture.

Piece of a roughly 7,000-year-old sieve used to make cheese.

6,500 YEARS AGO
Well-developed dairy economy established in central Europe.

7,500 YEARS AGO
Lactase persistence, the ability to drink milk in adulthood, emerges in central Europe.

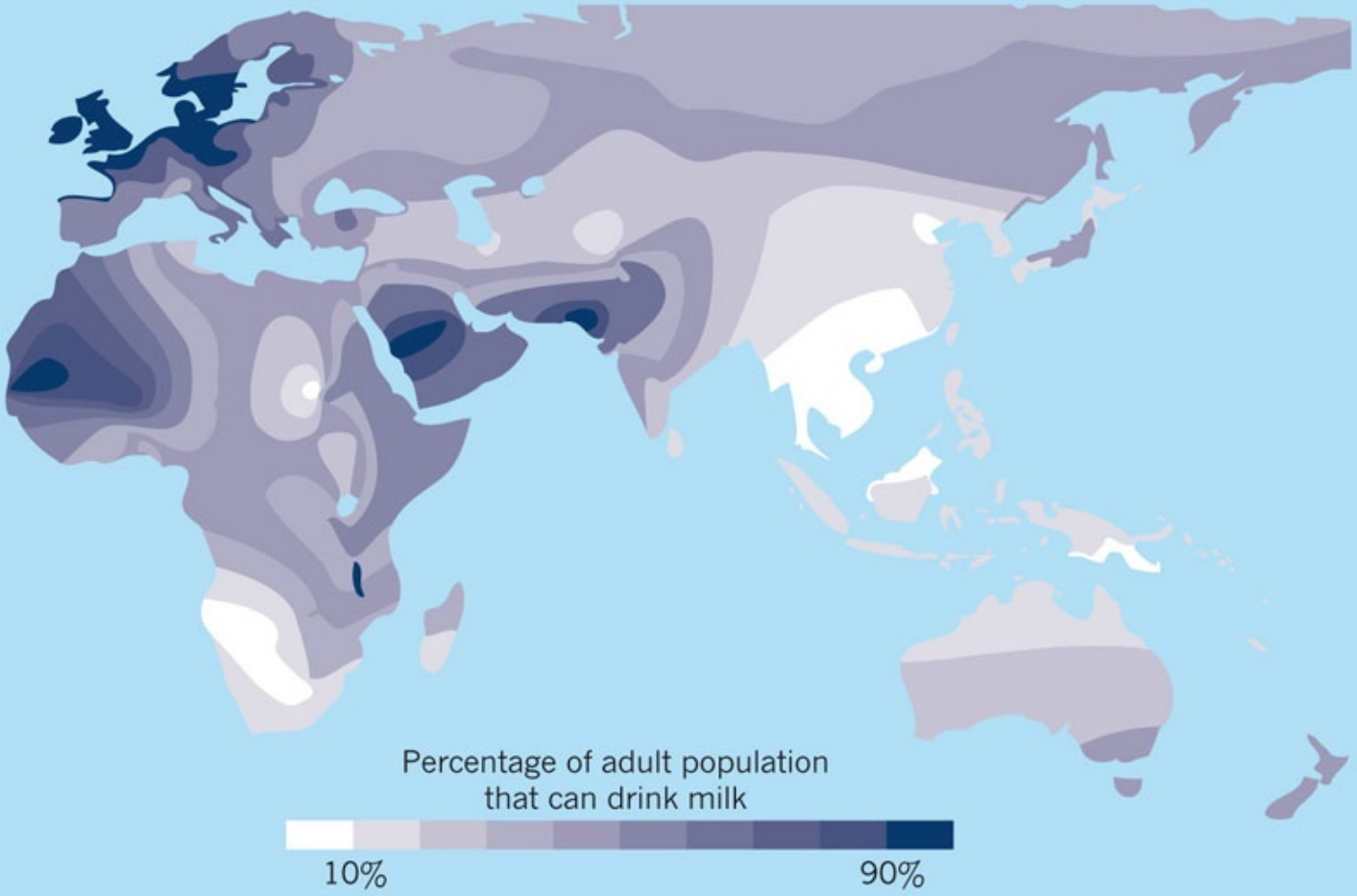
8,000 YEARS AGO
Neolithic reaches the Balkans.

8,400 YEARS AGO
Neolithic spreads to Greece.

11,000–10,000 YEARS AGO
Neolithic culture develops in the Middle East. This is the start of agriculture and possibly the domestication of dairy animals.

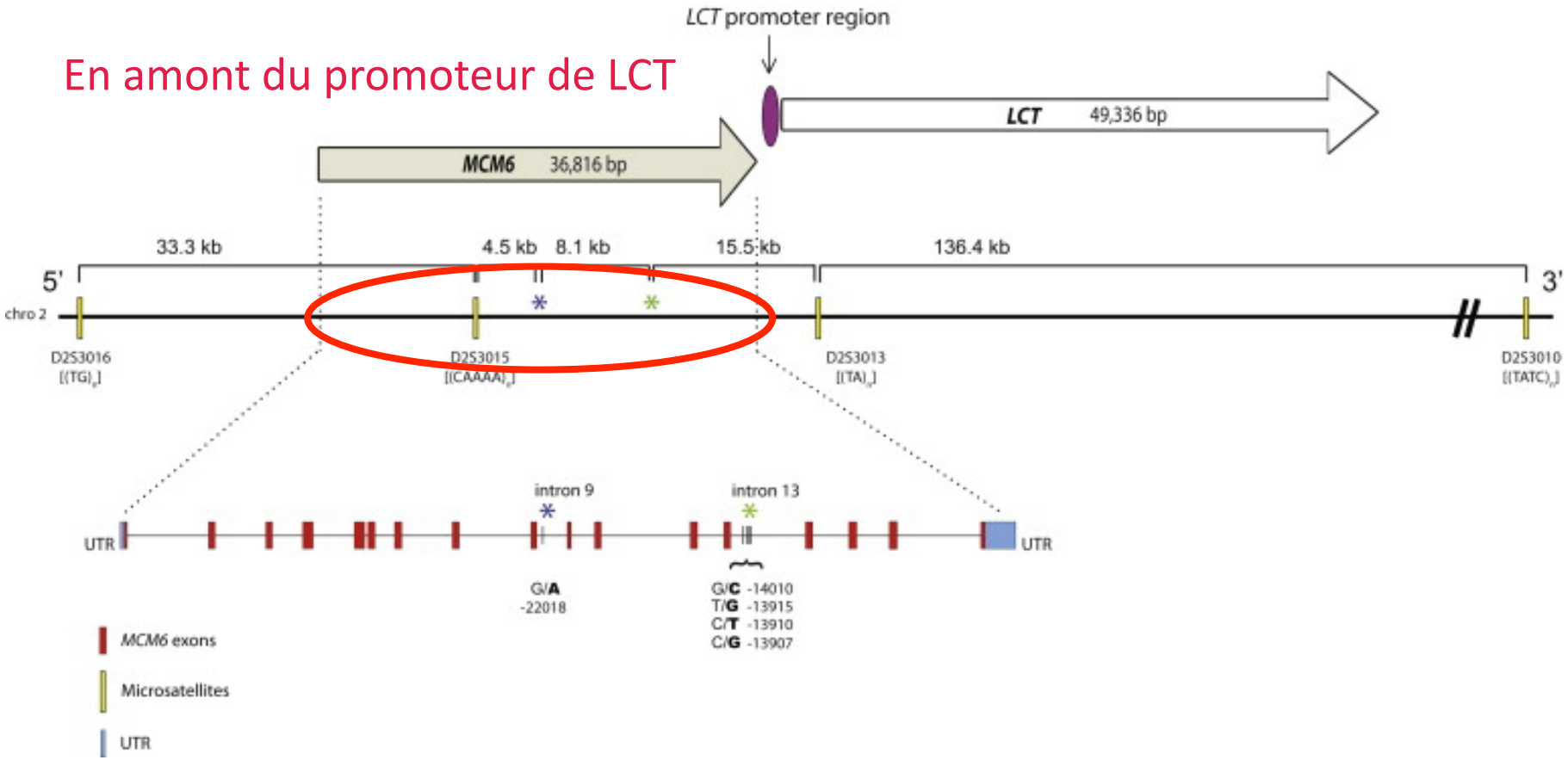
LACTASE HOTSPOTS

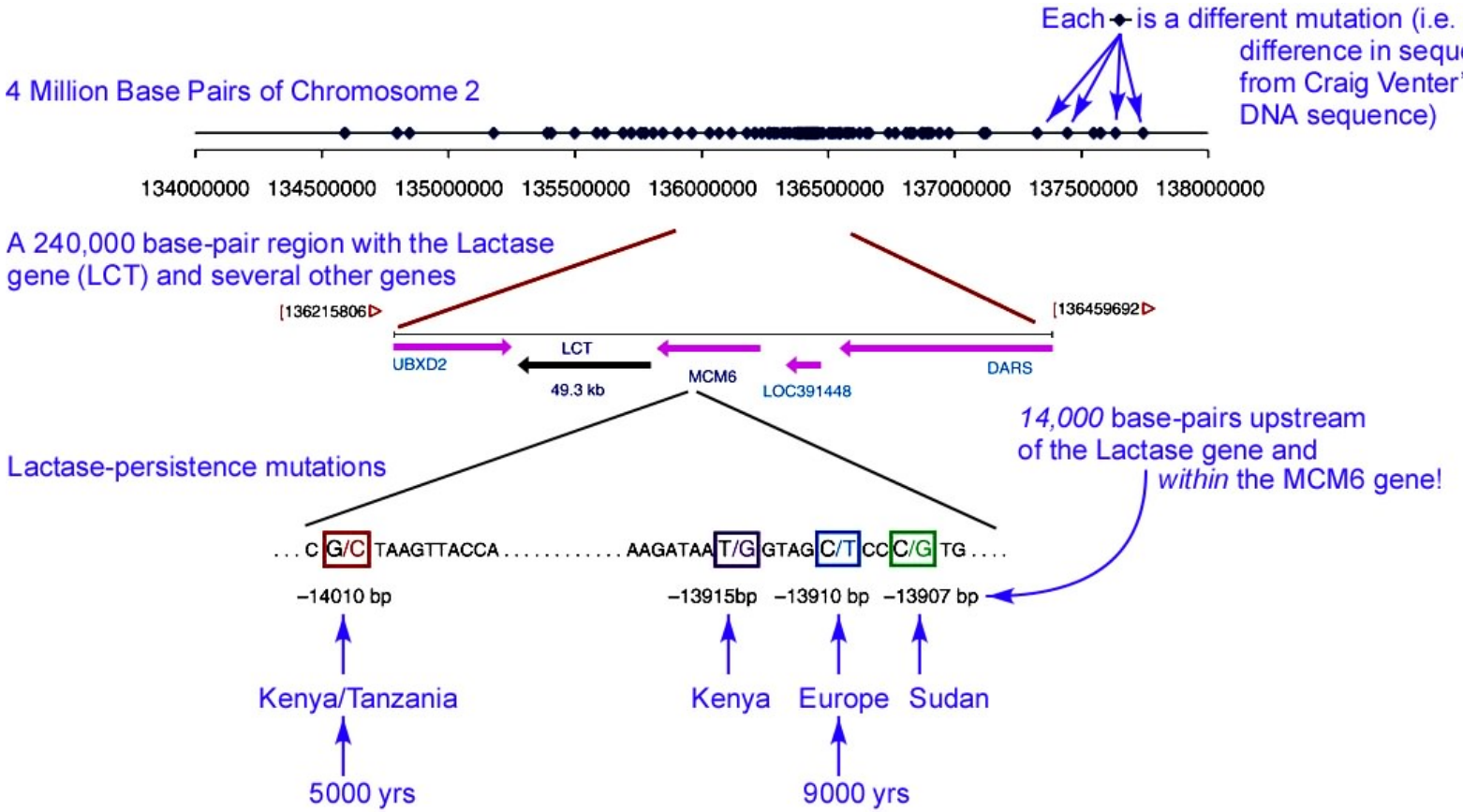
Only one-third of people produce the lactase enzyme during adulthood, which enables them to drink milk.



Mutations dominantes = lactase persistance (LP)

En amont du promoteur de LCT

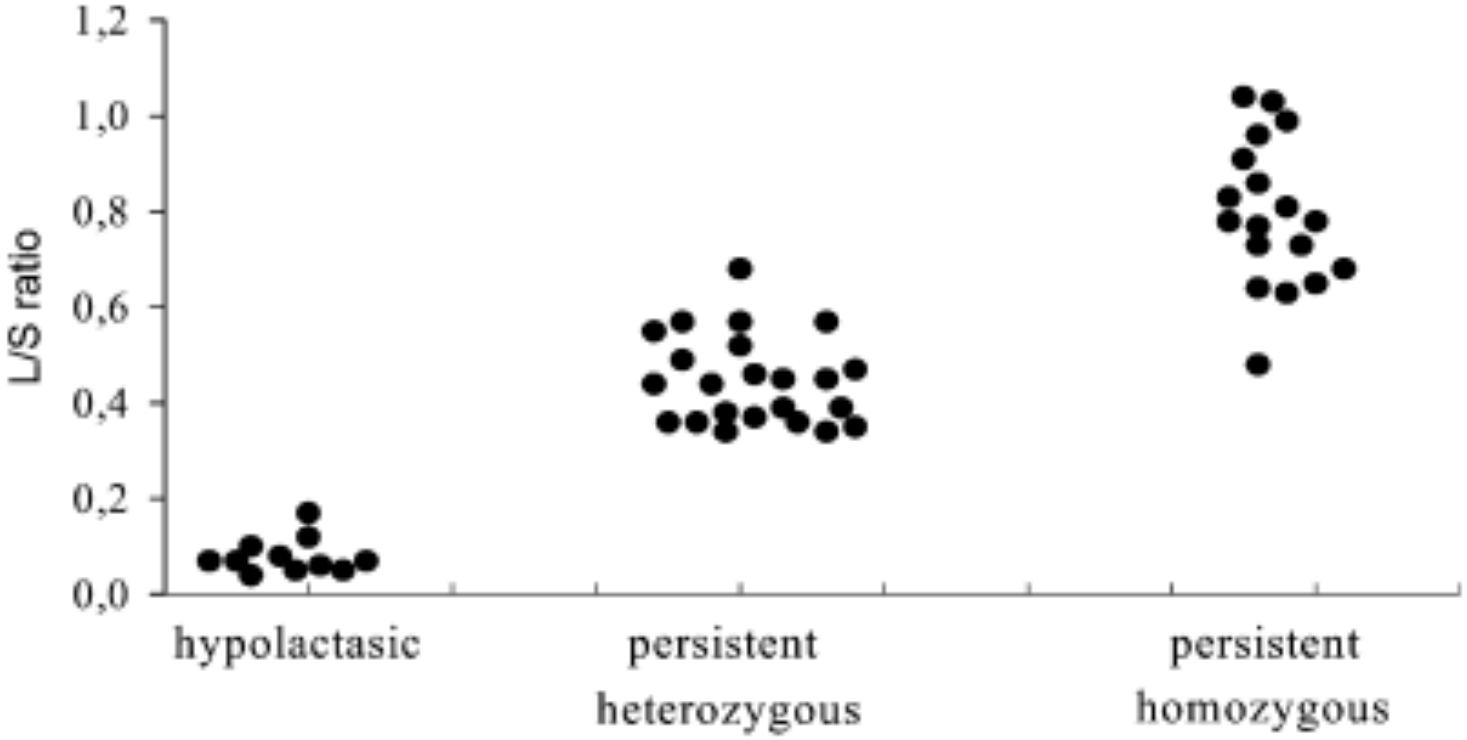




Mutations indépendantes et convergentes = sélection ?

Sarah A Tishkoff, Floyd A Reed, Alessia Ranciaro, Benjamin F Voight, Courtney C Babbitt, Jesse S Silverman, Kweli Powell, Holly M Mortensen, Jibril B Hirbo, Maha Osman, Muntaser Ibrahim, Sabah A Omar, Godfrey Lema, Thomas B Nyambo, Jilur Ghori, Suzannah Bumpstead, Jonathan K Pritchard, Gregory A Wray & Panos Deloukas

Convergent adaptation of human lactase persistence in Africa and Europe
Nature Genetics 39, 31 - 40 (2006)



Järvelä, 2005

Il est assez facile d'identifier le déficit en lactase

- test de tolérance au lactose
  - faux positifs et faux négatifs
- mesure de l'hydrogène expiré
  - combiné avec une charge de lactose
  - 5% échappent au diagnostic
- génotype du LCT
  - C/T 13910
  - séquençage : le plus adapté aux populations multi-ethniques
- mesure de l'activité spécifique
  - ≤ 10 U/g = LNP

Le diagnostic clinique d'*« intolérance au lactose »* est difficile

- Les symptômes attribués au déficit en lactase n'ont rien de spécifique

- Ils sont très sensibles à l'effet placebo

Il n'y a pas de corrélation entre l'activité de la lactase et les symptômes présentés

En population générale

323 sujets

104 lactase^{-} (32%) *« tolérant »*
13 lactase^{-} (4%) *« intolérant »*

Carroccio et al., 1998

LE « TRAITEMENT »

Teneurs en lactose des produits laitiers

Un bol de lait nature *250 ml*

12 g de lactose

Un pot de yaourt nature classique *125 g*

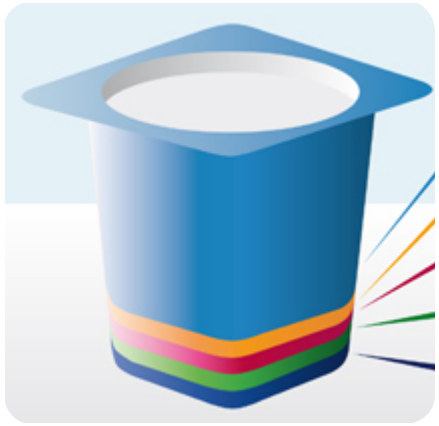
5 g de lactose

Une part de fromage fondu *25 g*

0,5 à 1 g de lactose

Une part de fromage affiné *30 g*

0 g de lactose ou traces



Un pot de yaourt nature classique de *125 g*

13 milliards de ferments vivants et actifs / pot

1,5 à 4,25 g de lipides / pot
(lait partiellement écrémé ou entier)
5 g de lactose / pot
5 g de protéines / pot
140 à 180 mg de calcium / pot

Oqali 2013

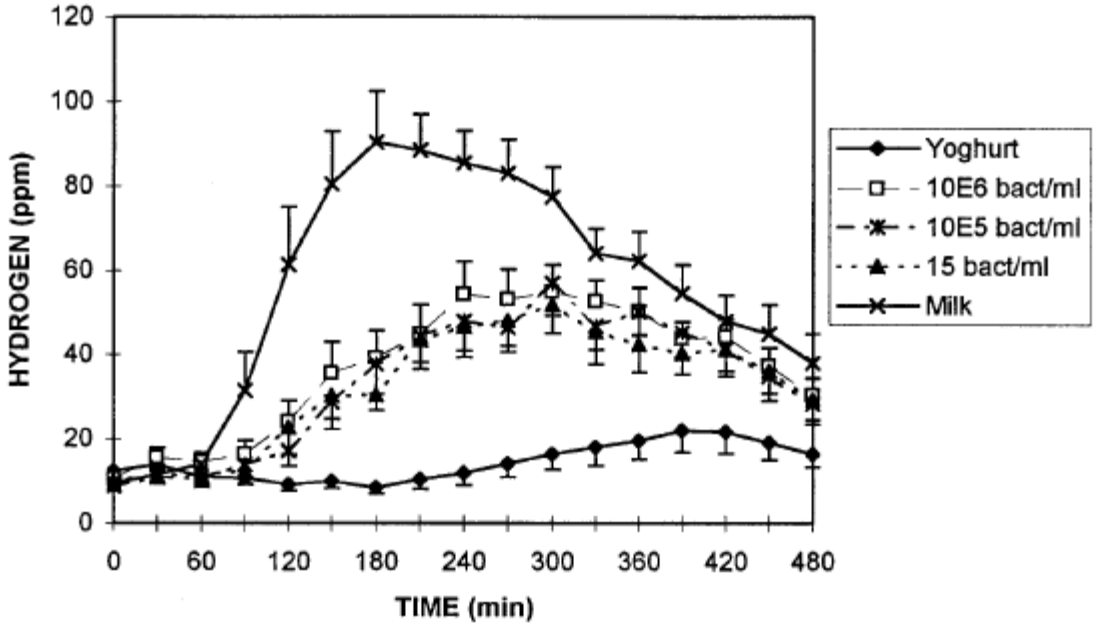
Des signes d'intolérance ont été rapportés par certains sujets pour des doses inférieures à 6 g

La grande majorité des sujets NPL peut tolérer jusqu'à 12 g de lactose en une prise

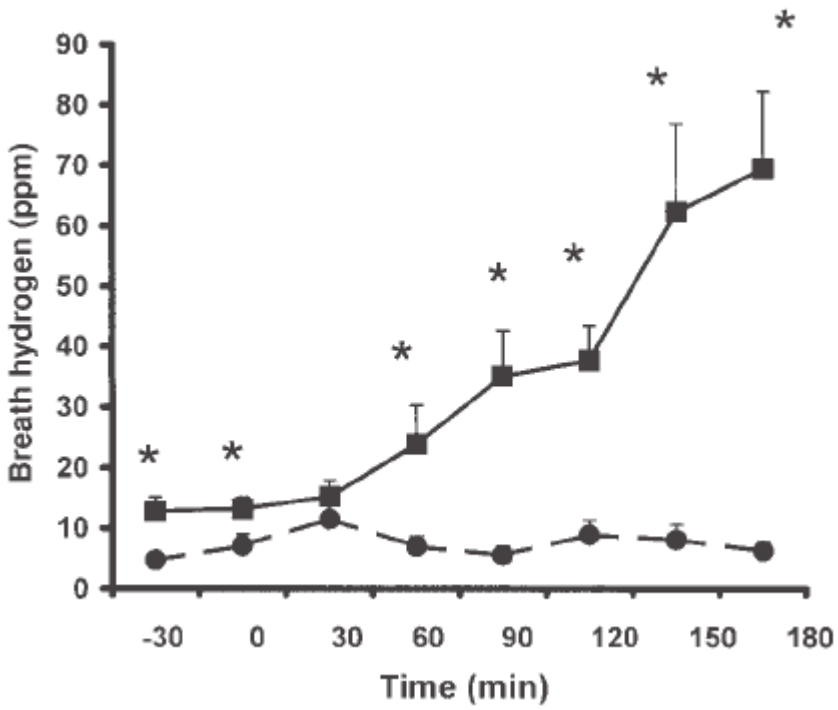
Des doses plus importantes peuvent être très bien tolérées par les sujets NPL, si elles sont distribuées sur la journée

EFSA 2010

	L. bulgaricus (cell/ml)	*S. thermophilus* (cell/ml)	*Lactose* (%)	*Dry matter* (%)	*Fat* (%)	*Total beta-galactosidase* (U/ml)
Yoghurt: 10^8 bacteria/ml	2.2×10^8	6.6×10^8	5.7	15.2	3.8	5.200 ± 0.500
Diluted product: 10^6 bacteria/ml	2.7×10^6	7.7×10^6	5.6	15.1	3.8	0.030 ± 0.009
Diluted product: 10^5 bacteria/ml	2.6×10^5	7.2×10^5	5.6	15.2	3.8	0.007 ± 0.008
Heat treated yoghurt: 15 bacteria/ml	<15	<15	5.6	14.5	3.7	<0.001
Gelified milk: no live flora	—	—	5.1	17.0	4.3	0



Pelletier et al., 2001



Rizkalla et al., 2000

	Subjects without lactose malabsorption				Subjects with lactose malabsorption			
	Fresh yogurt		Heated yogurt		Fresh yogurt		Heated yogurt	
	Day 0	Day 15	Day 0	Day 15	Day 0	Day 15	Day 0	Day 15
AUC of plasma breath hydrogen (ppm·3 h)	1539 ± 321	1189 ± 253	1342 ± 281	1124 ± 222	2400 ± 602	1461 ± 289[5]	2174 ± 648	3007 ± 796

European Food Safety Authority

EFSA Journal 2010;8(10):1763

SCIENTIFIC OPINION

Scientific Opinion on the substantiation of health claims related to live yoghurt cultures and improved lactose digestion (ID 1143, 2976) pursuant to Article 13(1) of Regulation (EC) No 1924/2006[1]

EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA)[2, 3]

European Food Safety Authority (EFSA), Parma, Italy

This scientific output, published on 12 January 2011, replaces the earlier version published on 19 October 2010[4].

European Food Safety Authority

EFSA Journal 2010;8(9):1777

SCIENTIFIC OPINION

Scientific Opinion on lactose thresholds in lactose intolerance and galactosaemia[1]

EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA)[2, 3]

European Food Safety Authority (EFSA), Parma, Italy

MERCI DE VOTRE ATTENTION

Although lactase cannot be induced by its substrate, some studies have indicated that daily lactose consumption may result in metabolic adaptation by the gut microbiota, thus dampening the symptoms of lactose intolerance in subjects with lactose maldigestion (Saavedra and Perman, 1989). Studies investigating colonic adaptation are few, examined different products to prevent lactose intolerance symptoms and used a wide variety of patients, interventions, comparisons, and outcomes. Results either did not show a difference in symptom score or reported clinically insignificant differences, mostly in symptoms of flatulence. Symptoms of abdominal pain, diarrhoea, or overall score were not improved, which may be more clinically relevant to lactose maldigesters (Wilt et al., 2010).

EFSA 2010