

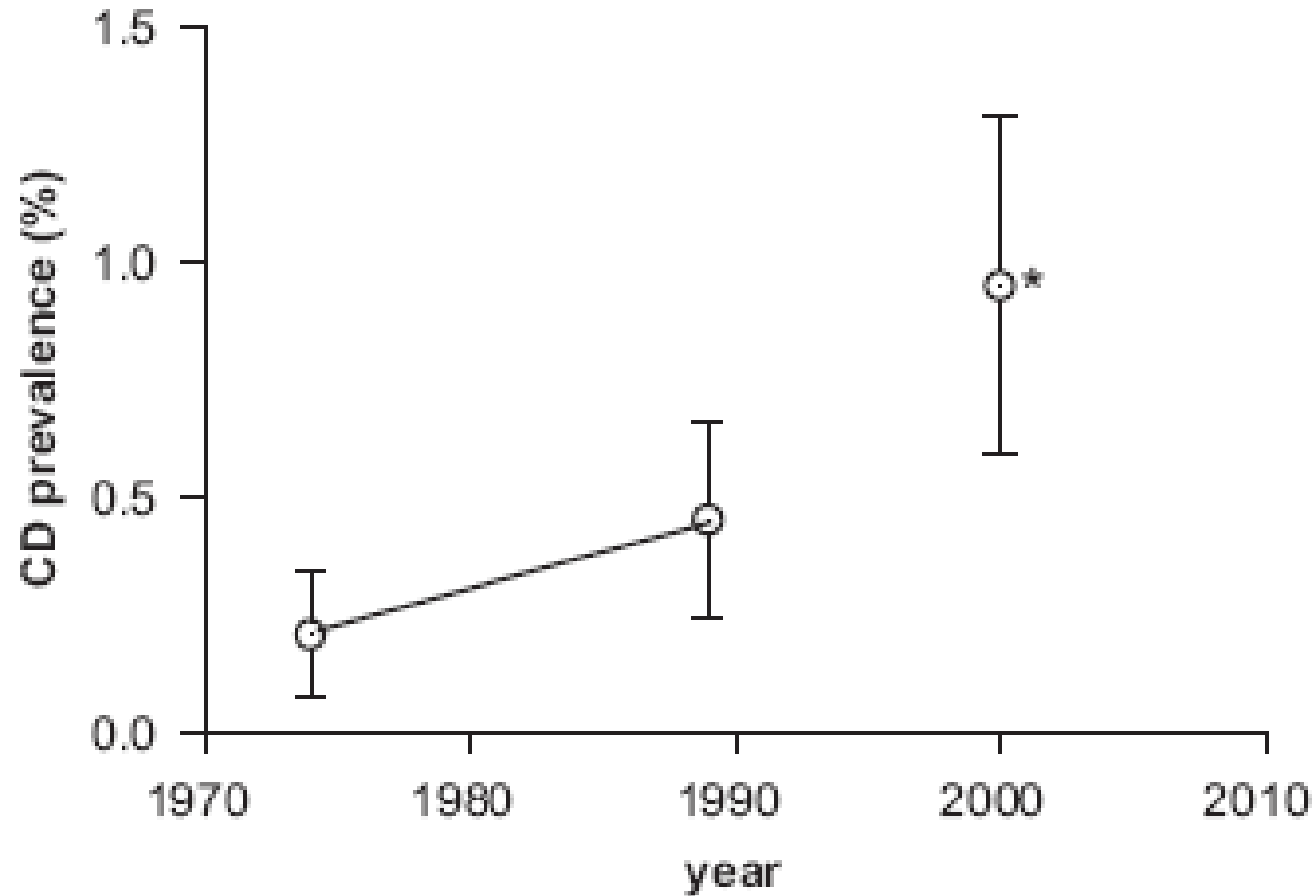
Celiachia ed ambiente

CARLO CATASSI

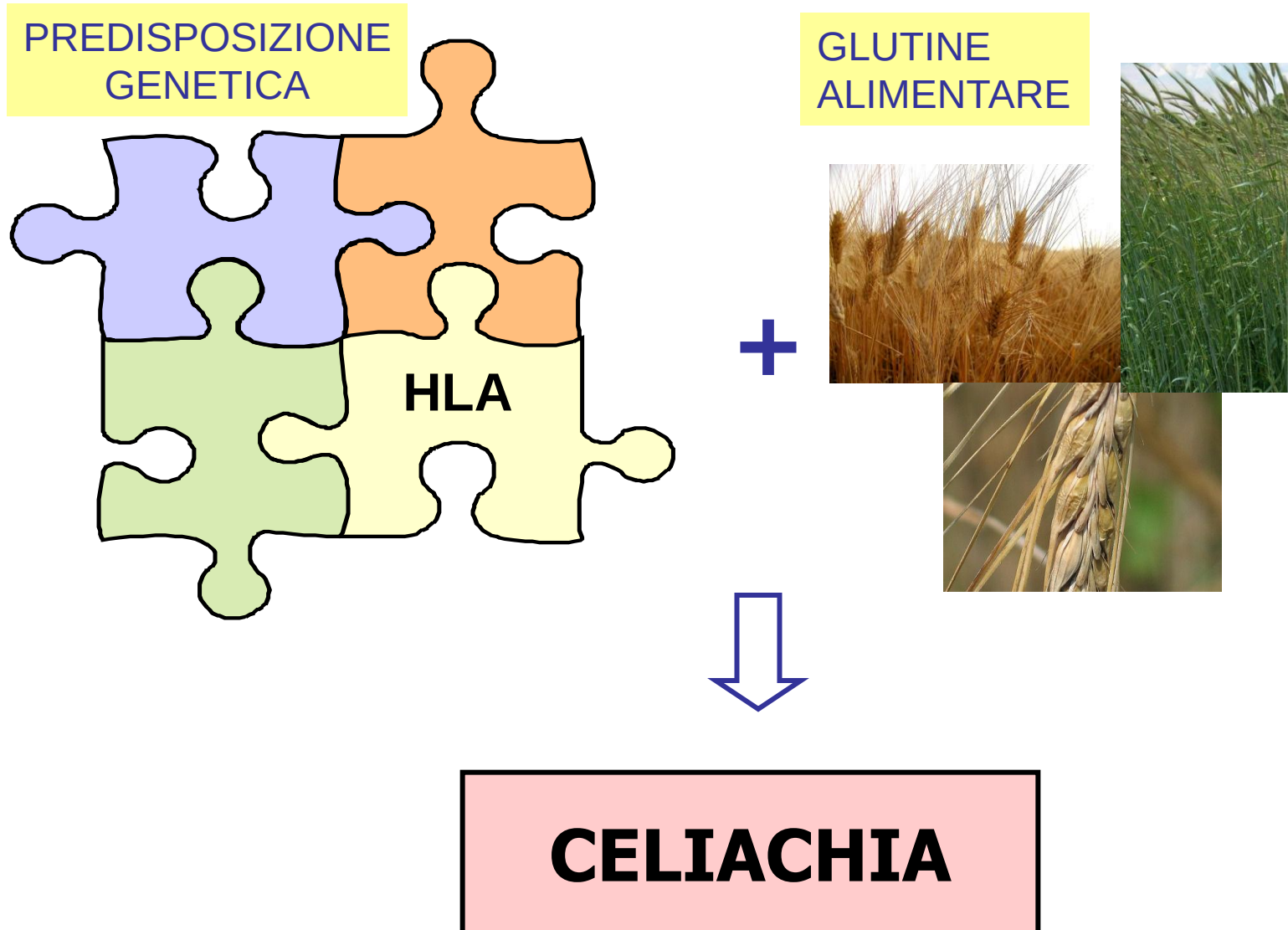
- *Clinica Pediatrica, Università Politecnica delle Marche, Ancona, Italy*
- *Center For Celiac Research, University of Maryland, Baltimore MD, USA*



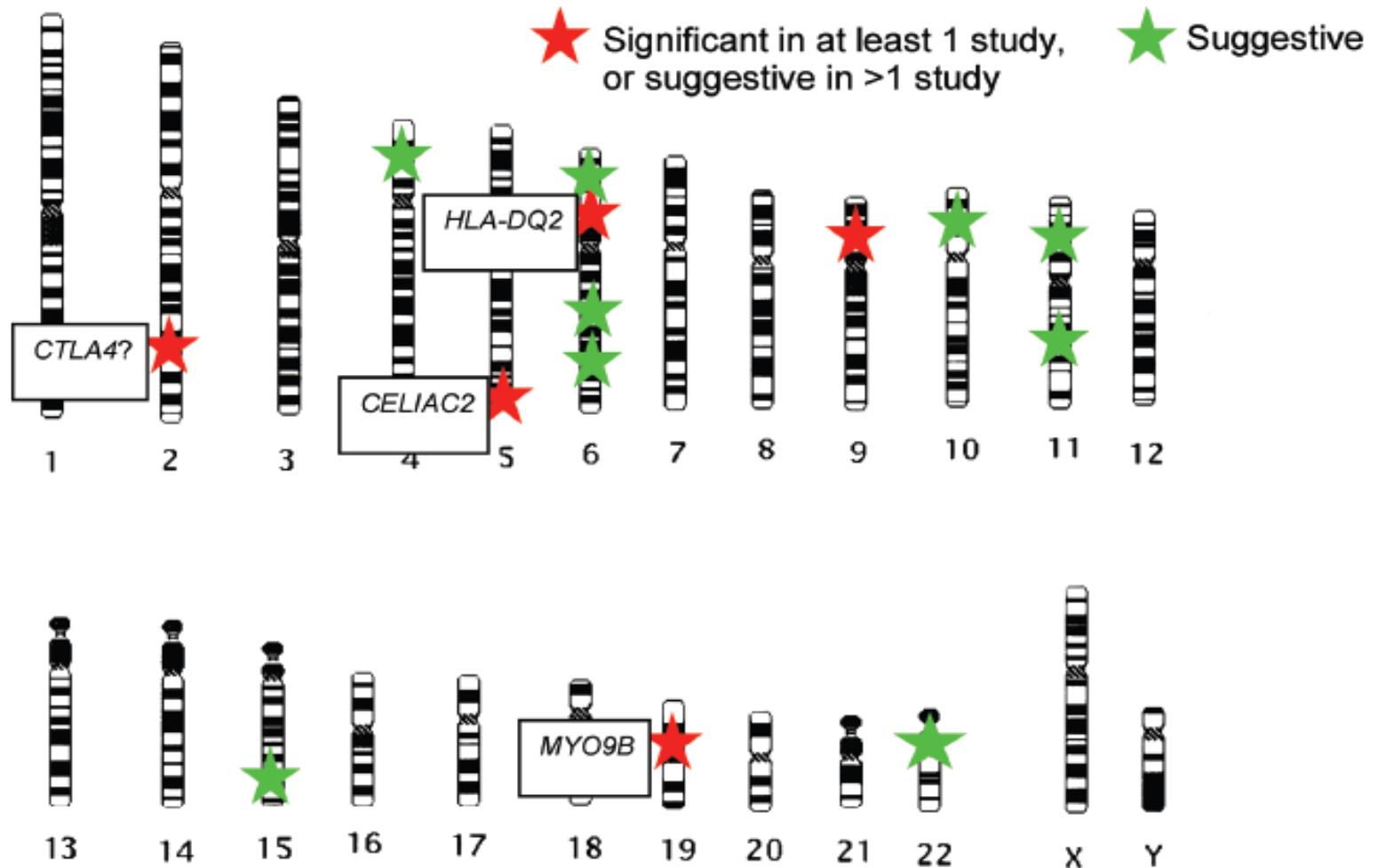
Increasing CD prevalence in the US



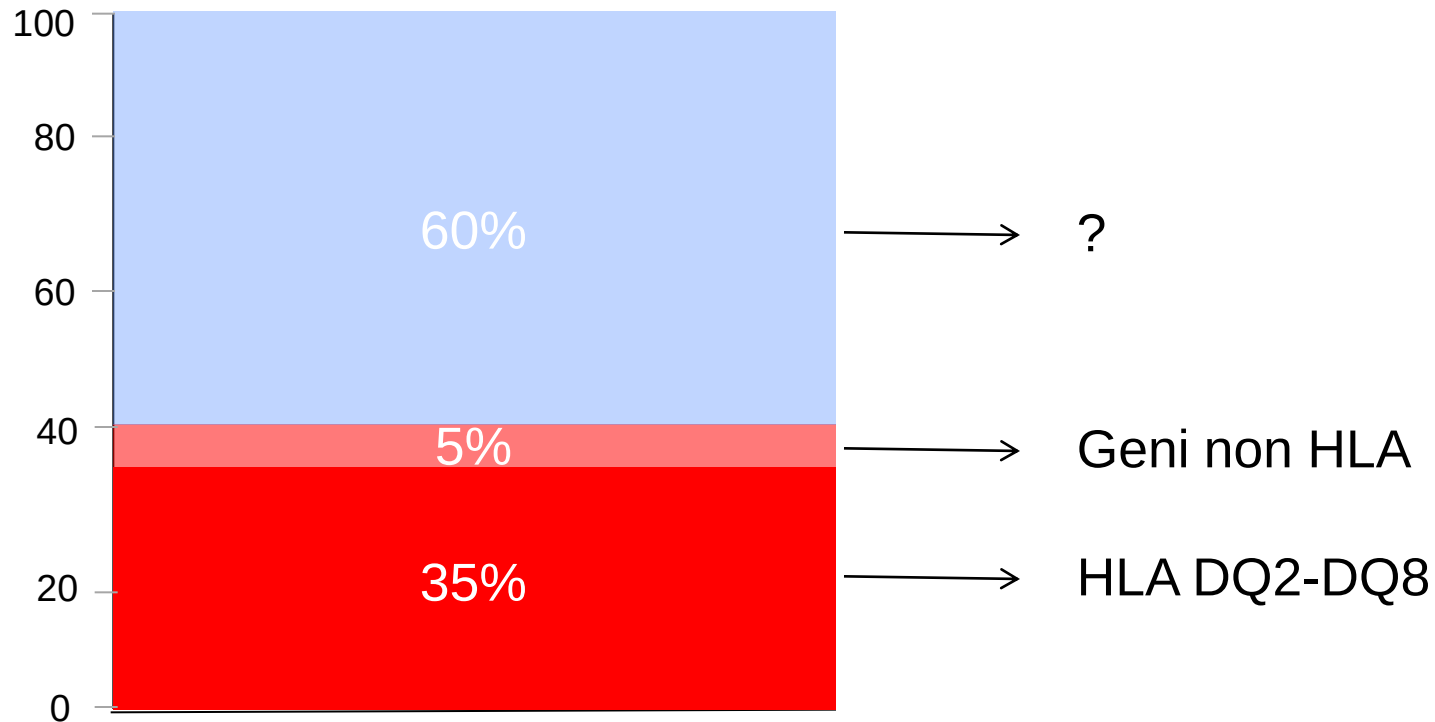
La celiachia è una patologia complessa



Sul piano genetico la celiachia è una patologia complessa con un ruolo principale svolto da alplotipi HLA



il ruolo dei geni sfuma in quello dell'ambiente



Le componenti ambientali della celiachia

- Quantità di glutine ingerito
- Qualità del glutine ingerito
- Lievitazione dell'impasto panificatorio
- Nutrizione (specie durante il primo anno) e periodo neonatale
- Infezione (Rotavirus, altri)
- Ipotesi igienica

I grani attuali sono “mostri” genetici





Pieter Bruegel, 1565

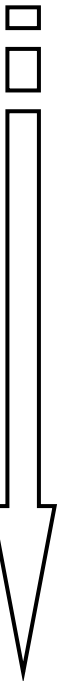
Esiste una gerarchia della tossicità dei peptidi del glutine

33-mer immunodominante (genoma D)



$\alpha > \omega > \gamma$ gliadin > LMW > HMW glutelins

Glia- α 2 (Alpha-II)	P	Q	P	<u>Q</u>	L	P	Y	P	Q
Glia- α 9 (Alpha-I)	P	F	P	<u>Q</u>	P	<u>Q</u>	L	P	Y
Glia- α 9 (Alpha-III)	P	Y	P	<u>Q</u>	P	<u>Q</u>	L	P	Y
Glia- α 20	F	R	P	<u>Q</u>	Q	P	Y	P	Q
Glu-5	Q	X	P	<u>Q</u>	Q	P	Q	Q	F
Glia- γ 1 (Gamma-I)	P	Q	Q	S	F	P	<u>Q</u>	Q	<u>Q</u>
Glia- γ 2	P	F	P	<u>Q</u>	Q	P	<u>Q</u>	Q	P ^F
Glia- γ 30 (Gamma-II)	I	I	Q	P	<u>Q</u>	Q	P	A	Q
Gamma-III	<u>Q</u>	Q	P	<u>Q</u>	Q	P	Y	P	Q
Gamma-IV	S	Q	P	<u>Q</u>	Q	Q	F	P	Q
Glt-156	P	F	S	<u>Q</u>	<u>Q</u>	Q	<u>Q</u>	S	P ^F
Glt-17 ^A	P	F	S	<u>Q</u>	<u>Q</u>	Q	<u>Q</u>	Q	P
Glt-17 ^B	P	F	S	<u>Q</u>	<u>Q</u>	Q	<u>Q</u>	P	V



10-mer protettivo (grano duro)

QQPQDAVQPF



Mapping of Gluten T-Cell Epitopes in the Bread Wheat Ancestors: Implications for Celiac Disease

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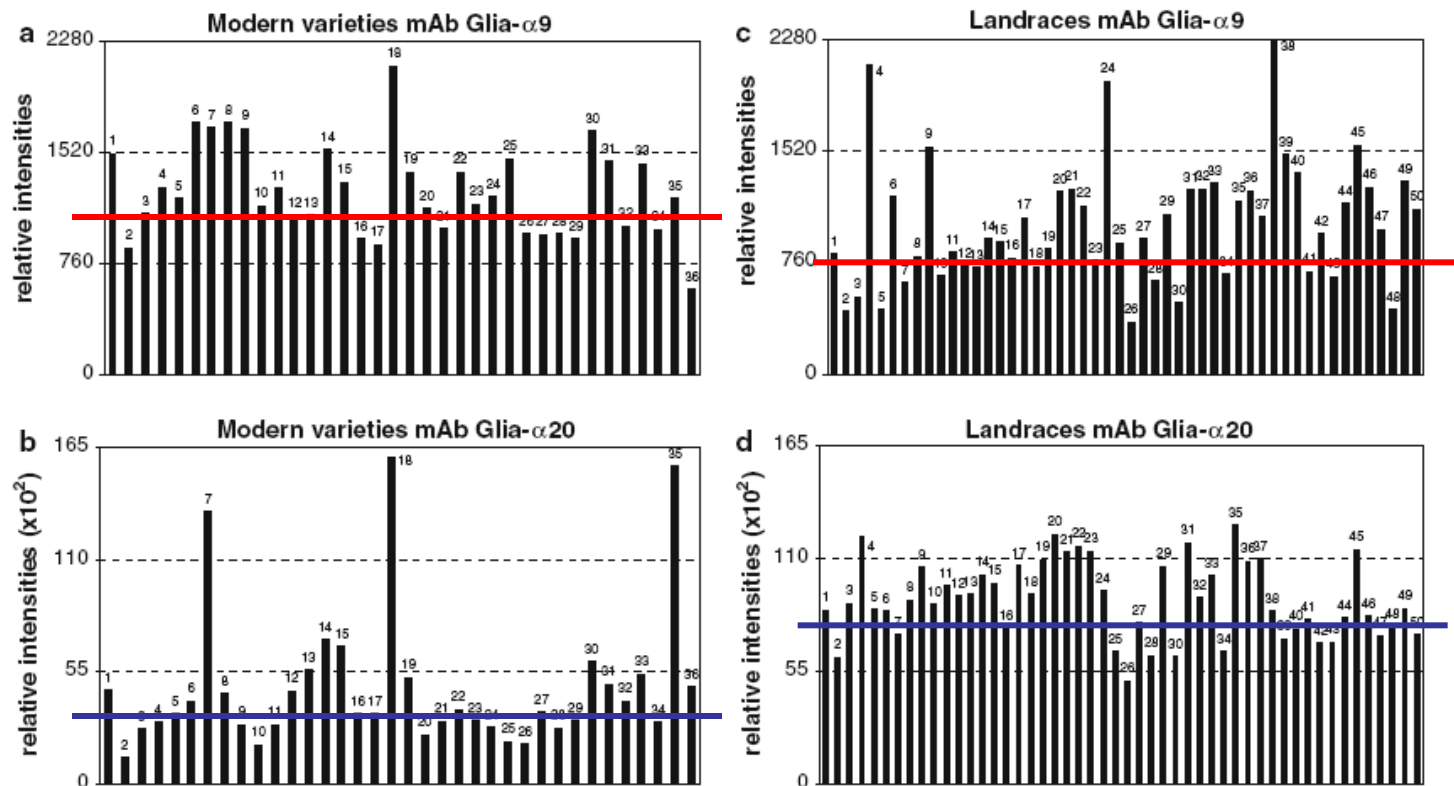
*Institute of Immunology, Rikshospitalet, University of Oslo, Oslo; and [†]Department of Plant and Environmental Sciences, Agricultural University of Norway, Ås, Norway

tides. **Results:** Distinct differences in the intestinal T-cell responses to the diploid species were identified. Interestingly, we found that the fragments identical or equivalent to the immunodominant 33mer fragment are encoded by α -gliadin genes on the wheat chromosome 6D and thus absent from gluten of diploid einkorn (AA) and even certain cultivars of the tetraploid (AABB) pasta wheat. **Conclusions:** These findings have implications for celiac disease because they raise the prospect of identifying or producing by breeding wheat species with low or absent levels of harmful gluten proteins.

Presence of celiac disease epitopes in modern and old hexaploid wheat varieties: wheat breeding may have contributed to increased prevalence of celiac disease

Hetty C. van den Broeck · Hein C. de Jong · Elma M. J. Salentijn ·
Liesbeth Dekking · Dirk Bosch · Rob J. Hamer · Ludovicus J. W. J. Gilissen ·
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Cereal food processing

Sourdough

(cocktail of acidifying and proteolytic lactic acid bacteria with yeasts)



- Long time, multi-step process (ca. 24 h)
- Lactic and alcoholic fermentation
- Intense degradation of polymeric cereal components (e.g., proteins)

Chemical leavening agents

(e.g., tartaric acid + sodium bicarbonate)



- No fermentation
- Instantaneous process
- No degradation of polymeric cereal components

Baker's yeast

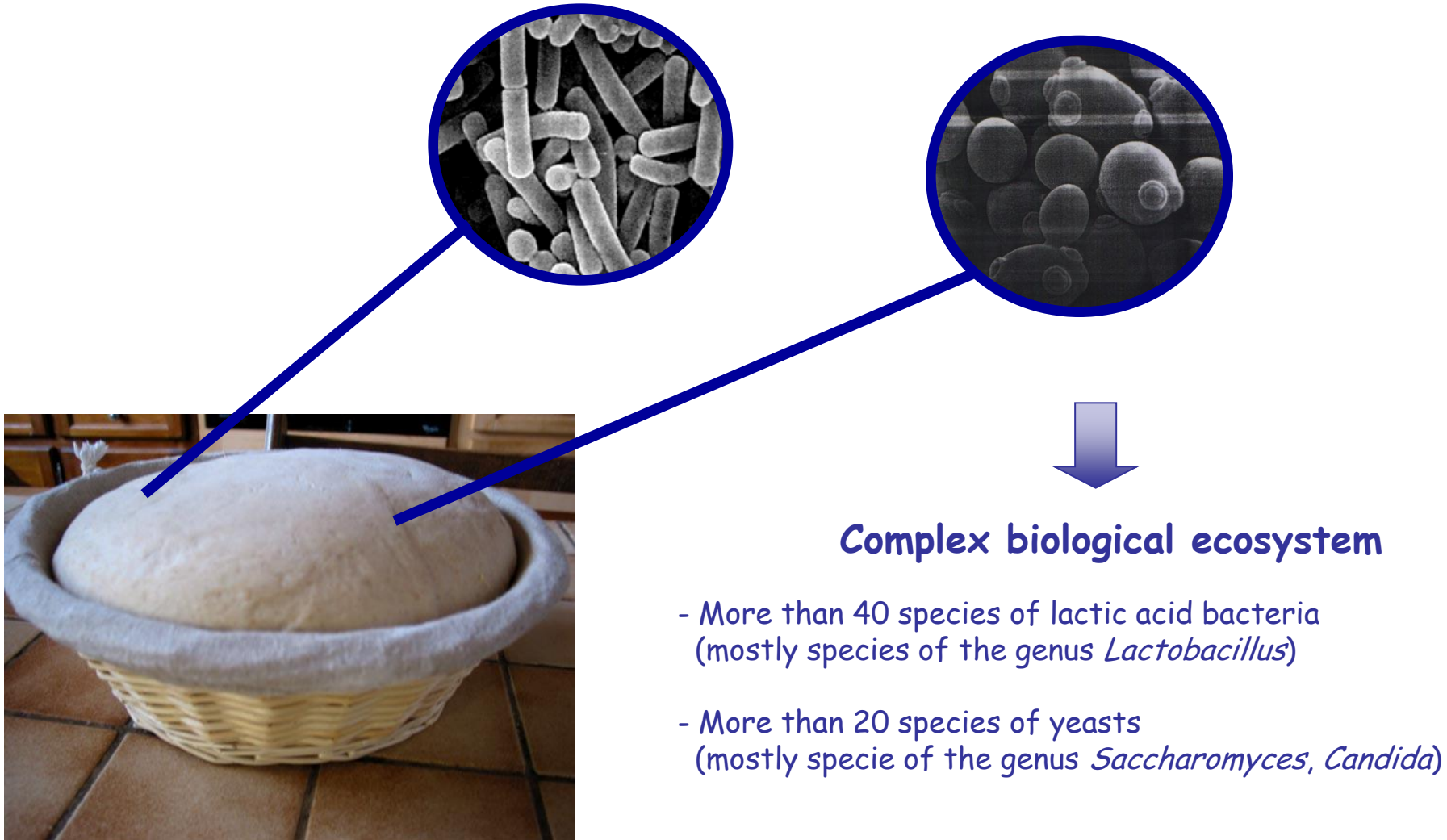


- Very rapid process (0.5 - 1 h)
- Alcoholic fermentation
- No degradation of polymeric cereal components

From tradition... 1900  to high performing processes 2010

courtesy of M Gobbetti, University of Bari

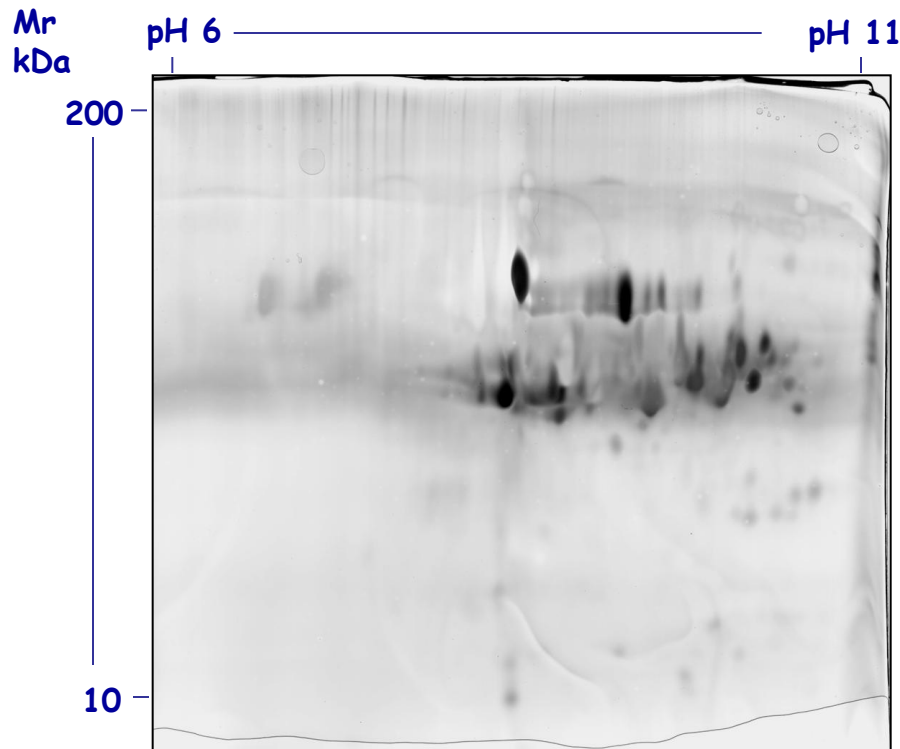
Sourdough



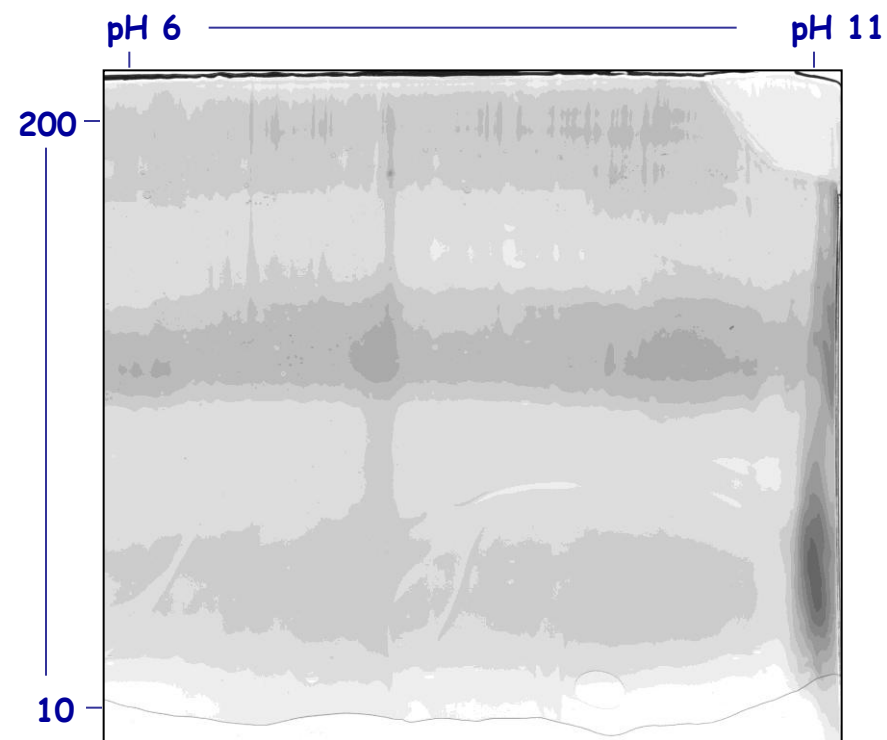
courtesy of M Gobbetti, University of Bari

2D electrophoresis analysis of prolamin fractions of chemically acidified dough (A) and fermented dough (20% wheat flour) with selected lactobacilli and proteases for 48 h at 37°C (B)

(A)



(B)

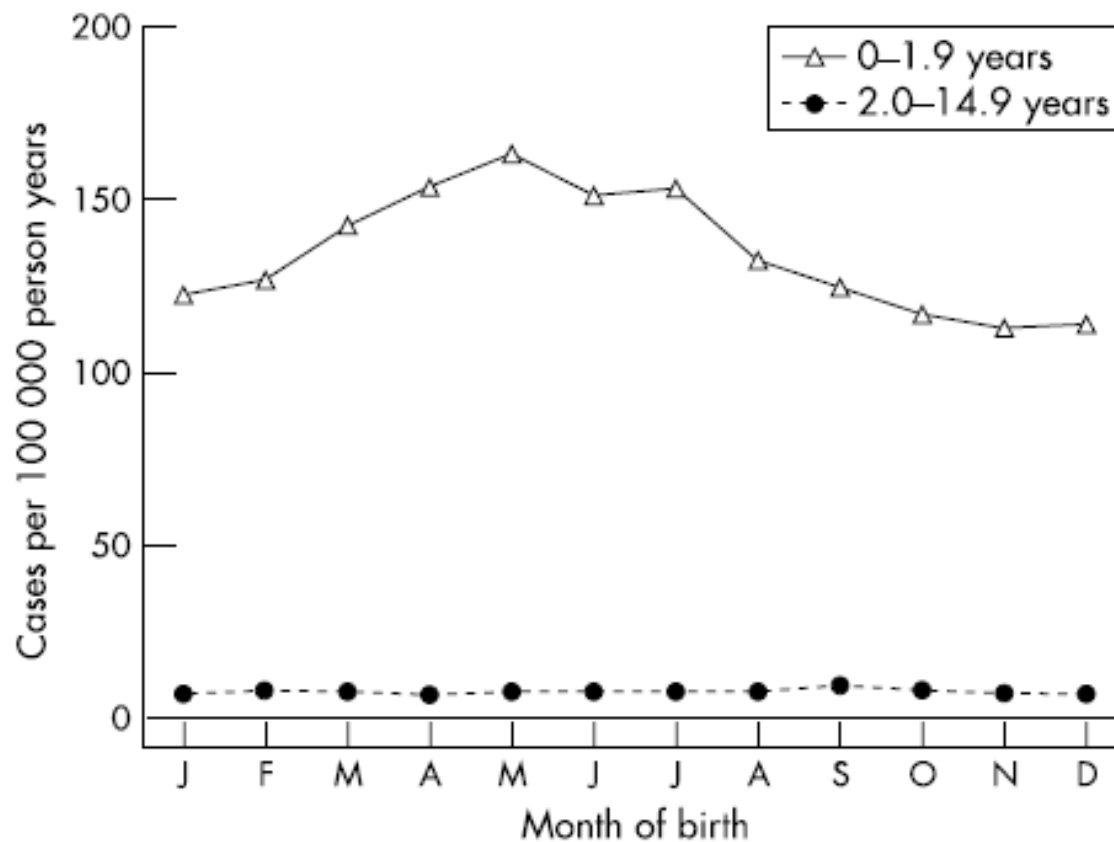


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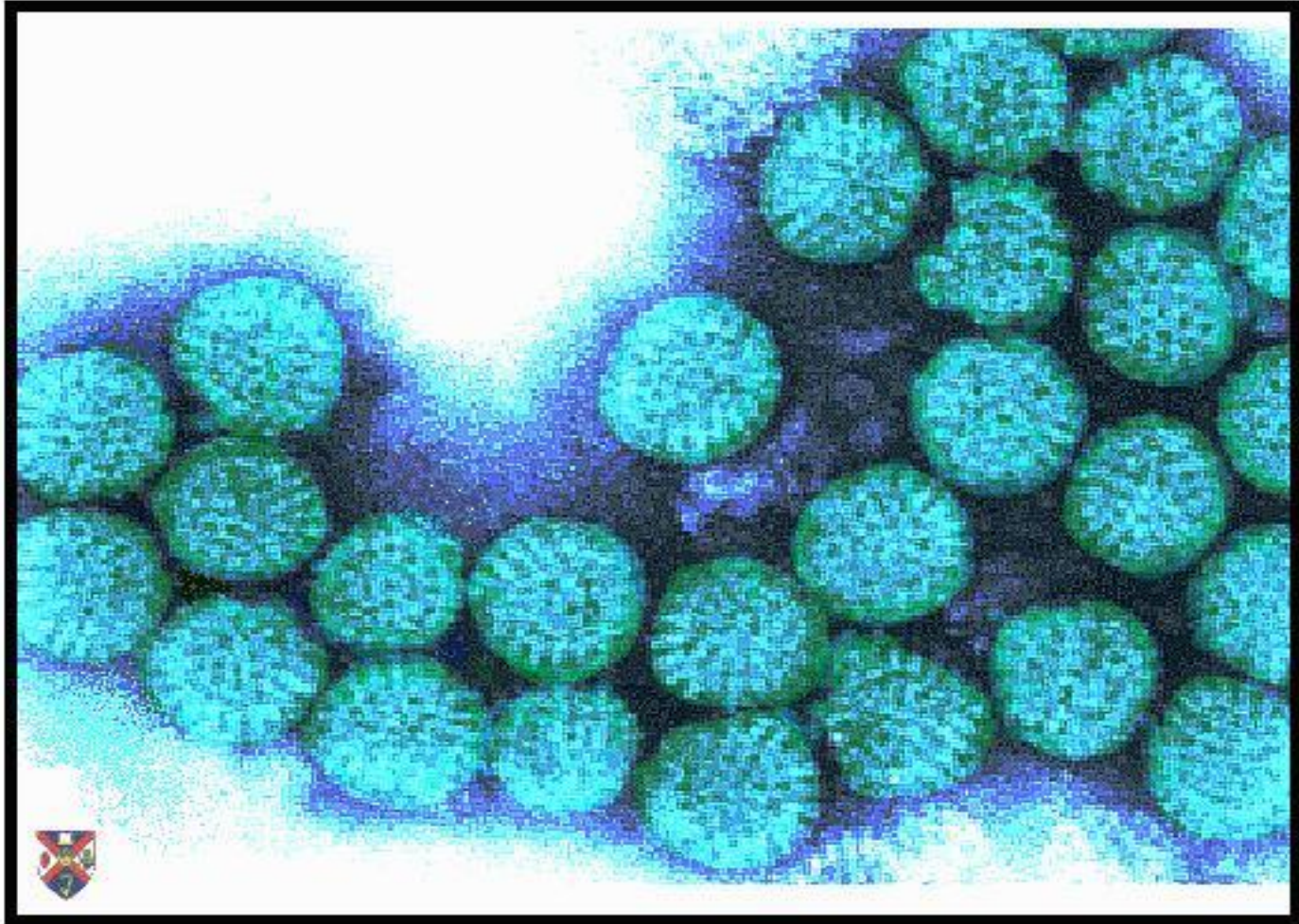
Le componenti ambientali della celiachia

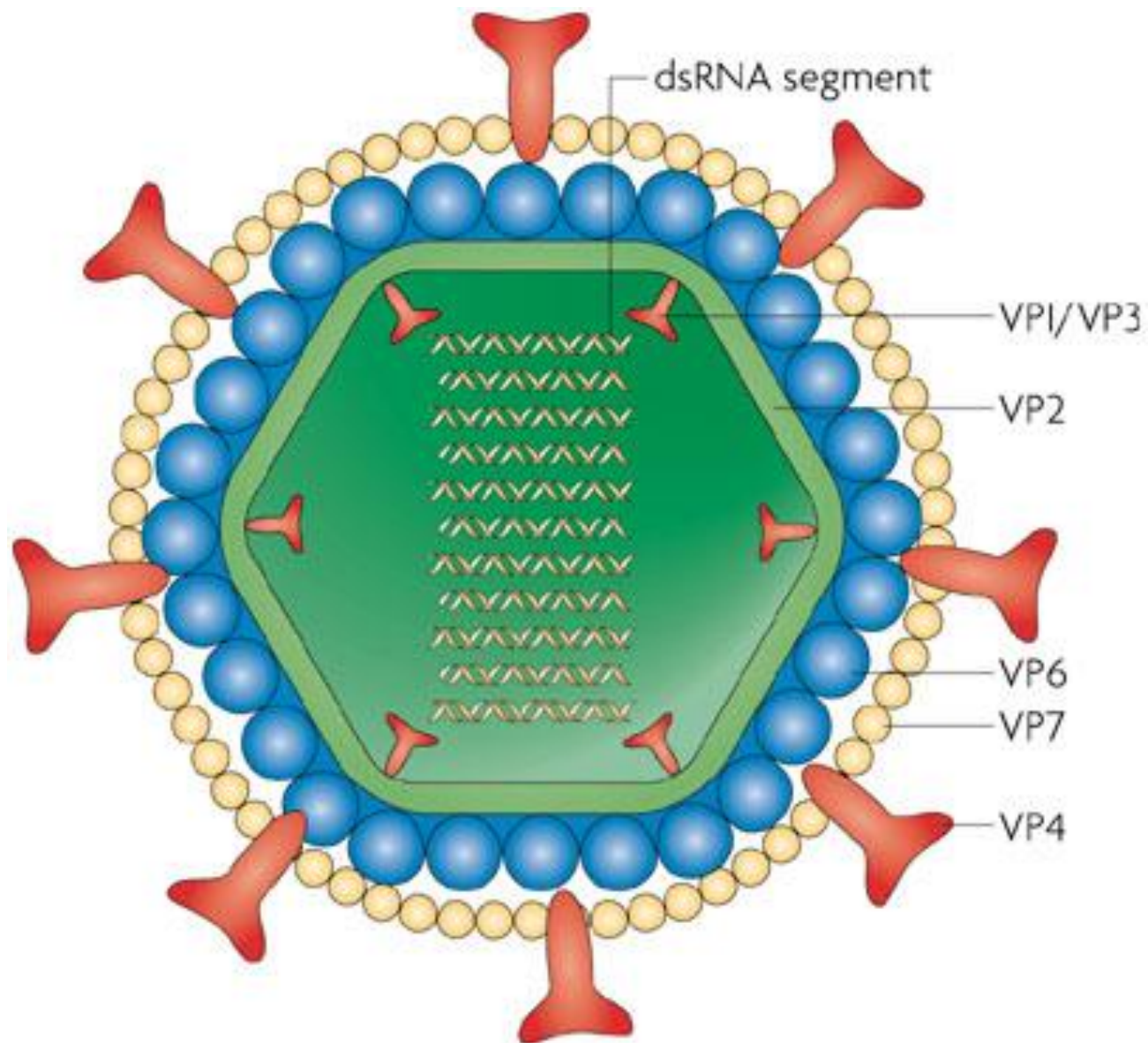
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Rischio di celiachia precoce e mese di nascita

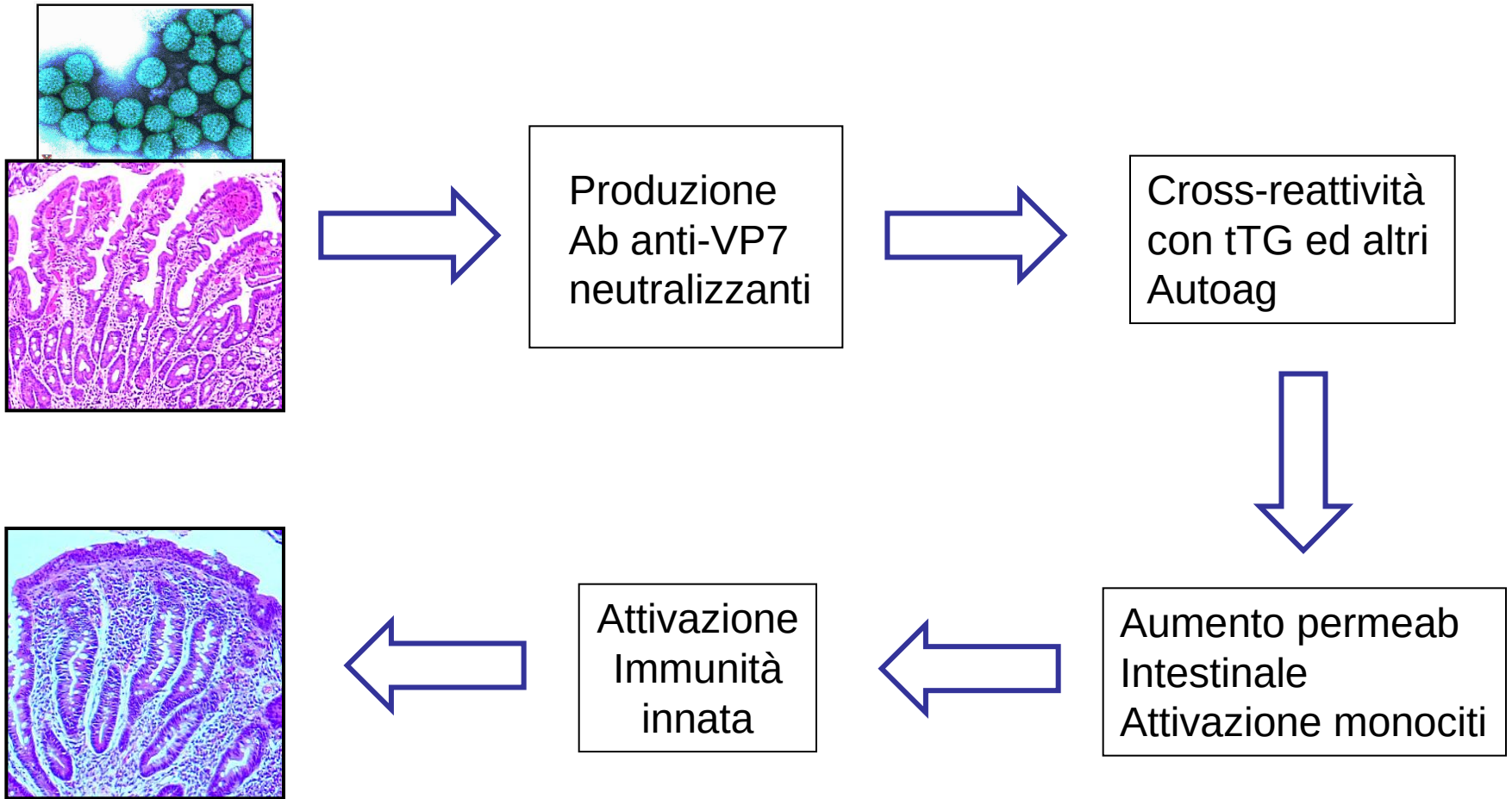


Rotavirus: la causa più frequente di gastroenterite infantile





Dal Rotavirus alla celiachia?



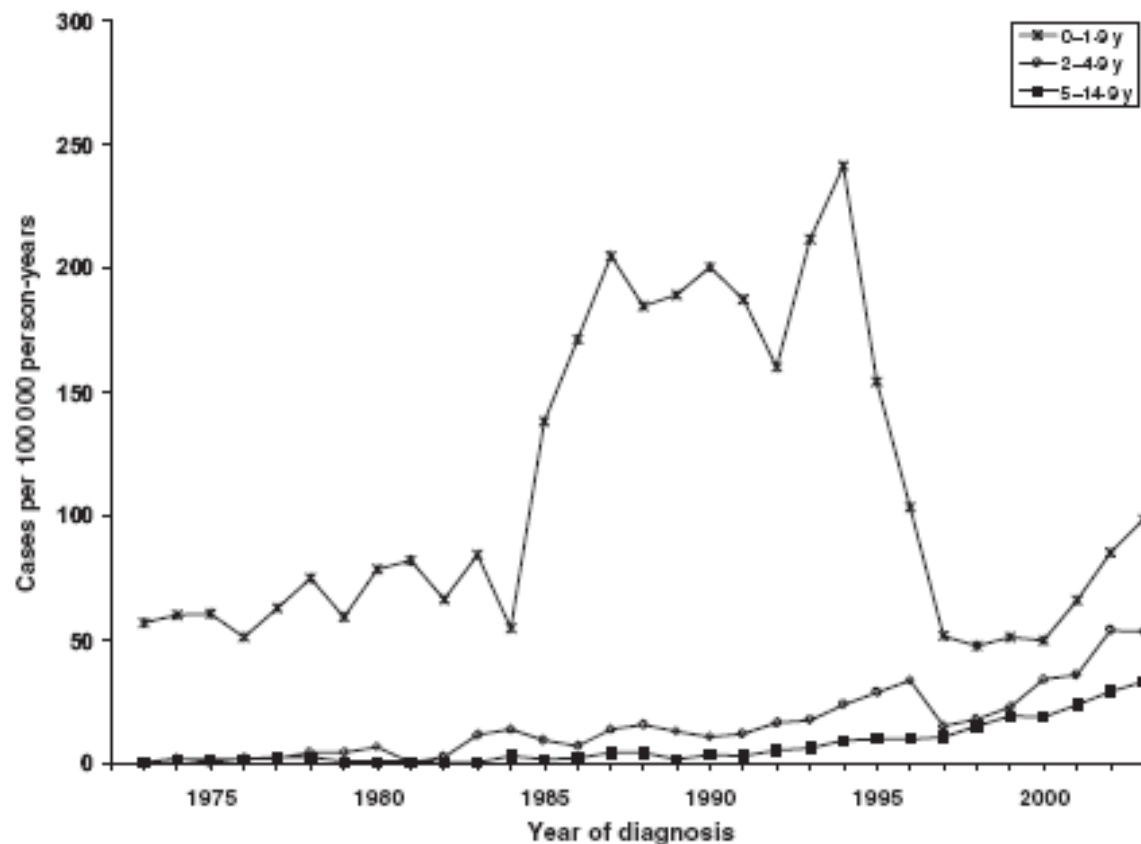
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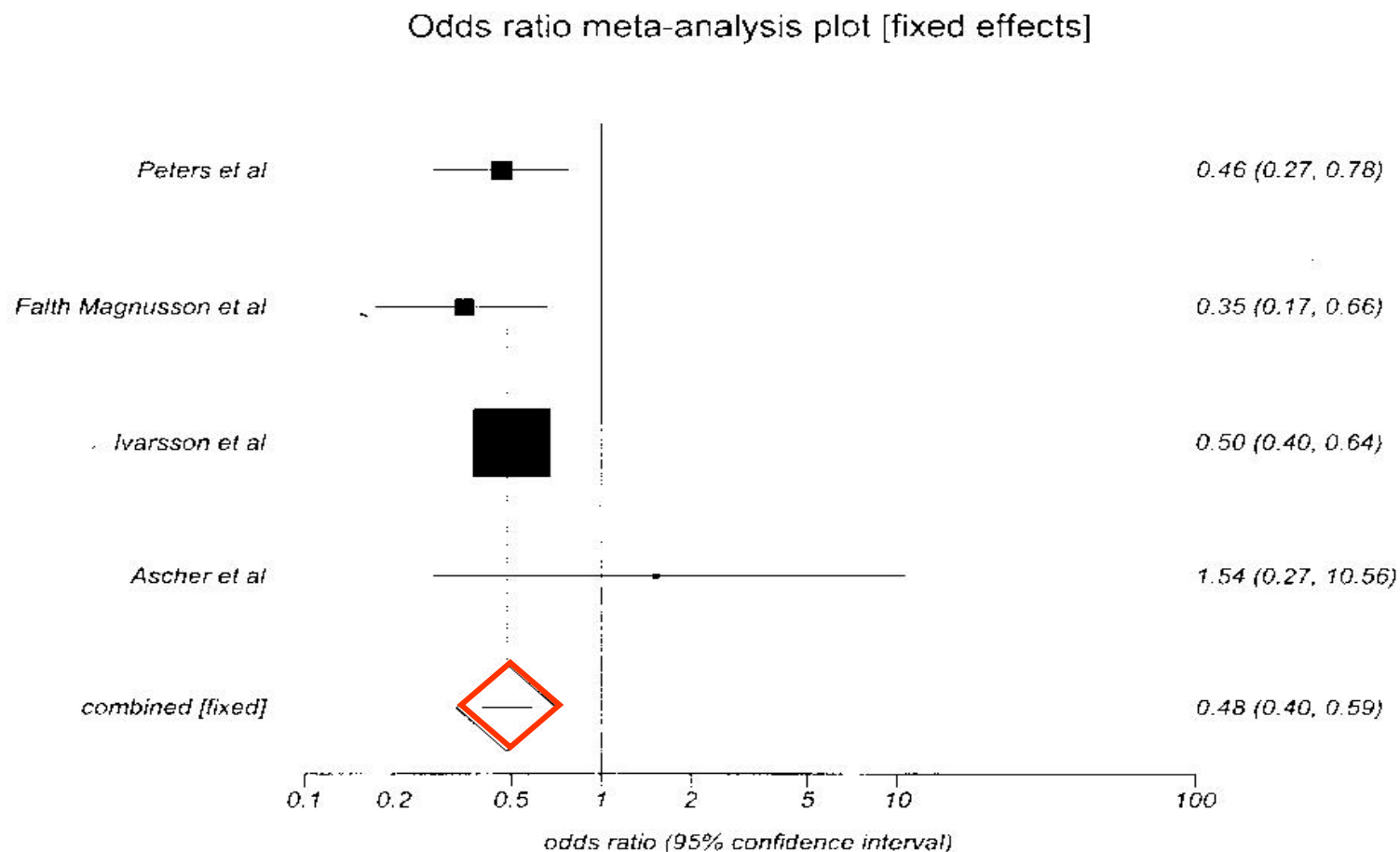
Difference in Celiac Disease Risk Between Swedish Birth Cohorts Suggests an Opportunity for Primary Prevention

Cecilia Olsson, RD^{a,b}, Olle Hernell, PhD^c, Agneta Hörnell, PhD^a, Göran Lönnerberg, BSc^b, Anneli Ivarsson, PhD, MD^b

^aDepartment of Food and Nutrition, Faculty of Social Sciences, and ^bDepartment of Public Health and Clinical Medicine, Division of Epidemiology and Public Health Sciences, and ^cDepartment of Clinical Sciences, Division of Pediatrics, Faculty of Medicine, Umeå University, Umeå, Sweden



Promotion of breast feeding is important



? Il primo glutine ?

- ESPGHAN suggerisce l'introduzione all'età di 6 mesi
- In Svezia è stato anticipato a 4 mesi (quando il bimbo è ancora allattato al seno) per favorire l'induzione della tolleranza
- L'introduzione tardiva potrebbe ridurre il rischio di sensibilizzazione (maturazione barriera intestinale)?



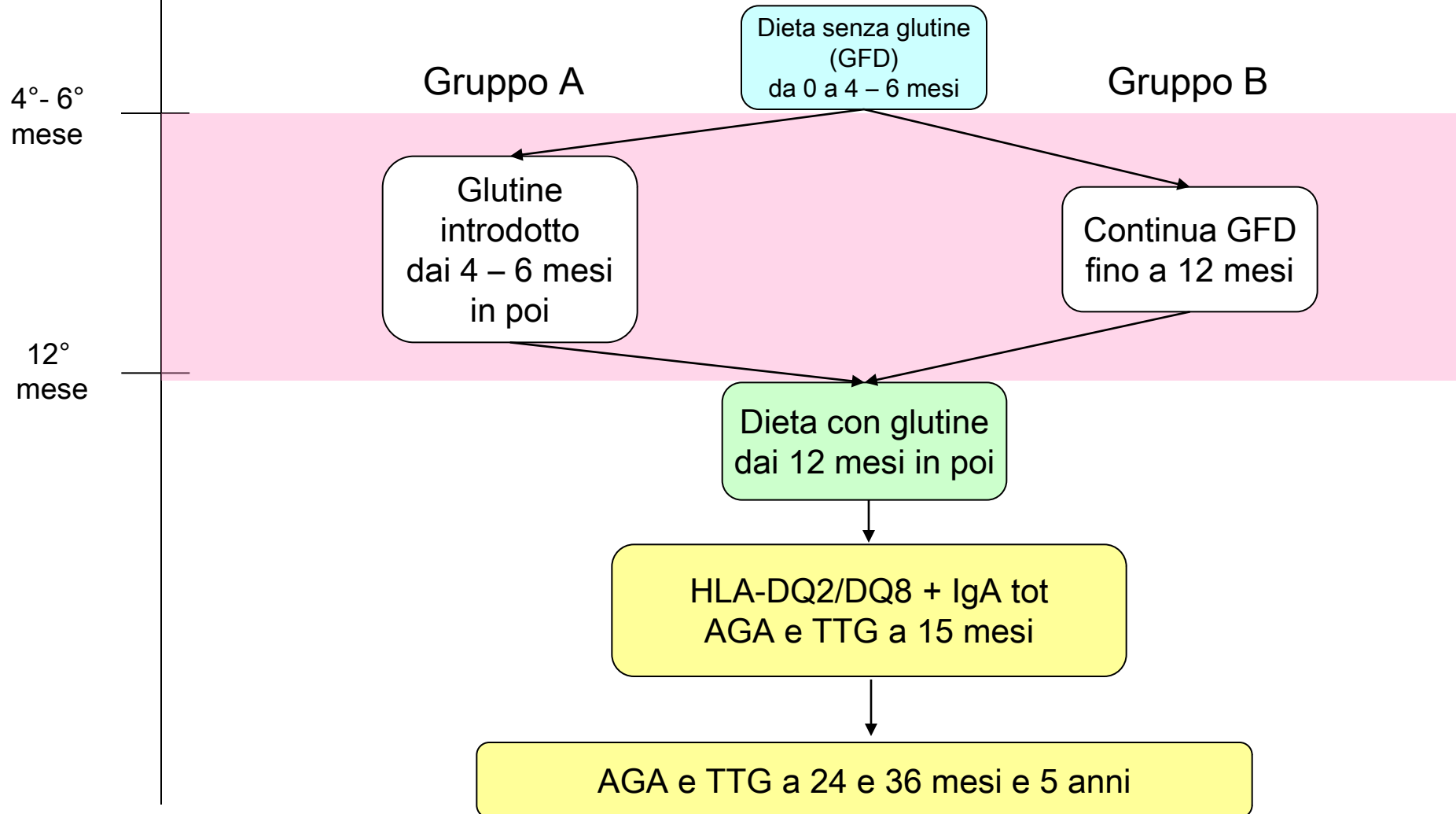
Age at gluten introduction and risk of celiac disease (CD): a prospective, multicentre, dietary intervention study on infants at family risk of disease

¹Castellaneta S, ²Lionetti E, ³Dongarrà ML, ⁴Aniballi F, ¹Francavilla R, ⁴⁻⁵Catassi C, and the Italian Working Group on “Weaning and Celiac Disease Risk”

*¹University of Bari, ²University of Catania, ³Diogene, Palermo,
⁴Università Politecnica delle Marche, Ancona (Italy) and ⁵University of Maryland, Baltimore (USA)*

Diagramma dello studio

Neonato a rischio familiare di malattia celiaca

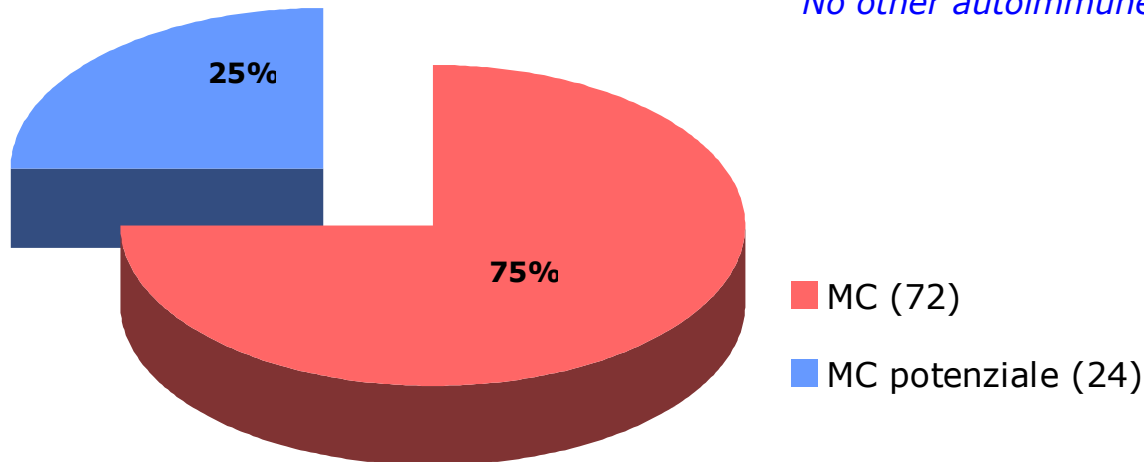


Italian Study on age at weaning and risk of celiac disease

1. Percentage of CD

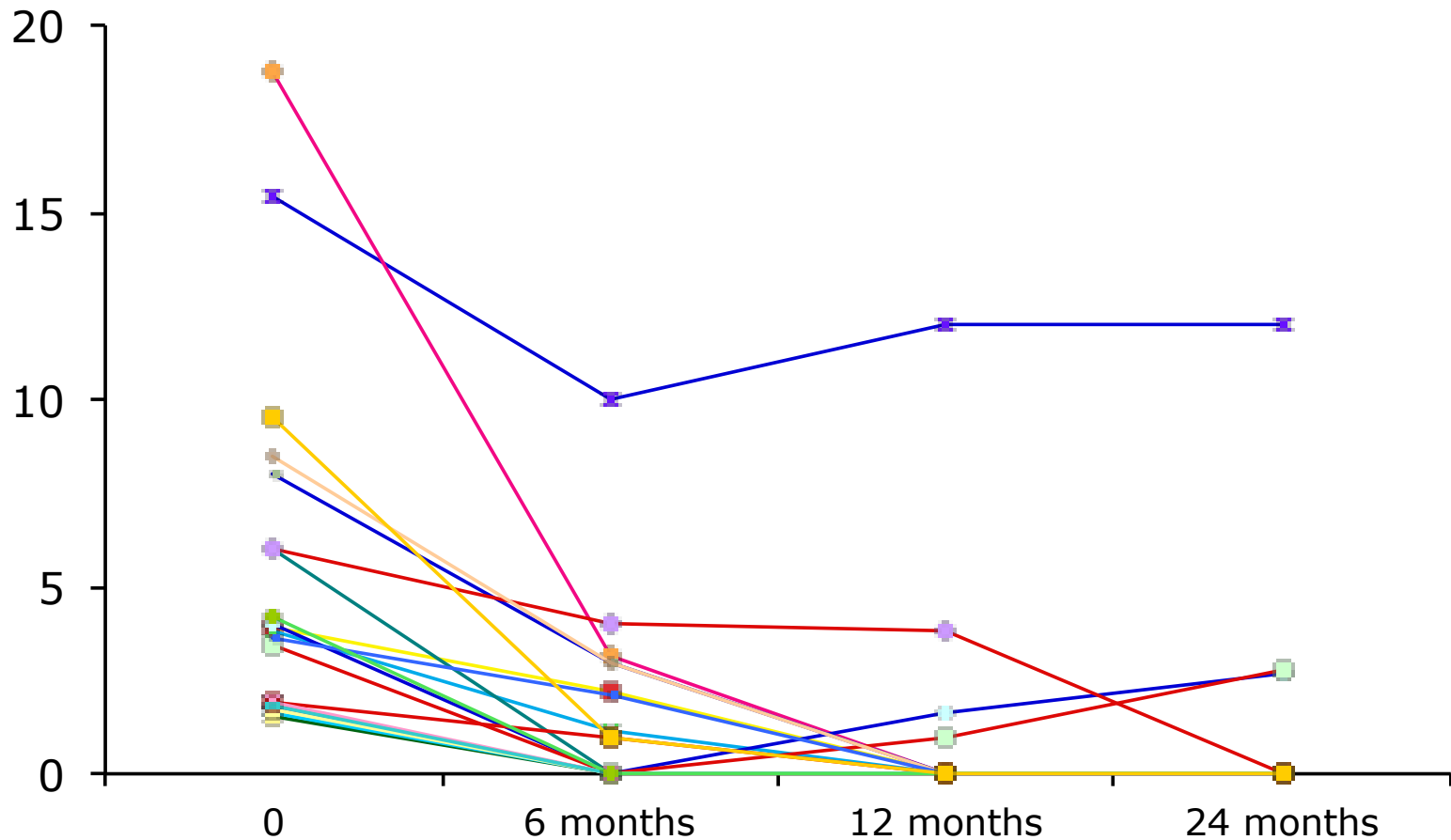
101 positives (5 refused biopsy)

*F 13 (50%); median age 2.1 years (range 1-5)
16 Marsh 0, 10 Marsh 1
25 TTG and EMA pos (1 a-DPG IgG pos)
All asymptomatic
Normal nutritional parameters
No other autoimmune diseases*



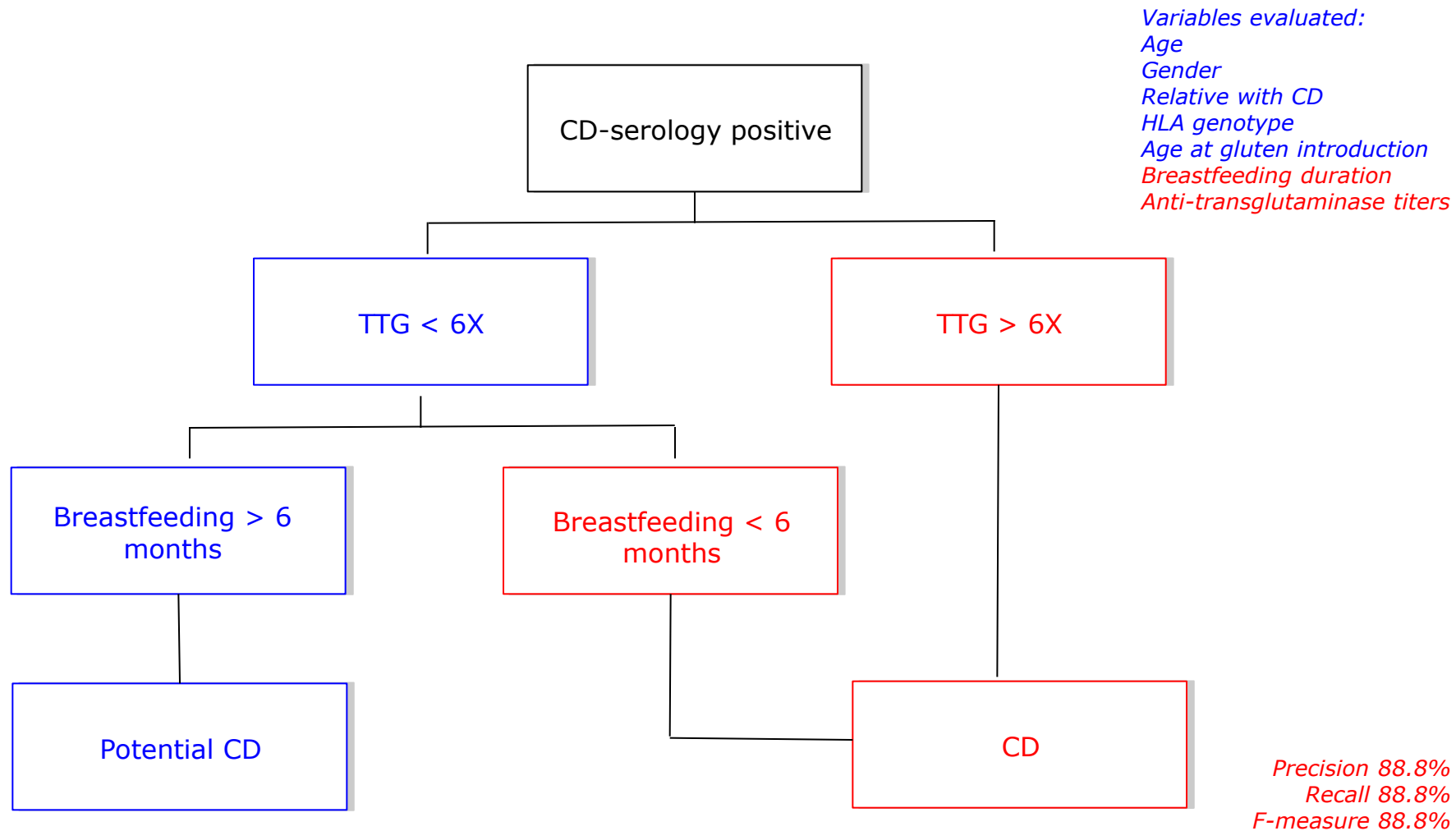
Prevalence of potential CD of 3.5 % (out of 729 at-risk infants)

Anti tTG-IgA nei soggetti con celiachia potenziale (UNL x)



Results: decisional-tree

5. Factors associated with potential CD versus overt CD



E' possibile la prevenzione primaria della celiachia ?

TOLLERANZA

INTOLLERANZA

