

Nutrizione come terapia della celiachia e della dermatite erpetiforme

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“Aspetti dismetabolici della dieta senza glutine”

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Percentuale di intervistati che nel decidere le proprie scelte alimentari si ispira a un tipo di dieta che considera molto utile per la propria salute



LESS IS MORE



LOW/NO CHOLESTEROL	38%
LOW SALT/SODIUM	33%
LOW SUGAR/SUGAR FREE	32%
LOW/NO FAT	30%
PORTION CONTROL	27%
LOW/NO CALORIES	27%
NO HIGH FRUCTOSE CORN SYRUP	26%
LOW/NO CARBOHYDRATES	24%
CAFFEINE-FREE	23%
GLUTEN-FREE	21%

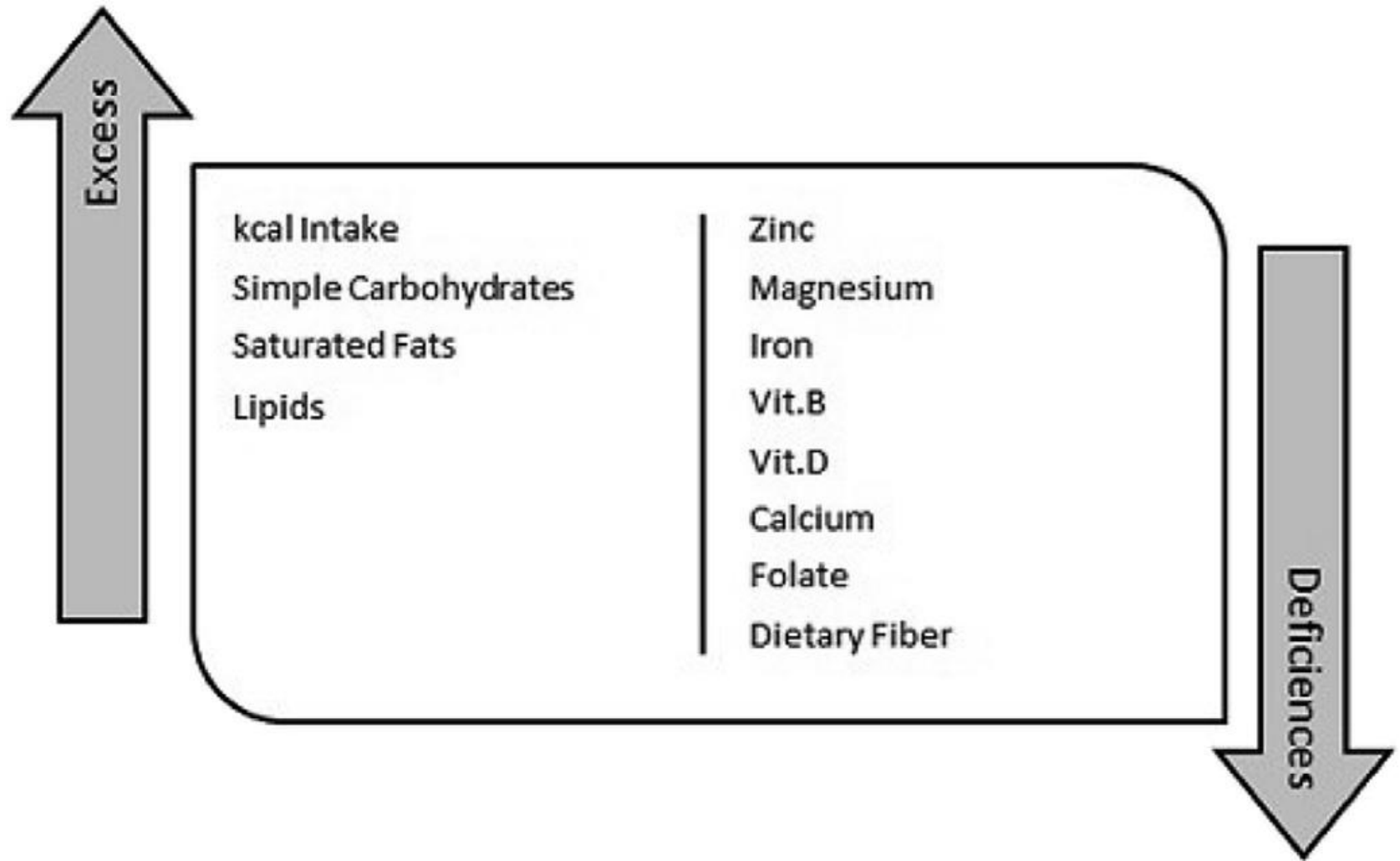
nielsen
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AN UNCOMMON SENSE
OF THE CONSUMER™

Inadeguatezze nutrizionali della dieta senza glutine

	Disegno dello studio	Soggetti	Metodo	Macronutrienti/fibra/ Micronutrienti
<i>Babio et al. 2017</i>	Caso-controllo	96 pazienti pediatrici con celiachia ben controllati con GFD, 98 controlli	Diario alimentare di 3 giorni	↑ grassi e zuccheri aggiunti, ↓ fibre, folati, calcio, ferro, magnesio
<i>Barone et al. 2016</i>	Caso-controllo	39 pazienti pediatrici con celiachia ben controllati con GFD, 39 controlli	Diario alimentare di 7 giorni	↑ grassi ↓ fibre
<i>Sephard and Gibson 2013</i>	Caso-controllo	55 pazienti pediatrici con celiachia ben controllati con GFD, 50 pazienti con diagnosi recente di celiachia	Diario alimentare di 5/7 giorni	↑ grassi ↓ CHO, proteine, folati, calcio, ferro, zinco
<i>Zuccotti et al. 2012</i>	Caso-controllo	18 pazienti pediatrici con celiachia ben controllati con GFD, 18 controlli	FFQ + 24h Recall	↑ energia, CHO ↓ grassi
<i>Wild et al. 2010</i>	Osservazionale	93 pazienti con celiachia ben controllati con GFD	Diario alimentare di 5 giorni	↑ CHO ↓ fibre, magnesio, zinco, ferro, manganese, selenio, folati
<i>Kinsey et al. 2008</i>	Caso-controllo	48 pazienti pediatrici con celiachia ben controllati con GFD	Diario alimentare 3 giorni	↑ proteine ↓ grassi

Possibili inadeguatezze nutrizionali della dieta senza glutine



Possibili inadeguatezze nutrizionali della dieta senza glutine

- L'inerente natura restrittiva di questo pattern alimentare
- Modificazioni della composizione dei prodotti resi senza glutine

Contenuto nutrizionale di prodotti resi senza glutine

Author	Year	Country	Gluten-free products analyzed	Findings
Estevez et al	2016	Chile	19 food products across 10 food categories	Lower protein in gluten free bread and cereal, lower dietary fiber in gluten free pastas and biscuits compared to standard
Miranda et al	2014	Spain	206 food products across 9 food categories	Lower protein and higher fat content in gluten free breads and pastas, higher sodium and lower dietary fiber in gluten free cereal bars and flour compared to standard
Thompson	1999	USA	368 food products across 3 food categories	Lower thiamine, riboflavin, and niacin content across categories compared to standard
Thompson	2000	USA	86 food products across 3 food categories	Lower dietary fiber, folate, and iron content across categories compared to standard
Wu et al	2015	Australia	3213 food products across 10 food categories	Lower dietary fiber in gluten free cereals, lower protein content in gluten free cereals, breads, and pastas, similar sodium, saturated fat, sugar content across categories compared to standard

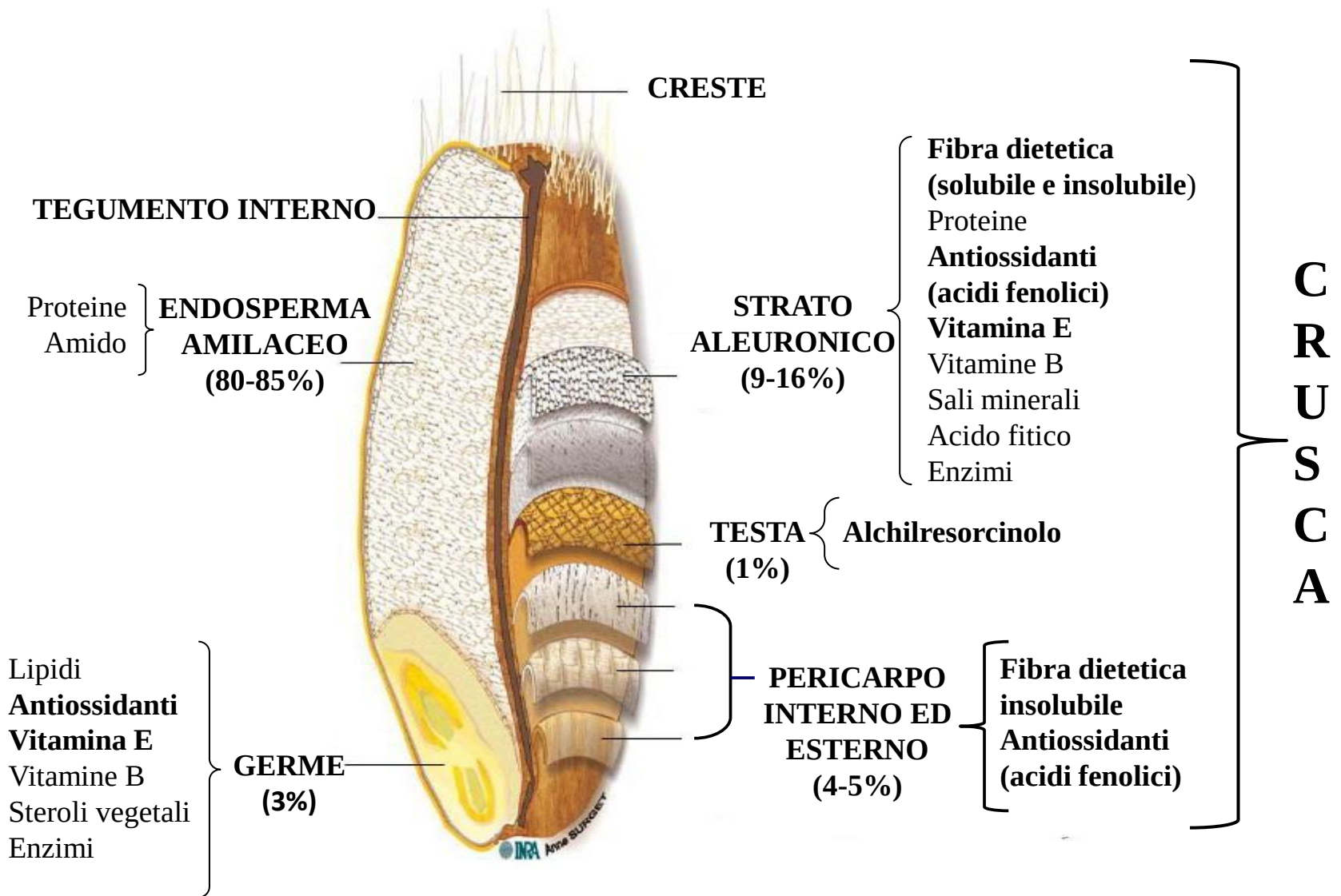
Composizione della dieta abituale di donne sane quando venivano utilizzati alimenti contenenti glutine o i corrispondenti prodotti resi senza glutine

		Females		
Content		Mean	SD	<i>P</i>
Carbohydrates % from the total energy intake	With gluten	42.3	6.6	0.26
	Gluten-free	42.0	6.6	
Lipids% from the total energy intake	With gluten	39.9	5.8	<0.00
	Gluten-free	40.9	5.6	
Proteins% from the total energy intake	With gluten	17.8	2.8	<0.00
	Gluten-free	17.2	3.0	
Fiber intake (g/d)	With gluten	17.6	5.4	0.01
	Gluten-free	16.1	6.7	

Long term gluten consumption in adults without celiac disease and risk of coronary heart disease: prospective cohort study

- Long term dietary intake of gluten was not associated with risk of coronary heart disease.
- However, the avoidance of gluten may result in reduced consumption of beneficial whole grains, which may affect cardiovascular risk.
- The promotion of gluten-free diets among people without celiac disease should not be encouraged

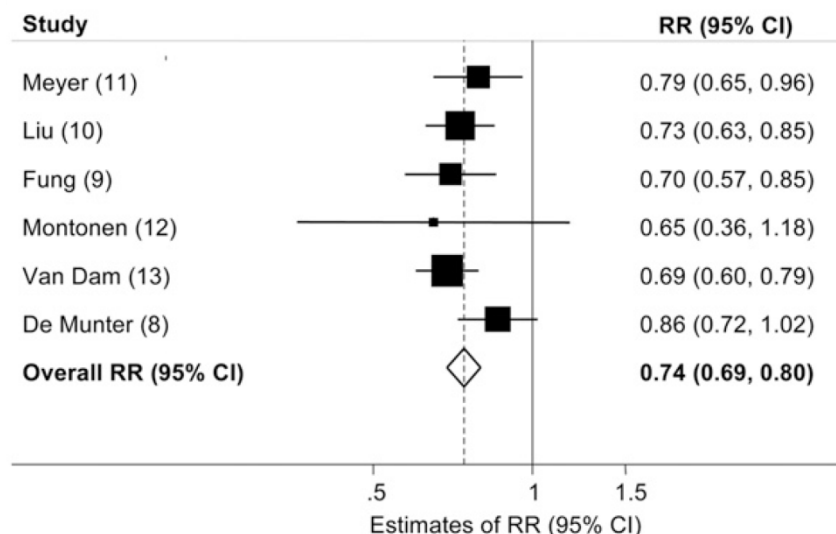
Struttura della cariosside di frumento



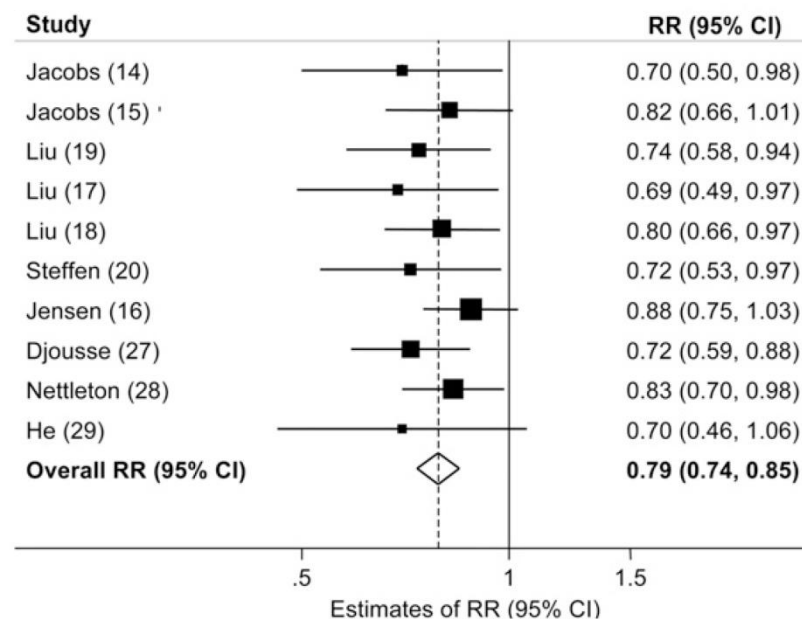
(modificata da Fardet A - Nutrition Research Reviews, 2010)

Il consumo abituale di alimenti contenenti cereali integrali si associa a un ridotto rischio di diabete e malattie cardiovascolari

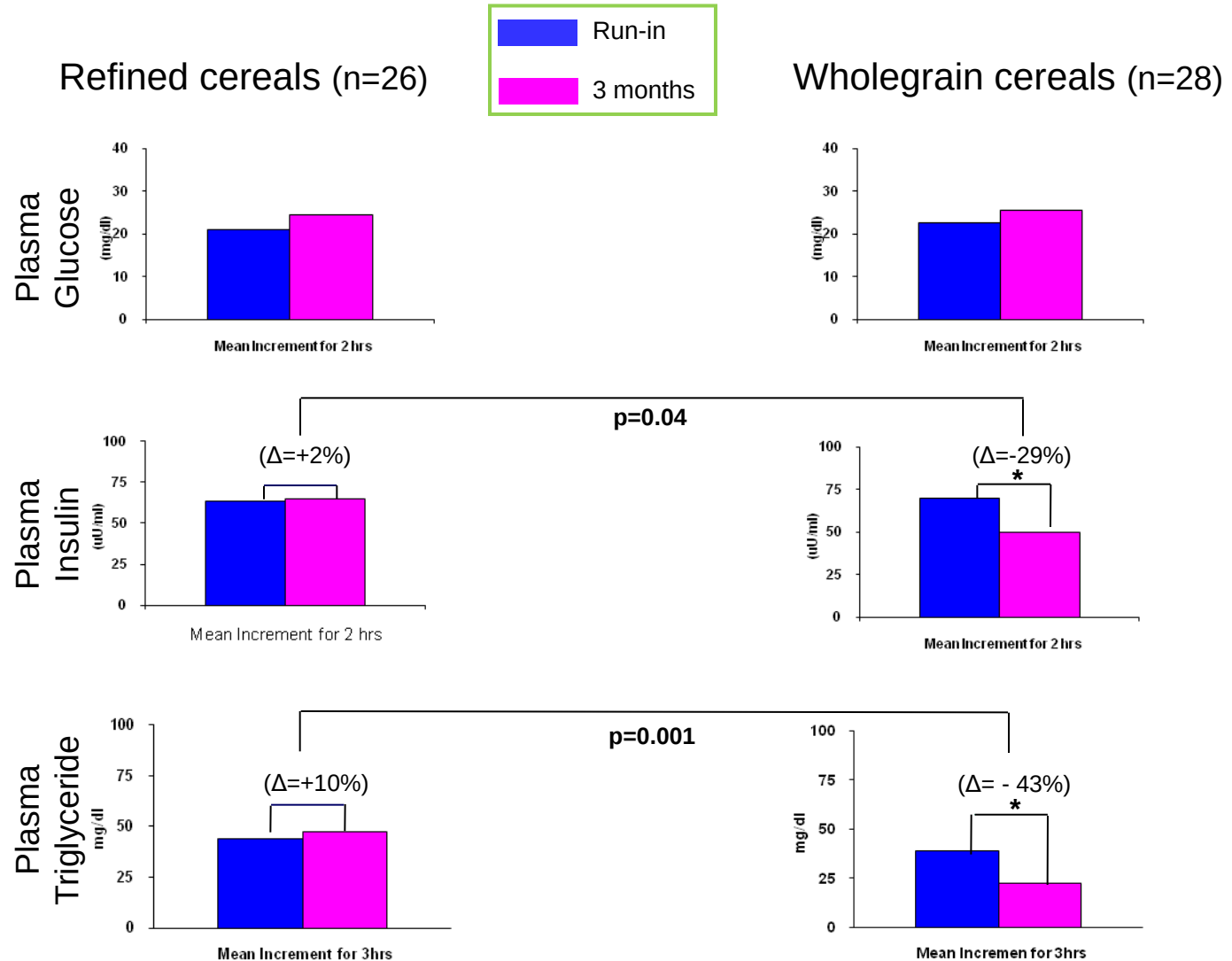
DIABETE TIPO 2



EVENTI CARDIOVASCOLARI

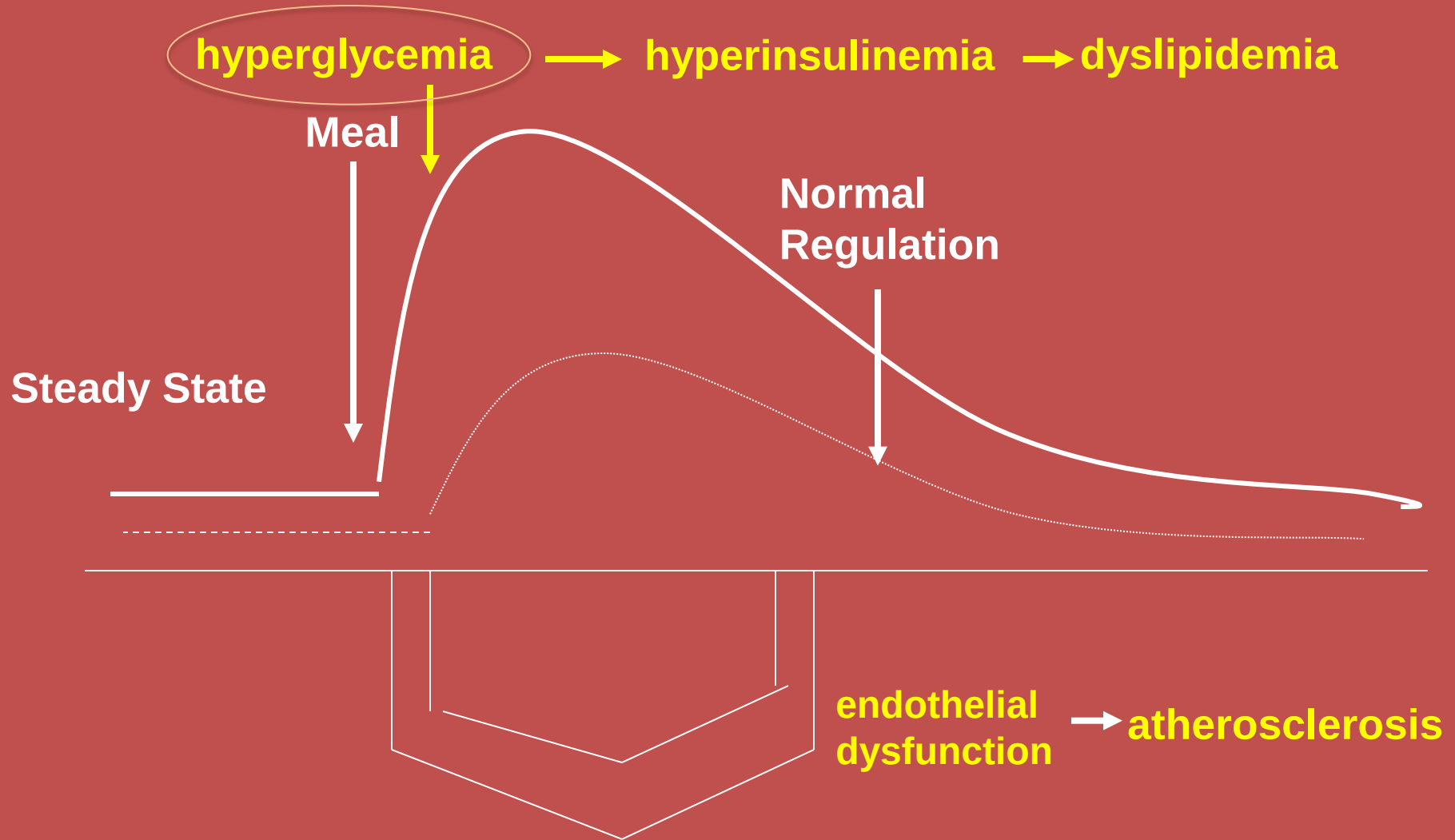


A diet rich in whole grains improves the action of insulin and reduces triglycerides levels in the postprandial period



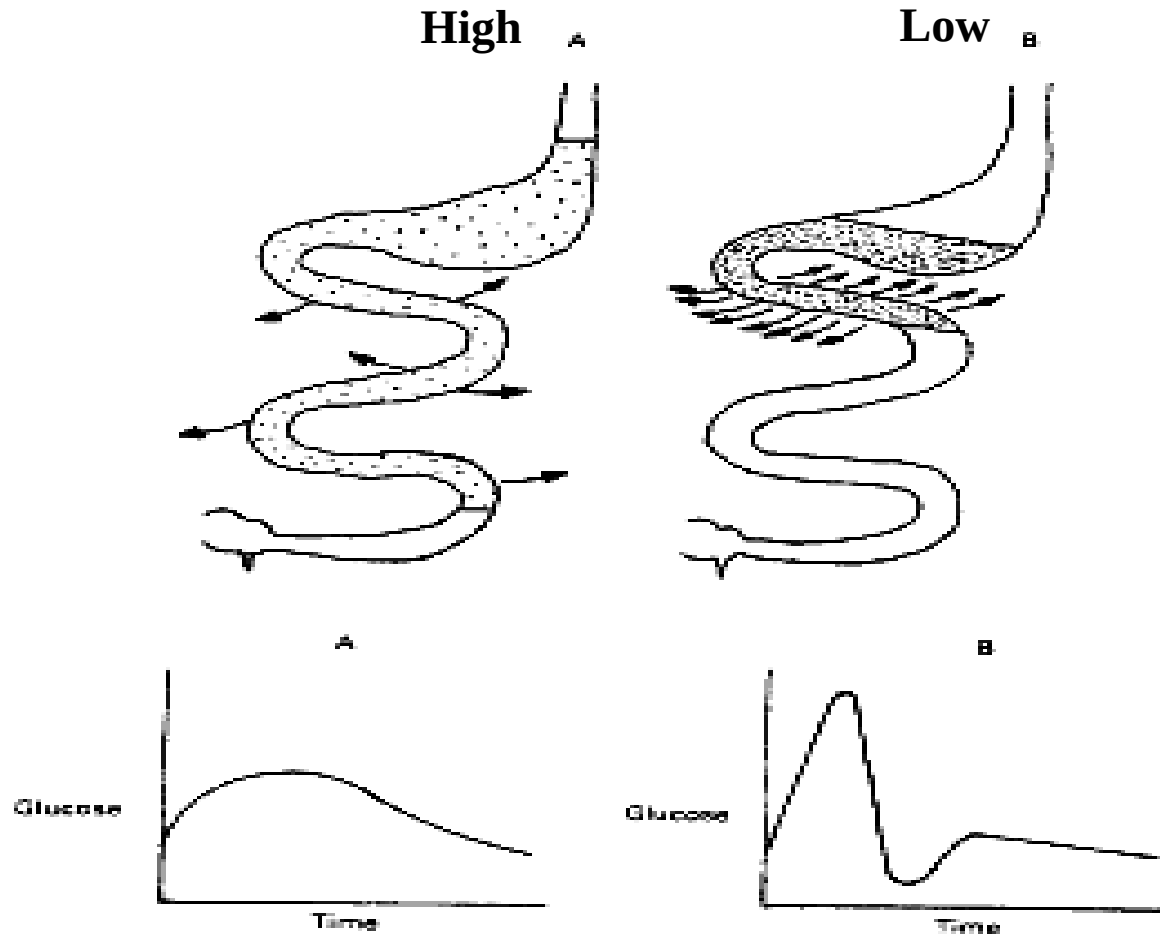
* $p < 0.05$ vs 12 week (Paired Sample t-test)

Metabolic effects



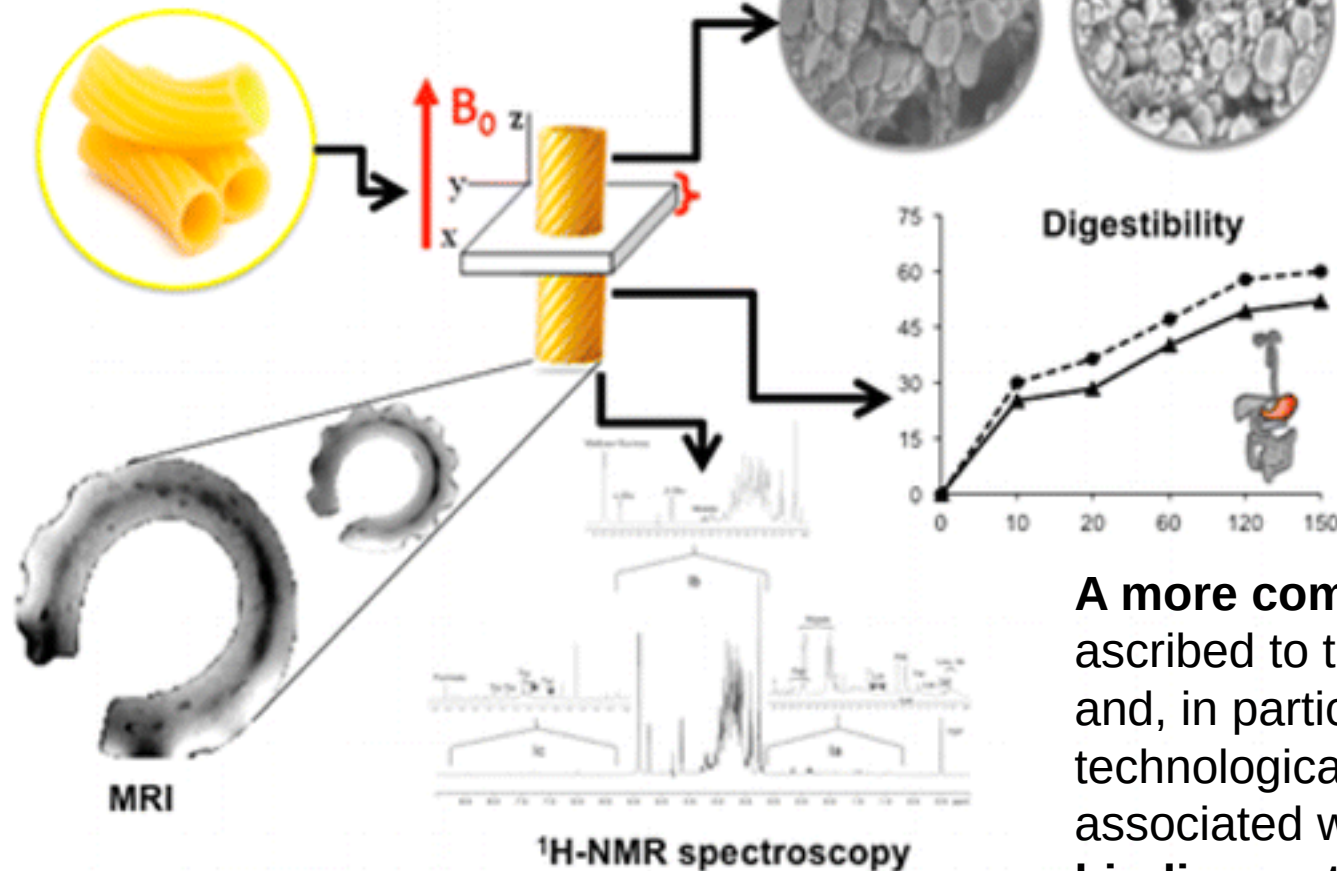
Vascular effects

La viscosità del contenuto intestinale regola la risposta glicemica postprandiale

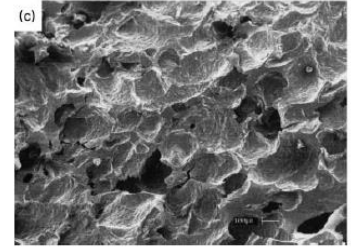


Structural and Nutritional Properties of Pasta from *Triticum monococcum* and *Triticum durum* Species. A Combined ^1H NMR, MRI, and Digestibility Study

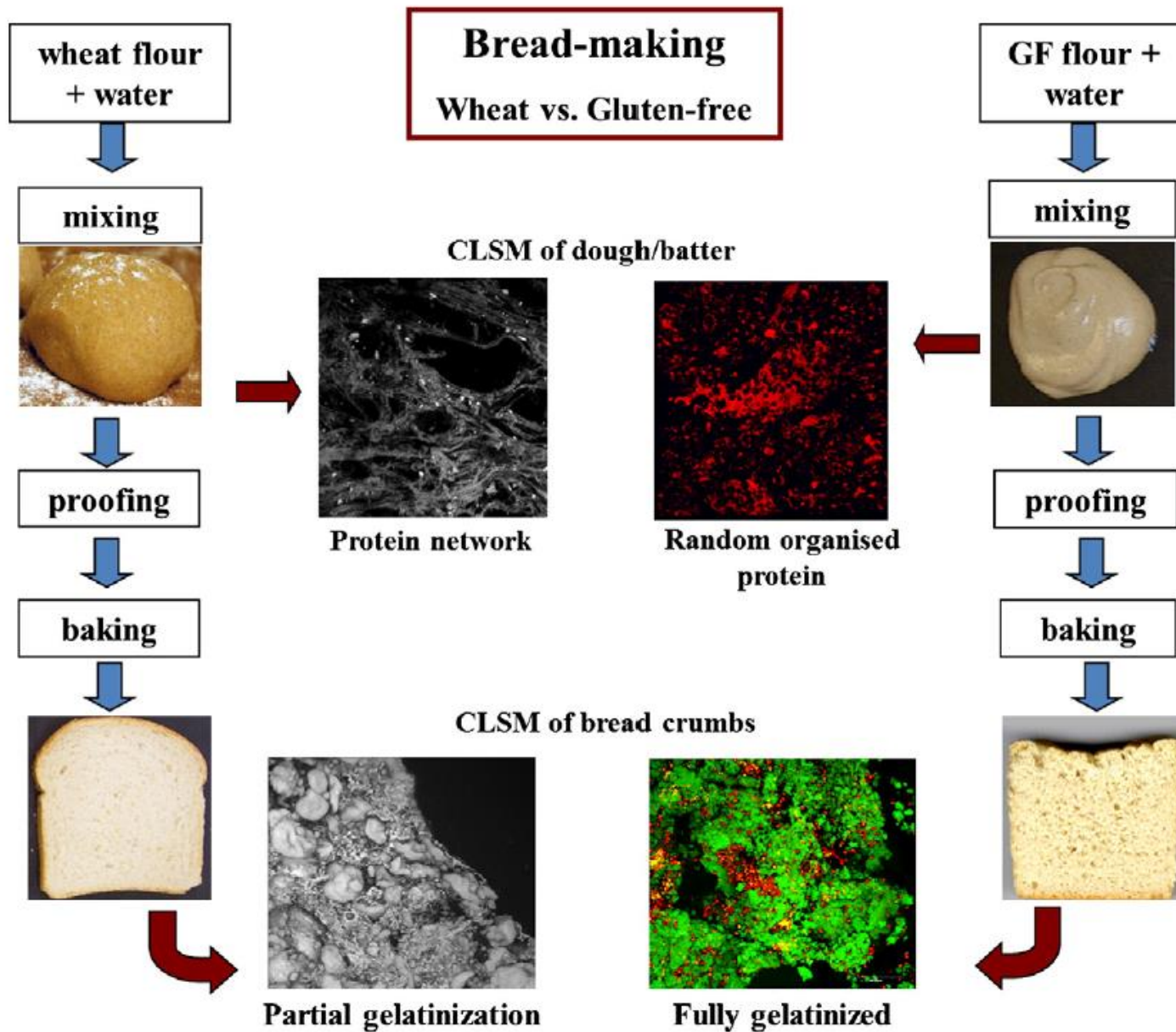
- *Triticum Monococcum*
- *Triticum durum*



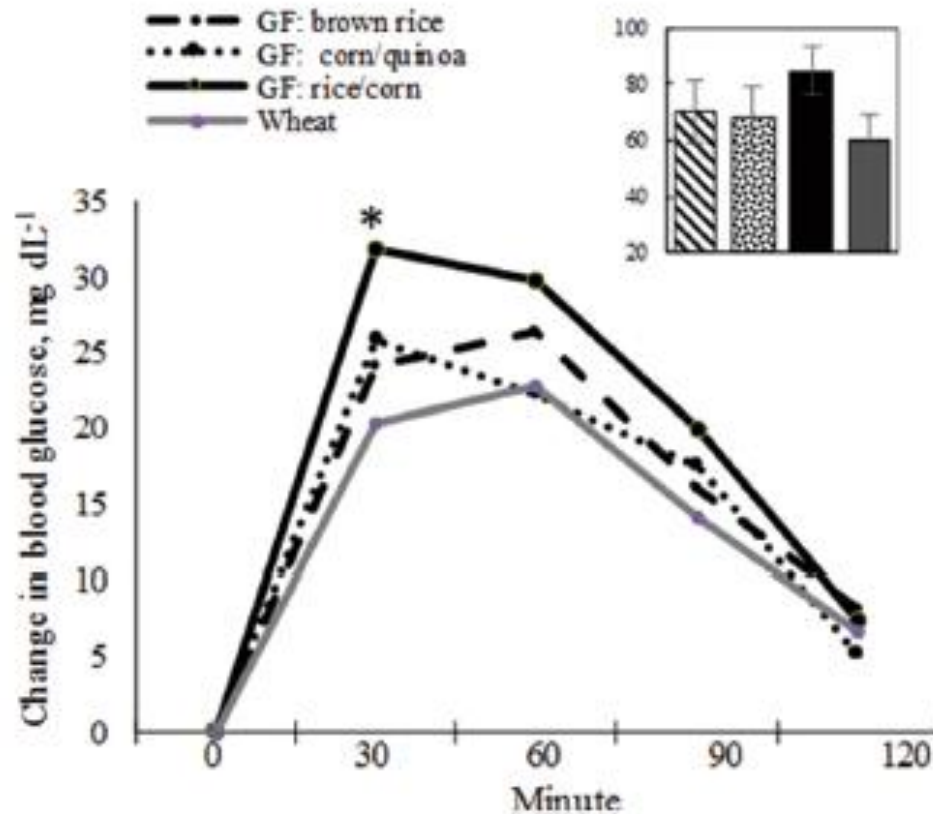
PIZZA



A more compact structure, ascribed to the **protein network** and, in particular, to different technological gluten properties, are associated with a **lower ability in binding water** and a lower rate of **starch hydrolysis**.



Risposta glicemica postprandiale dopo il consumo di tipi diversi di pasta



[§]80 grammi di pasta bollita per 10 minuti, in acqua salata, e servita con aggiunta di burro, latte e formaggio fuso.

*p=0.011 vs wheat pasta by LSD test;
p = 0.036, Repeated Measures ANOVA

Cereali		Cereali minori e pseudo cereali	
	Riso		Grano saraceno
	Mais		Amaranto Quinoa
Frumento (grano duro/tenero) Kamut, Segale, Farro, Orzo.. 			Miglio
			Sorgo
			Teff
			Avena

Senza Glutine

Con Glutine

Senza Glutine

Pseudocereali ...

- **E' un termine non botanico entrato nell'uso comune per indicare le piante non monocotiledoni (come le Graminacee considerate i "veri" cereali), ma dicotiledoni, che producono frutti i quali macinati danno una farina utilizzata per farne pane e altri cibi.**
- **Sono senza glutine**
- **Sono ricchi di minerali, vitamine e fibre.**
- **Sono pseudocereali il grano saraceno, l'amaranto, la quinoa.**

Quinoa (*Chenopodium quinoa*-Chenopodiaceae)

- Originaria del Perù, è utilizzata come un cereale ma in realtà appartiene alla stessa famiglia degli spinaci e della barbabietola.



Amaranto (Amaranthus-Amarantheae)

- E' una pianta appartenente alla famiglia delle Amarantacee, originaria del Centro America e usata per secoli dagli Inca e dagli Atzechi. Sia i semi che le foglie sono commestibili ed usate in Sud America per l'alimentazione quotidiana.

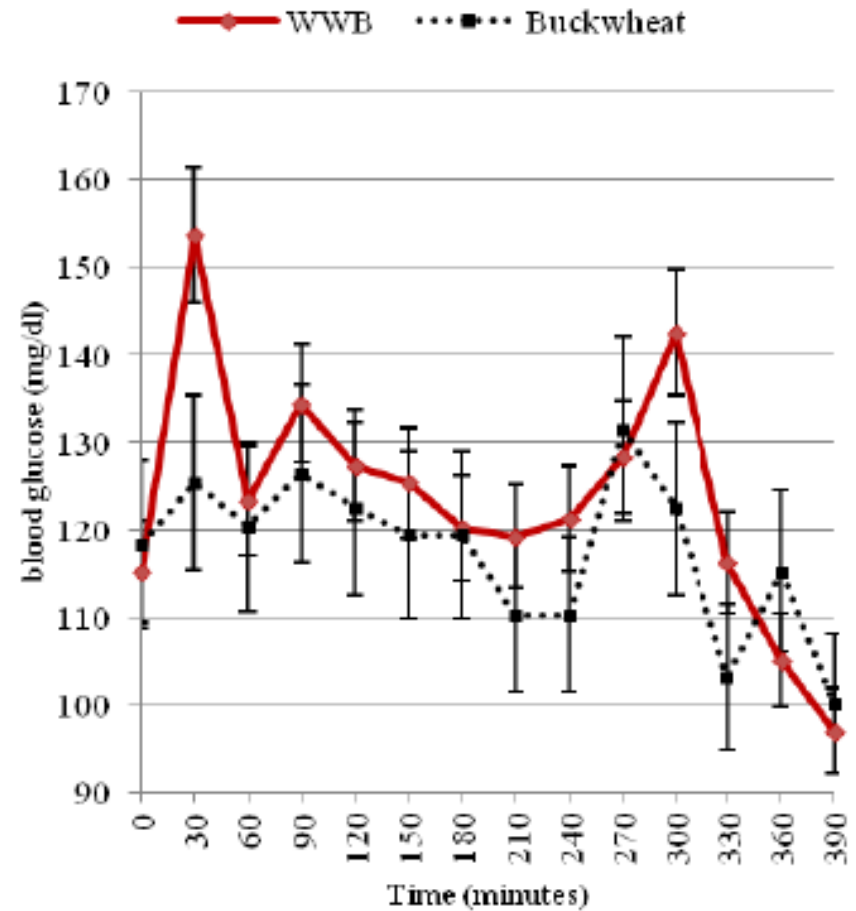
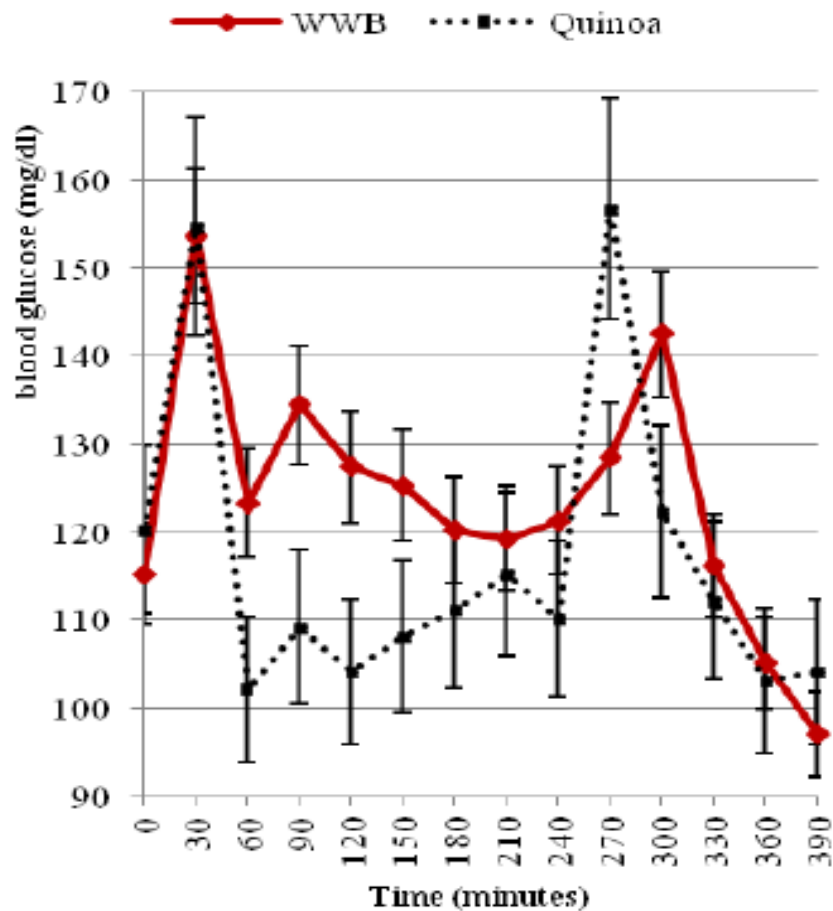


Composizione nutrizionale dei principali cereali e pseudocereali

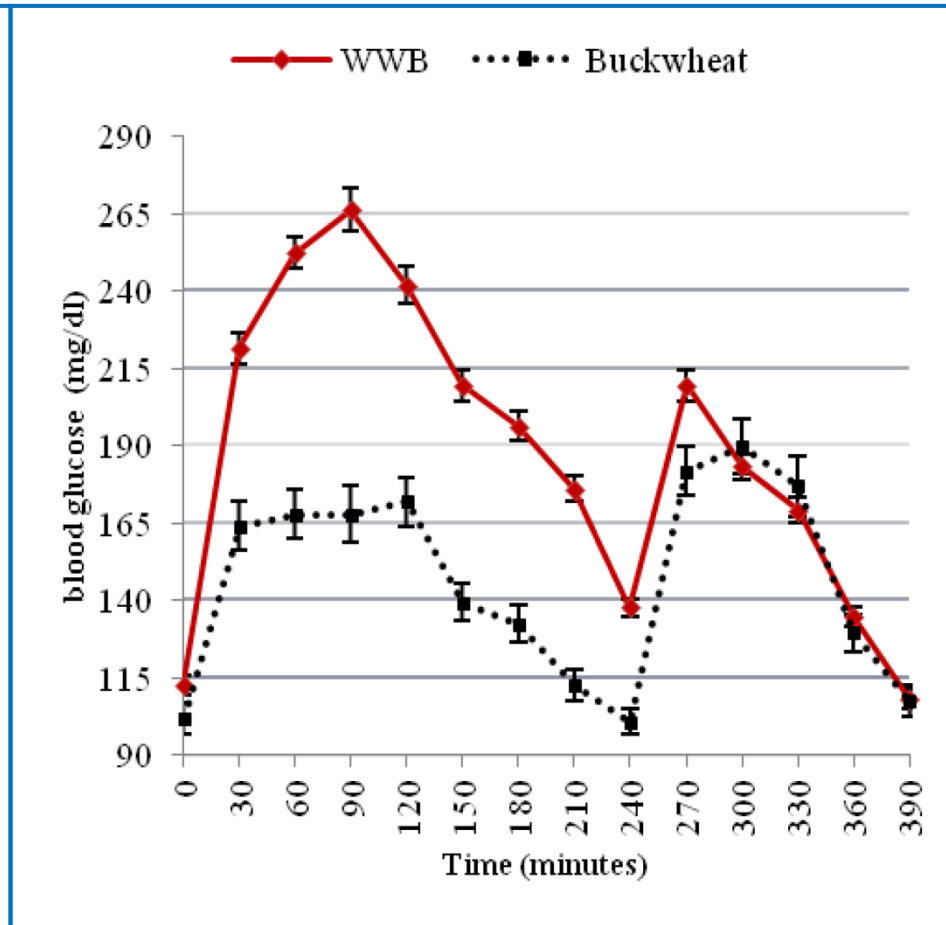
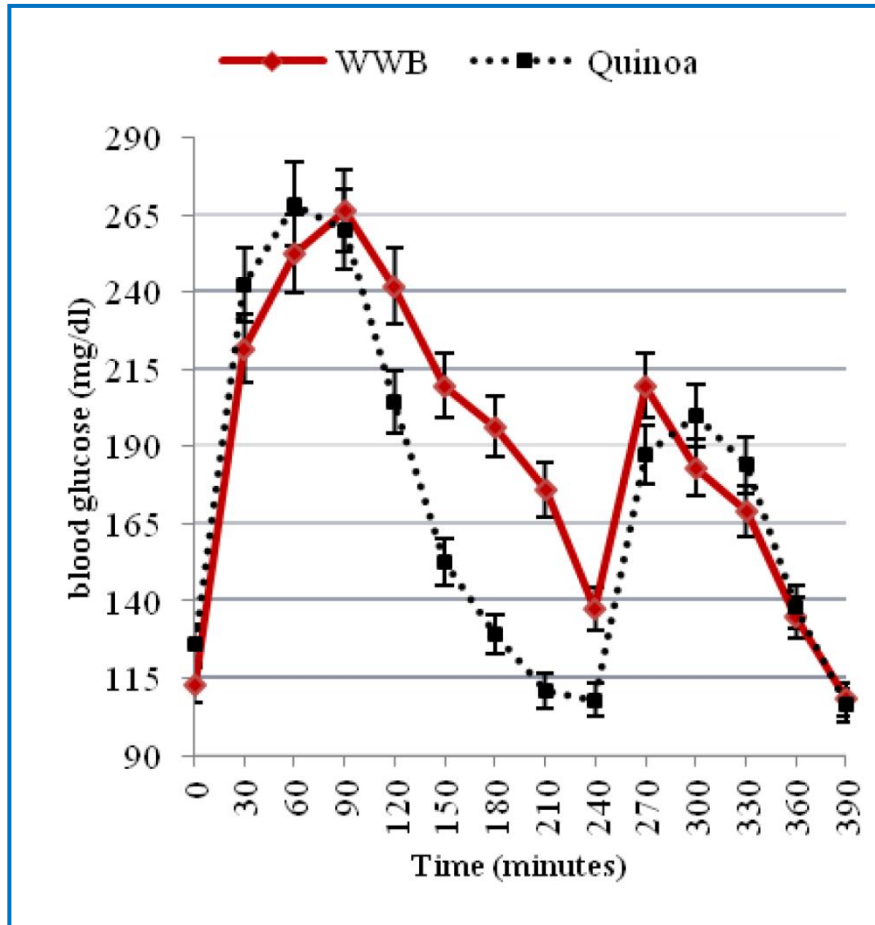
Botanical source	Moisture (% _w , db) ^a	Carbohydrates (% _w , db)	Proteins (% _w , db)	Lipids (% _w , db)	Fibre (% _w , db)	Ash (% _w , db)
Wheat	14.2 ± 0.3	77.3 ± 1.1	11.5 ± 0.7	0.7 ± 0.1	2.2 ± 0.1	0.5 ± 0.1
Corn	nd	87.6–92.5	5.18–7.82	1.56–2.42	0.42–0.62	0.19–1.63
Oat	12.0 ± 0.3	62.0 ± 0.8	12.6 ± 0.8	12.3 ± 0.6	11.4 ± 0.6	1.9 ± 0.1
Rice	11.9 ± 0.3	80.1 ± 1.2	5.9 ± 0.9	1.4 ± 0.1	2.4 ± 0.2	0.6 ± 0.2
Rye	9.8 ± 0.3	77.5 ± 1.5	9.4 ± 0.6	1.7 ± 0.1	14.6 ± 0.6	1.5 ± 0.1
Amaranth	9.8 ± 0.2	66.2 ± 1.0	14.4 ± 0.6	5.7–7.0	9.3–20.6	3.0 ± 0.3
Quinoa	9.3 ± 0.1	68.9 ± 1.2	13.0 ± 0.9	5.2–5.8	5.9 ± 0.3	0.6 ± 0.1
Buckwheat	11.1 ± 0.4	70.6 ± 1.1	10.6–12.6	2.1–3.1	10.0 ± 0.7	1.8–2.5

- 90% trigliceridi e lipidi complessi (fosfolipidi e glicolipidi)
di cui **70% acido oleico/linoleico**
- 20% acido stearico

Effect of Pseudocereal -Based Breakfast Meals on the First and Second Meal Glucose Tolerance in Healthy Subjects



Effect of Pseudocereal -Based Breakfast Meals on the First and Second Meal Glucose Tolerance in Diabetic Subjects



Effetti del consumo di quinoa sui parametri metabolici in un gruppo di soggetti sani

	Corn Flakes group		Quinoa Flakes group	
	T1	T2	T1	T2
Glucose (mg/l)	97.51 ± 18.19	97.18 ± 25.44	96.67 ± 17.81	95.03 ± 16.94
Total cholesterol (mg/dl)	188.10 ± 36.29	178.50 ± 46.01	191.00 ± 35.86 ^a	181.30 ± 28.71 ^b
HDL-c (mg/dl)	42.59 ± 12.08	42.36 ± 8.24	39.08 ± 8.40	37.85 ± 6.88
LDL-c (mg/dl)	118.70 ± 37.89	113.40 ± 45.02	129.50 ± 35.41 ^a	121.90 ± 26.88 ^b
Triglycerides (mg/dl)	133.90 ± 89.49 ^a	113.70 ± 57.17 ^b	112.30 ± 35.86 ^a	107.90 ± 33.07 ^b

Values are reported as mean ± SD. T1 (before) and T2 (after) 4 weeks of intervention. Different letters: $p < 0.05$.

Major concerns about the nutritional quality of some gluten free products and strategies to overcome them

Major concerns	GF products	Strategies for increasing the nutritional quality of GF products
High content of total and saturated fats	Bread, dough/pastry/pizza and pasta categories ²⁰	To avoid starch as a major ingredient; sourdough fermentation
High content of sodium	Pastas and bakery products; ²⁰ breads and pastas ²⁷	To avoid starch as a major ingredient; sourdough fermentation
Low content of total folate	GF ingredients (e.g. rice starch), flours and breads; ²⁵ flours, breads, pastas, bakery products and breakfast cereals ¹⁸	To avoid starch as a major ingredient; to include quinoa and amaranth, ^{25,65} especially in wholemeal form
Low content of B vitamins (e.g. thiamine and niacin)	Flours, breads, pastas, bakery products and breakfast cereals; ²³ breads; ²⁴ breads and pastas ²⁷	To include legumes (e.g. lupine ⁶⁹) and pseudocereals (such as amaranth, quinoa and buckwheat ⁶⁴), especially in wholemeal form
Low content of calcium	Breads; ²⁴ breads and pastas ²⁷	To include teff, quinoa and amaranth, ^{62,63} especially in wholemeal form

Major concerns about the nutritional quality of some gluten free products and strategies to overcome them

Low content of iron	Breads; ²⁴ flours, breads, pastas, bakery products and breakfast cereals; ¹⁸ breads and pastas ²⁷	To include quinoa, teff and buckwheat, ⁶² especially in wholemeal form
Low content of other minerals (e.g. potassium, phosphorus and zinc)	Breads and pastas ²⁷	To include quinoa, teff and buckwheat, ⁶² especially in wholemeal form
High glycaemic index	Breads ^{45,47} and pastas ⁴⁵	Viscous fibre ⁵² (e.g. inulin-type fructans ⁵⁰); sourdough fermentation; ⁵¹ to include legumes ⁶⁸
Presence of mycotoxins (e.g. fumonisins)	Corn-based foods such as extruded products and flours; ⁵⁹ flours, breads, pastas, bakery products and breakfast cereals ^{17,60,61}	Sourdough fermentation ⁷³

La produzione degli alimenti per celiaci deve confrontarsi con l'assenza del glutine e quindi delle sue importanti proprietà visco-elastiche, fondamentali per la struttura dell'impasto e del prodotto finito.

L'utilizzo di nuove tecnologie di produzione e/o di nuovi ingredienti (pseudocereali) potrebbe favorire lo sviluppo di alimenti senza glutine “ad alta qualità nutrizionale”, che oltre a sapore e consistenza, privilegino anche profili nutrizionali bilanciati e un adeguata quantità di fibre vegetali



Grazie per l'attenzione