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Is there a relationship between whole grain intake and biomarkers of nutritional status?

A.P. Nugent[1], N.F.C. Devlin[1], J. Walton[2], A. Flynn[2] and B.A. McNulty[1]

[1]*UCD Institute of Food and Health, University College Dublin, Belfield, Dublin 4, Ireland and* [2]*School of Food and Nutritional Sciences, University College Cork, Cork, Ireland*

Previously, consumption of wholegrain foods has been related to a more nutrient dense diet in Irish adults[1]. This analysis investigated any associations between eating wholegrain foods and biomarkers of nutritional status using data from the National Adult Nutrition Survey (2008–2010) (www.iuna.net)[2]. A 4-day semi-weighed food diary recorded food intake data of 1500 adults and wholegrain intake was identified at food and brand level[1]. Markers of nutritional status were measured by ELISA (serum 25 (OH) vitamin D), microbiological assay (red blood cell (RBC) and serum folate), fluorescence polarization immunoassay (plasma homocysteine; Hcy), HPLC (plasma pyridoxal-5′-phosphate; PLP, vitamin B6), erythrocyte glutathione reductase activation coefficient (EGRAC; riboflavin), Beckman Coulter Counter (Haemoglobin; Hb) or a RX Daytona automated analyser (serum ferritin, Total Iron Binding Capacity; TIBC). After the exclusion of under-reporters, non-consumers of whole grain were identified and tertiles of intake calculated for consumers.

| | Tertiles of mean daily whole grain intakes* | | | | | | | | |
| | Non-consumers n = 94 | | Tertile 1 n = 298 | | Tertile 2 n = 313 | | Tertile 3 n = 346 | | P value |
	Median	IQR	Median	IQR	Median	IQR	Median	IQR	
Wholegrain (g/d)	0[a]	0	8·6[b]	10·1	31·3[c]	11·8	68·3[d]	38·1	<0·001
Serum ferritin (ng/ml)	95·8	101·7	87·4	109·4	78·9	100·7	93·0	121·9	0·901
TIBC (μmol/L)	59·7	11·4	59·9	15·4	60·9	12·7	59·0	11·0	0·502
Haemoglobin (g/dL)	14·1	2·7	14·3	2·1	13·9	1·8	14·3	1·8	0·587
Serum folate (nmol/L)	17·8[a]	14·6	20·9[a]	17·0	28·3[b]	24·2	31·9[b]	27·8	<0·001
RBC folate (nmol/L)	790·4[a]	387·9	799·8[a]	424·0	908·7[b]	558	1019·5[b]	584·4	<0·001
Serum B12 (nmol/L)	269·3[a]	141·9	273·6[a]	155·3	302·1[b]	137·2	329·4[b]	169·8	<0·001
EGRAC	1·4[a]	0·3	1·4[a]	0·2	1·3[b]	0·2	1·3[b]	0·2	<0·001
Plasma PLP (nmol/L)	77·1[a]	60·4	79·4[a]	62·0	89·0[b]	69·5	93·5[b]	59·5	<0·001
Plasma Hcy (nmol/L)	13·0[a]	4·8	12·1[a]	3·9	11·4[b]	3·1	11·3[b]	3·8	<0·001
Serum 25(OH)D (nmol/L)	48·1	40·1	56·6	28·8	56·4	33·7	59·8	35·7	0·249

* Differences between groups were determined by General Linear Model with Bonferroni post hoc tests on log transformed variables where applicable; controlling for social class, supplement use, gender, age, alcohol intake, smoking and energy intake. Different subscripted letters indicate statistically significant (P < 0·05) differences between groups.

Higher dietary wholegrain intakes were associated with improvements in B-vitamin and homocysteine status but not in biomarkers of iron or vitamin D intake. Across the consumption groups, there were no changes (P > 0·05) in dietary intakes (mg or μg/10MJ/day) of iron, vitamin D or of any of the B vitamins studied. Although correlations were weak, dietary intakes of wholegrain containing breads, ready to eat breakfast cereals and cooked breakfast cereals were more strongly (P < 0·05) related with B-vitamin and homocysteine status than other wholegrain containing foods. Further research will identify whether benefits of eating wholegrain containing foods exist beyond B-vitamin status.

1. Devlin NFC, McNulty BA, Walton *et al.* (2014) *Proc Nutr Soc*. Summer Meeting, Glasgow.
2. IUNA (2011) National Adult Nutrition Survey Summary Report. http://www.iuna.net. March 2015

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