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Association of key sources of riboflavin with EGRac status in a representative sample of Irish adults aged 18-90 years

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Previous analysis has identified that 10-26 % of Irish adults (range across age groups) have low dietary intakes of riboflavin while 61 % have evidence of low/deficient riboflavin biomarker status (erythrocyte glutathione reductase activation coefficient (EGRac) >1.3)[1]. The key dietary sources of riboflavin in the Irish population were identified as milks, 'meat & meat products' and ready-to-eat breakfast cereals (RTEBC)[1]. The objective of this study was to examine the association of consumption of these food groups with EGRac status in Irish adults using data from the National Adult Nutrition Survey (2008-2010) (www.iuna.net). A 4-day semi-weighed food record was used to collect food and beverage intake data from a nationally representative sample of 1500 Irish adults (18-90 years)[1,2]. Blood samples (*n* 1126) were collected by venepuncture by a trained professional and processed and analysed using stardard operating procedures[1,2]. Determination of riboflavin biomarker status was by EGRac, calculated as the ratio of flavin-dependent glutathione reductase activity before and after *in vitro* reactivation with its prosthetic group FAD, with a cut-off value of >1.3 generally used to indicate low/deficient status[3]. For the purposes of this analysis; only those participants with both food intake and biochemical data were included (*n* 1126). Participants were divided into three intake groups (stratified by age-group and gender); non/low, medium or high consumers of milks, 'meat & meat products' and RTEBC, respectively; on the basis of their mean daily intake. The prevalence of EGRac >1.3 was examined across tertiles of intake of each food group and a chi-square test for inependence was used to determine significant associations (p < 0.001).

The prevalence of low/deficient riboflavin status signficiantly decreased (p < 0.001) across tertile of milk intake: 71 % among those with a non/low intake (equivalent to approx. 0.3 servings/day based on a 200ml serving) compared to 51 % among those with a high intake (approx. 2.1 servings/day). No significant association was found between tertile of 'meat & meat products' intake and EGRac status. The prevalence of low/deficient riboflavin status signficiantly decreased (p < 0.001) across tertile of RTEBC intake: 69 % among those with a non/low intake (approx. 0 servings/day based on a 30g serving) compared to 26 % among those with a high intake (approx. 1.9 servings/day). These findings show that the consumption of 'meat & meat products' is not associated with EGRac status in Irish adults. However, the increased consumption of milks and RTEBC are associated with an improved EGRac status. As RTEBCs are commonly consumed with milk, it is likely that the combined food pattern will be important in determining EGRac status and these findings may be useful in the development of dietary guidelines to improve riboflavin status in the Irish population.

Table 1. Mean intake of milks, meat & meat products and RTEBC in non/low, medium and high consumers and the prevalence (%) of EGRAC >1.3

	n	Non/Low	*n*	Medium	*n*	High	p-value
Milks (g/d)	373	51.4	377	177	376	413	
%EGRAC > 1.3	264	70.8	231	61.2	190	50.5	**0.000**
Meat & meat products (g/d)	373	93.2	379	174	374	284	
%EGRAC > 1.3	212	56.8	231	60.9	242	64.7	0.088
RTEBC (g/d)	451	0.1	303	18.7	372	56.7	
%EGRAC > 1.3	310	68.7	179	59.1	196	52.7	**0.000**

1. Kehoe L, Walton J, Hopkins SM *et al.* (2017) *Proc Nutr Soc* **78** (OCE3):E
2. Irish University Nutrition Alliance (2012) The National Adult Nutriton Survey www.iuna.net
3. McAuley E, McNulty H, Hughes C *et al.* (2016) *Proc Nutr Soc* **75** (3): 405–414.