Whole Wheat Intake for Six Weeks Slightly Decreased IL-8 Concentration

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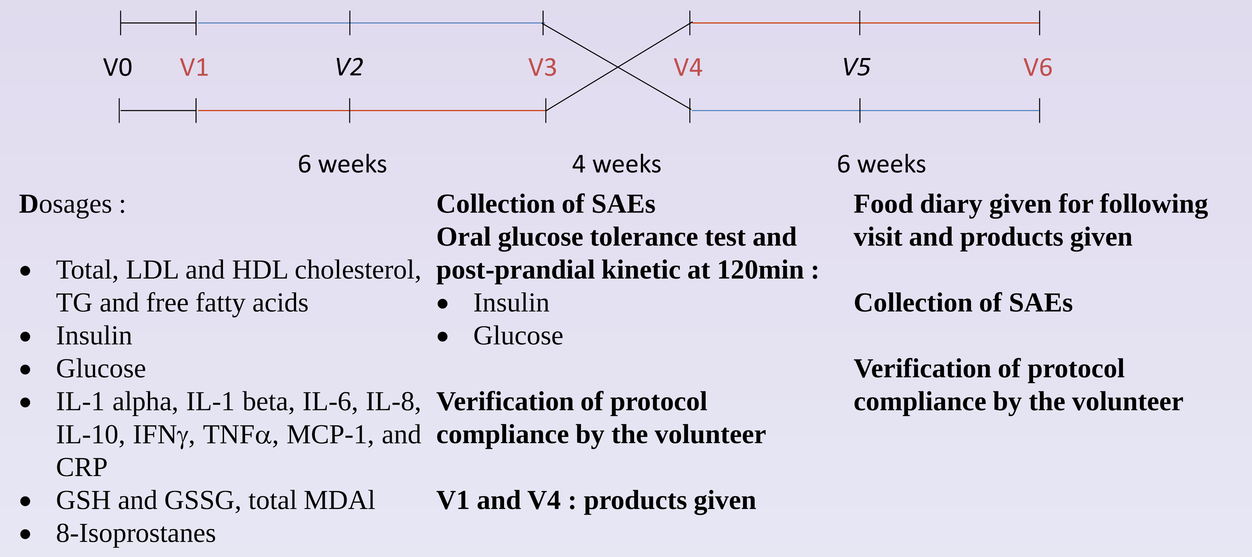
Background and Objectives:

Many epidemiological studies have shown association between the amount of wholegrain consumed and the deceased risk of metabolic diseases (e.g. type 2 diabetes, cardiovascular diseases). When considering intervention studies, results are much less consensual about the benefit of consuming wholegrain (WG). This should be due to the great heterogeneity in the cereals, food forms, doses, study design and populations tested. Wheat is the most common cereal and it is also the most investigated one. The objective of the present study was to investigate the effect of medium term consumption of whole wheat for six weeks on markers of inflammation and metabolism in overweight subjects.

Methods:

A randomized, controlled, open, cross-over study was launched on 30 overweight healthy subjects (Figure 1). They were randomly allocated to whole wheat diet providing daily 88 g of whole wheat ingredient through the consumption of 3 servings of cereal products (biscuits, rusks and crackers) or refined wheat group in which they consumed daily 3 servings of the same cereal products but made with refined wheat flour. Each intervention period lasted 6 weeks and were separated by a 4-weeks wash-out period. During each period, subjects came for 2 visits, one at the beginning and one at the end of the period. Fasting and postprandial samples were analyzed for markers of inflammatory (C-reactive protein (CRP), IL-6, IL-1α, IL-1β, IL-10, IFNγ, TNFα and MCP-1), of oxidative stress (MDA, GSH and GSSG, 8-isoprostanes) and for metabolic markers (glycemia, insulinemia, blood lipids).

Figure 1 : Study plan



Results and Discussion:

- 30 subjects were recruited for the present study. They were **overweight (BMI range is 25 to 30 kg/m²) and aged 49 ± 6 years. Fasting hsCRP at baseline** in this population **was low** with an average value of 3,2 mg/L (1,2 – 7,9 mg/L).
- **No significant** difference was observed between the two groups on **CRP, IL-6, TNFα and MCP-1**
- **Huge variability** was observed on these inflammatory parameters
- **Several markers of inflammation were not detected in the blood of the subjects** (i.e. IL-1α, IL-1β, INFγ and IL-10)
- **Fasting IL-8 was slightly decreased in the whole wheat group** (-8%) whereas it slightly increased in the refined wheat group (+7%) (figure 2).
- No significant effect of the intervention was observed on markers of oxidative stress was observed.
- No significant difference was observed on glucose metabolism and on blood lipids.

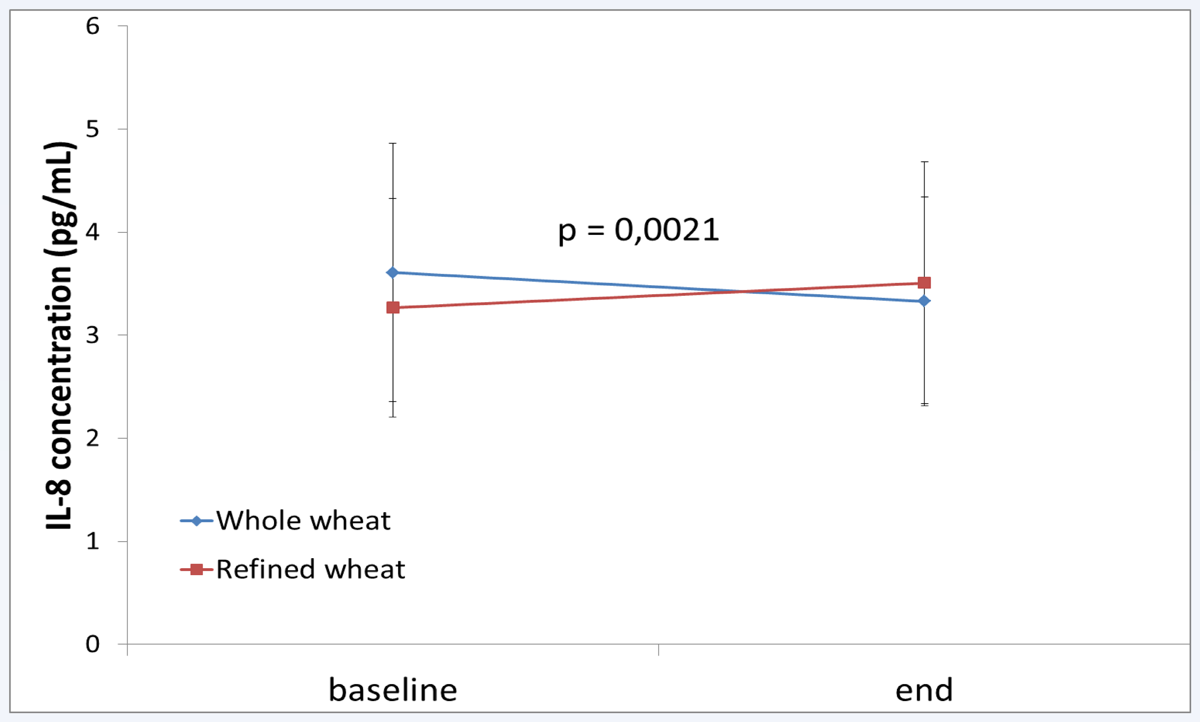
Discussion:

- Healthy overweight population was chosen because some published data suggest that inflammatory status and in particular CRP level are positively correlated with BMI. **In this particular population, blood CRP concentrations were pretty low.**
- Several parameters in the refined wheat group tended to change also, which should have lead to a decrease in the potential difference between the two groups. **Is refined flour a valid control product for investigations on whole grain?**
- The potential difference between the products appears to be quite limited in healthy population when comparing refined versus whole grain product effects**.** Would **challenge tests improve the possibility to differentiate between the groups? Which markers should be sensible enough to detect such a small difference?**
- Several markers of inflammation which are often reported in literature were not detected in this population. Are they adapted to nutrition investigation**? Which markers are valid for nutrition investigation?**

Table 1 : Subject characteristics at baseline

Demography	Statistics	WF/RF (N=15)	RF/WF (N=15)	Overall (N=30)
	N	15	15	30
Age (years)	Mean±SD	50.3±6.5	48.1±4.9	49.2±5.8
	Min/Median/Max	40/50.0/61	41/48.0/56	40/49.0/61
Gender				
Male	N(%)	4(26.7)	3(20.0)	7(23.3)
Female	N(%)	11(73.3)	12(80.0)	23(76.7)
Height (cm)	Mean±SD	167.1±6.6	167.3±10.0	167.2±8.3
	Min/Median/Max	157.0/165.00/184.0	154.0/165.00/189.0	154.0/165.00/189.0
Weight (kg)	Mean±SD	78.99±5.73	79.35±9.73	79.17±7.85
	Min/Median/Max	70.2/79.20/87.8	67.4/75.30/100.3	67.4/78.30/100.3
BMI (kg/m²)	Mean±SD	28.27±1.31	28.27±1.37	28.27±1.32
	Min/Median/Max	25.9/28.50/29.9	25.2/28.60/30.0	25.2/28.55/30.0
Waist circumference (cm)	Mean ± SD	94.6±4.5	91.4±8.8	93.0±7.0
	Min/Median/Max	87/95.0/102	81/91.0/107	81/93.5/107
Ethnic origin				
Caucasian	N(%)	15(100.0)	14(93.3)	29(96.7)
Black	N(%)	0(0.0)	1(6.7)	1(3.3)

Figure 2 : IL-8 blood concentrations at the beginning and at the end of each intervention period



Conclusions:

Whole wheat intervention only induced a slightly lower IL-8 concentration compared to control refined wheat group. Several inflammatory markers were not detected in the study population. Several questions regarding the study design of nutrition interventions need to be answered in order to improve these studies. Identification and validation of relevant markers to investigate the development of metabolic diseases sufficiently sensitive to detect small variation appears as an important topic for future discussions.

Keywords: **wholegrain, wheat, inflammation, healthy subjects, metabolic diseases, markers**

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