NSA Concurrent Oral Session 6: Miscellaneous

Bioavailability of folic acid from fortified rice in humans using stable isotope techniques

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Background – In order to retain water-soluble vitamins on a fortified rice grain, coating of the rice grain with an edible coating has become popular. Preliminary studies by Shrestha[1] show pectin to give reasonably good protection against processing losses in the rice. Pectin, being an indigestible fibre, may have the ability to entrap or bind with the added folate decreasing its absorption efficiency.[2]
Objective - The aim of this study was to measure the relative bioavailability of folic acid from fortified rice *in vivo*; to study the effect of the edible coating material on absorption of folic acid in comparison with a pharmaceutical dose.
Design - Healthy volunteers (n=22 f, n=5 m, aged 18-39 years) received three test meals in three randomized short-term cross-over trials as follows: TRIAL 1: aqueous 400 µg $^{13}C_5$-PteGlu TRIAL 2: 200g cooked white rice + aqueous 400 µg $^{13}C_5$-PteGlu TRIAL 3: 200g fortified white rice with pectin coating containing 400 µg $^{13}C_5$-PteGlu. Blood samples were drawn at 0, 1, 2, 5 and 8 hours postprandial. For 24 hours prior to the baseline level and during the AUC study, the subjects were placed on a low-folate diet (100 µg/day). The relative bioavailability of the folic acid following meal 3 was measured by taking the area under the curve relative to meals 1 and 2. The levels of metabolized $^{13}C_5$-5methyl-THF appearing in plasma were quantified using HPLC-MS/MS.
Results - Preliminary analysis of the results (n=10) show the relative bioavailabilities of trial 2 and trial 3 to be 85.3 ± 36.5 % and 77.0 ± 29.0 % respectively.
Conclusions – Based on the preliminary observations, it appears that the pectin coat reduces folic acid bioavailability in pectin coated rice.

1. Shrestha, AK, Arcot, J and Paterson J. Edible coating materials-their properties and use in the fortification of rice with folic acid. Food Research International 2003; 36: 921-928
2. Castenmiller, JJM, Van de Poll CJ, West CE, Brouwer IA, Thomas CMG, van Dusseldorp M. Bioavailability of folate from processed spinach in humans. Ann Nutr Metabolism 2000; 44:163-169.

Omega-3 polyunsaturated fatty acid content in different edible portions of Sydney rock oyster

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Background - Previous studies showed that n-3 polyunsaturated acid (PUFA) content might vary between different edible portions of seafood. However, there are no data available on the variation of fatty acid content between different edible portions of Sydney rock oyster, *Saccostrea commercialis*.
Objective - To compare the fatty acid contents of muscle, gonads and gills of Australian commercial oyster species, *Saccostrea commercialis.*
Design - Eight samples of oysters were analysed. The total lipid was extracted with chloroform-methanol (2:1, v/v) containing butylated hydroxytoluene. The fatty acid methyl esters were prepared by saponification using KOH followed by transesterification in BF_3 in methanol. The fatty acid methyl esters were separated by gas liquid chromatography**.**
Outcomes - Gonads contained significantly higher levels of total n-3 PUFA, 20:5n-3 and 22:6n-3 than muscle and gills ($P<0.01$). Higher levels of total n-6 PUFA, saturated fatty acids (SFA) and monounsaturated fatty acids (MUFA) were also recorded in gonads than in muscle and gills ($P<0.05$) while total lipid content did not vary significantly between the three edible portions.

	Muscle	Gonads	Gills
20:5n-3(mg/100g)	47.1 ± 14.8	349.9 ± 23.3	123.8 ± 21.7**
22:6n-3 (mg/100g)	96.4 ± 25.1	507.9 ± 35.9	217.2 ± 46.1**
Total n-3 PUFA (mg/100g)	190.5 ± 47.9	1101.2 ± 186.6	442.4 ± 80.3**
Total n-6 PUFA (mg/100g)	64.2 ± 21.2	155.5 ± 32.2	62.2 ± 13.5*
Total SFA (mg/100g)	157.8 ± 49.0	516.2 ± 48.4	310.3 ± 44.3**
Total MUFA (mg/100g)	63.7 ± 18.8	340.1 ± 96.6	114.5 ± 39.5**

Values are mean ± SD. *P< 0.05, **P<0.01.

Conclusion - Gonads of commercial oysters are a better source of long chain n-3 PUFA than muscle and gills. Consumption of oysters with well-developed gonads will provide a good source of long chain n-3 PUFA and will have beneficial effects on health.