Fish consumption and major depression

Sir—WHO estimates that major depression is the greatest single cause of disability worldwide.¹ The annual prevalence of major depression shows nearly a 60-fold variation across countries,² in a pattern similar to crossnational differences in mortality from coronary artery disease, which suggest that similar dietary risk factors could be important.

Among healthy volunteers, low plasma concentrations of an essential fatty acid found in fish. docosahexaenoic acid, predict low concentrations of a marker of brain serotonin turnover, cerebrospinal fluid 5-hydroxyindolacetic acid (CSF 5-HIAA).³ The finding that low concentrations of CSF 5-HIAA are strongly associated with depression suicide have been widely and replicated. Since docosahexaenoic acid is selectively concentrated in neural tissues and important for nervoussystem function, we tested the hypothesis that a high consumption of fish could be correlated with a lower annual prevalence of major depression (figure).

The cross-national comparisons of the prevalence of major depression reported by Weissman and colleagues² are among the most reliable crossnational data available. The rigorous methodologies used in these studies large sample size (35 000), random prospective design, repeat sampling

techniques, multiple community sampling, and use of a structured clinical interview with uniform internationally accepted diagnostic criteria-create confidence in the validity and comparability of these data. The structured interviews were independently verified as culturally appropriate for each community. The core biological symptoms that define major depression were the main factors used to determine the differences in prevalence of major depression across countries, rather than mood ratings which are prone to cultural bias. The economic data on apparent fish consumption was calculated by fish catch plus imports minus exports and are not as reliable as data from direct dietary surveys or tissue analyses, but do provide a comparable estimate across countries. The data on the annual prevalence of major depression reported by the Ministry of Welfare in Japan included 130 000 individuals, but did not use structured instruments diagnosis randomised for or population-sampling methods. However, exclusion of these Japanese data did not significantly affect the correlation analysis (r=0.77, p<0.03).

The direction and power of the correlation between apparent fish consumption and major depression accords with recent clinical reports of individuals that higher concentrations of docosahexaenoic acid in red-blood-cell membranes (r=-0.80, p<0.01),⁴ as well as higher ratios of eicosapentaenoic acid to arachidonic



Fish consumption and prevalence of major depression

Simple correlational model with Pearson product moment analysis indicates a potentially substantial interaction between the nearly 60-fold range in annual prevalence rates of major depression and the over 100-fold range of apparent fish consumption, in a multinational comparison. 1 lb=0-4536 kg.

acid in plasma (r=-0.73, p<0.01),⁵ predict less severe symptoms of depression.

This correlation between apparent fish consumption and lower annual prevalence of major depression does not show that fish consumption can cause differences in the prevalence of major depression or that eating fish or fish oils are useful in treatment. Various cultural, economic, social, and other factors can confound this simple correlational relation.

Joseph R Hibbeln

Outpatient Clinic, National Institute on Alcohol Abuse and Alcoholism, Rockville, MD 20852, USA

- Murray CJL, Lopez AD, eds. Global burden of disease: a comprehensive assessment of mortality and disability from diseases, injuries and risk factors in 1990 and projected to 2020. Boston MA: Harvard University Press, 1996.
- 2 Weissman MM, Bland RC, Canino GJ, et al. Cross-natonal epidemiology of major depression and bipolar disorder. *JAMA* 1996; 276: 293–99.
- 3 Hibbeln JR, Umhau JC, George DT, Salem N Jr. Do plasma polyunsaturates predict hostility and violence? World Rev Nutr Diet 1996; 82: 175–86.
- 4 Edwards R, Peet M, Shay J, Horrobin D. Omega-3 polyunsaturated fattyacid levels in the diet and in red blood cell membranes of depressed patients. *J Affect Dis* (in press).
- 5 Adams PB, Lawson S, Sanigorski A, Sinclair AJ. Arachidonic to eicosapentaenoic acid ratio in blood correlates positively with clinical symptoms of depression. *Lipids* 1996; 31: S-167–76.

Food rations for refugees

Sir—Barbara Reed and Jean-Pierre Habicht (Jan 10, p 129)¹ highlight the gap between policy and practice in the distribution of food aid. Refugees generally receive a cereal, an erratic supply of pulses or beans, vegetable oil, and sometimes salt. Most rations are deficient in overall calorie content and inadequate in micronutrient content.

In September, 1990, in the forest region of Guinea, a beriberi epidemic occurred in the Thuo refugee camp among Liberian adults who claimed to have consumed exclusively white rice and vegetable oil, the only rations received for months. Similarly, in 1989 and 1990, pellagra epidemics occurred among Mozambican refugees in Malawi. The attack rate was 0.5% among self-settled refugees and 13.2% in Nyamithutu camp. A case-control study showed that refugees dependent on relief rations were most at risk of the disease.²

In November, 1997, the caloric content of refugee rations was increased by the World Food