IMMUNOLOGICAL COMPETENCE AND LIVER FUNCTION IN SUBJECTS CONSUMING FISH WITH ORGANOCHLORINE CONTAMINANTS.

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We have previously found that consumption of fish from the Baltic Sea plays a major role in non-occupational human exposure to PCDD/Fs in Sweden[1]. Exposure to dioxin (2,3,7,8-TCDD) induces several immunological abnormalities in animals. Adverse effects on human immune function have been reported in some epidemiological studies after accidental exposure to TCDD. Consumption of fish from the Baltic Sea also causes exposure to PCBs [2]. Different kinds of PCB-induced immunotoxic effects have been reported from animal studies [3].

Organochlorine compounds like PCDD/Fs and PCBs also have hepatotoxic effects. Hepatic enzyme induction and liver pathology have been reported from studies in several animal species [3].

The aim of the present study was to see wether subjects with a high consumption of fish from the Baltic Sea differed, with regard to parameters of immunological competence and liver function, from non-consumers of fish.

MATERIAL AND METHODS

Two groups with a total of 43 men from south-east Sweden were examined. One group, "non consumers" of fish, consisted of 20 subjects who had a very low fish consumption. Most of them did not eat fish at all. The other group, high consumers of fish, comprised 23 subjects who ate fish several times a week (fatty fish 2.6 meals/week, range 1 - 5). All subjects were working full time.

From each subject 70 ml blood was drawn and analysed for different blood cells, subsets of lymphocytes, immunoglobulins, and some routine clinical tests of liver function.

None of the subjects had symptoms of infectious disease at the time of the blood sampling. Each subject was asked about his usual consumption of different species of fish through a self-administered questionnaire.

Some of the subjects had, three years before the present study, participated in studies of blood levels of different polychlorinated organic substances. Four subjects in the non consumers group and seven subjects in the high consumers group had then been examined for blood levels of PCDD/Fs [1]. In the same subjects, and in two additional high consumers, blood levels of different PCB congeners had also been analysed [2].

RESULTS

The non consumers had higher proportion and number of natural killer (NK) cells (CD 56+), than the high consumers. There was a negative correlation between proportions and numbers of NK cells (CD56+), respectively, and blood levels of PCDD/Fs, expressed as Nordic TCDD equivalents, in eleven subjects. These correlations were, however, not statistically significant (r_S= -0.57 and -0.51; p=0.07 and 0.11, respectively). A similar negative correlation between the total blood levels of PCBs, expressed as Nordic TEQs, and the proportions of NK cells (r_S=-0.63; p=0.07) was found in nine subjects (eight of them high consumers). More specificly, the same negative correlations were found between plasma levels (mass basis) of the most toxic co-planar PCB congener (IUPAC 126) and NK cells (proportions and numbers; r_S=-0.58 and -0.68; p=0.04 and 0.02, respectively) in 13 subjects (Figure 3). The same correlations were found for CD56+ lymphocytes that also were CD3- (r_S=-0.62, p=0.05 and r_S -0.83, p=0.009, respectively).

There were no significant differences in plasma immunoglobulins between the groups. Moreover, there were no significant correlations between intake of fish, or blood levels of persistent organochlorine compounds, and plasma levels of immunoglobulins. Three subjects had antinuclear antibodies and in one subject C1qBA immune complex was detected. All were, however, non-consumers.

There were no differences in serum bilirubin (S-Bil) levels or liver enzyme activities (S-ALP, S-GT, S-ASAT, S-ALAT) between the groups. Both groups had similar alcohol consumption habits.There were significant correlations between intake of alcohol on the one hand, and activities of S-GT and S-ALAT respectively, on the other. No correlations were however found between levels of PCDD/Fs or PCBs and liver enzyme activities.

DISCUSSION

Our study indicates that consumption of fish, contaminated with persistent organochlorine compounds, might have an adverse effect on a subset of lymphocytes: the natural killer cells. This is in accordance with findings in some animal studies. So far, results from studies in humans are limited and inconclusive.

The possible implications on health from decreased numbers of NK cells are hard to evaluate. NK cells are believed to have a part in defence against viruses and tumours. It is not certain, however, that the number of NK cells, determined by monoclonal antibodies, reflect NK function. None of the subjects studied displayed any signs of health impairment, which could be attributed to the findings of a lowered number of NK cells.

There was no impact on studied parameters of liver function from consumption of fish from the Baltic Sea.

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