Polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs) and polychlorinated biphenyls (PCBs) - can the combined toxicity be assessed?

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PCDDs and PCDFs are two series of almost planar molecules, in all there are 210 congeners in the two series. However, due to degradation in the environment, usually only 17 congeners are found in environmental biological samples, all of these represent 2,3,7,8-substituted congeners. There are in all 209 PCBs, of these, more than a hundred have been detected in biological samples. The PCDDs and PCDFs probably all act through common mechanisms and most of the toxic responses are probably elicited through interaction with the Ah receptor. A limited number of PCBs (primarily non-ortho- and mono-ortho-substituted) can assume a coplanar shape and by binding to the Ah receptor also act like the PCDDs and PCDFs. Most of the PCB congeners (and those with the highest concentrations) however, are not dioxinlike and presumably act through different mechanisms.

Many national and international risk assessments have been performed on PCDDs, PCDFs and PCBs[1,2,3,4] and several are in still in progress[5,6]. All of these assessments address the risk caused by exposure to the defined group of chemicals, i.e. PCDDs and PCDFs or PCBs. Sometimes the combined risk of PCDDs and PCDFs together with the coplanar dioxinlike PCBs are analyzed[6]. Such an analysis clearly demonstrates that the contribution from PCBs to dioxinlike activity in many biological samples is more important than the contribution from PCDDs and PCDFs.

Furthermore, PCDDs, PCDFs and PCB congeners, both of the dioxinlike type and non-dioxinlike, act as tumour promoters in rodent liver[6,7]. The mechanisms and the possibilities of interactions still remains to be elucidated.

Another complication is caused by the fact that experimental evidence indicate that PCB mixtures or non-dioxinlike PCB congeners might antagonize some of the effects caused by PCDDs and PCDFs[8,9,10].

Finally, the indicated connection between pre- and postnatal human exposure to PCB and disturbances in mental development[11] points to hitherto unknown toxic responses that makes the risk assessment still more complicated.

As the main exposure to PCDDs, PCDFs and PCBs occurs through food such as fish and diary products (at least in the Nordic countries), there is a need to assess the risk of this combined exposure. At present, the data base does not allow for this assessment to be performed in an adequate way.

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