Letter to the Editor regarding: de Ree H, et al. ‘‘Health risk assessment of exposure to tricresyl phosphates (TCPs) in aircraft: A commentary’’ [Neurotoxicology (2014), http://dx.doi.org/10.1016/j.neuro.2014.08.011]

2nd of January 2015

Sir, having read the Commentary by de Ree et al on aircraft cabin air quality, the risk assessment, in my opinion, has multiple errors and does little to address current concerns. I am a medically qualified toxico-pathologist with experience in regulatory risk assessment.

The first problem is that only the ortho- isomer of tricresylphosphate (TOCP) is addressed. However anti-wear additives in jet engine lubrication oil form a complex racemic mixture. For example the di- and mono-orthocresyl phosphates are present at much higher concentrations [1,2] and are more neurotoxic [3,4]. Then there are the para- and meta-isomers, and a number of other problematic chemicals in addition. The commercial formulation of TCP, DURAD 125 and the para isomers recently are reported as inhibiting enzymes, including those linked to cognition. [5]

The second problem is that the toxicological endpoint, OPIDN, requires a high level of exposure. In regulatory toxicology it is normal to adopt the most sensitive toxicological endpoint for setting standards. Low dose functional neuro-behavioural deficits (rather critical when flying an aeroplane) are much more relevant than exposures leading to gross pathology. A recent paper [6] has demonstrated in vitro that the dose of TOCP required to induce neurophysiological compromise is 900 times lower than that which will cause cell death.

The third problem is that the authors adopt an industrial standard based on a NOAEL and then apply it to an aeroplane cabin setting where the general public, which includes many vulnerable sub-groups e.g at the extrema of life, will be exposed. It is more usual to adopt regulatory limits for the general public that are lower and based on NOELs.

The authors question the existence of aerotoxic syndrome by stating that the presenting symptomatology is too varied to constitute a syndrome. TOCP is known to cause primary axonal and secondary myelin degeneration. [7] It is well recognised that multiple sclerosis (MS), which is a demyelinating disease, can mimic almost any neurological condition when presenting clinically. This is why MS is often regarded as a diagnosis of exclusion. Therefore I would expect aerotoxic syndrome *a priori* to have a highly variable presenting symptomatology. It is certainly not a reason to try to dismiss it. That said, there is a consistency across the plethora of symptoms of aircrew complaining of aerotoxic syndrome.

We should learn from the current debate about bees and neonictinide pesticides. It wasn’t acute toxicity that was the main problem but very low dose exposure leading to subtle neuro-behavioural abnormalities that impaired the bee’s ability to navigate. The airline

industry need to address this matter urgently and with relevant risk assessment methods. In my opinion the Commentary by de Ree et al is misleading and should be retracted.

References

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