

Professor Dr. Joan Marie Cranmer  
Editor in Chief NEUROTOXICOLOGY  
Department of Pediatrics and Toxicology  
University of Arkansas for Medical Science  
Mail # 512 – 19C / 1 Children's Way  
Little Rock, AR 72202  
United States of America

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**Re: Article by de Ree H, et al. Health risk assessment of exposure to TriCresyl Phosphates (TCP's) in aircraft: A commentary, published in NeuroToxicology (2014)**

Dear Professor Cranmer.

I am writing to you in your capacity as Editor of the Journal of Neurotoxicology in general and the above referenced published paper in particular.

As a journalist I have been working extensively on the issue of contaminated aircraft cabin air over the last 7 years. I also authored numerous articles in the highly-regarded media Title "DIE WELT".

I was also one of the experts questioned by the elected members of the DEUTSCHE BUNDESTAG; and I gave testimony in a non-public hearing on the issue of "contaminated cabin air" in the German parliament in the fall of 2011. I also edited numerous magazine and documentary feature pieces for German public-owned broadcasters over that period of time.

In the process of producing a documentary on this issue for the German public broadcaster ARD Network, we also conducted our own experiments; we sampled the air aboard several long- and medium-range flights on different aircraft types. We also drew blood samples from a passenger on each corresponding flight. I would like to emphasise that we were using the very same SKC samplers that were used in the KLM Boeing 737 sampling study. The samples were then analysed at the University of British Columbia under the supervision of Professor Christiaan van Netten (retd) who had conducted many similar test samples; he has also conducted sample testing on behalf of the US Federal Aviation Administration (FAA).

For those reasons I am fully conversant with the ongoing discussion about the subject, all the scientific research conducted in this area and the resultant findings. I have also conducted many personal face-to-face in-depth interviews with all key scientists in this field such as the late Professor Chris Winder, the late Professor Dietrich Henschler, as well as Professor Mo-

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hamed B. Abou-Donia of Duke University, NC, Professor Clem Furlong of Washington State University, WA, Professor Oksana Lockridge of the University of Nebraska and others. I also interviewed, on camera and face-to-face one of the co-authors of the referenced article – Professor Martin van den Berg, of the University of Utrecht, in the Netherlands.

I am also familiar with details of the ongoing litigation by crewmembers of KLM (Royal Dutch Airlines), the testing conducted and the statements about the findings published by the airline.

As a result of all my specialist knowledge, I regard the referenced article as an industry-biased publication where the findings are presented as “independent scientific research results” when that is not true.

My constructive critique starts with some of the authors, especially:

- **Mr Hans de Ree.** He is a staff employee of KLM, and works in its health department. Although his obvious conflict of interest is self evident, he has not made a specific conflict declaration and his “independence” is thoroughly compromised.
- **Prof. Gerard Mulder (retd).** All I have criticised about Hans de Re applies also to the retired professor. He is a salaried or contracted advisor to KLM.
- **Brinio Veldhuisen van Zanten** is the director of KLM Health Service and his authorship-standing is similarly and hugely compromised. How can he, in a published article, do other than put the most favourable gloss on the problem?
- **Professor Martin van der Berg** recently became a part-time advisor to KLM. Again he is in a similar position to the others desiderated above.

I am very surprised that this most obvious conflict of interest and the perceived threat to the scientific independence of the paper, failed to alert the Elseviers editorial board, and apparently the peer-reviewers, to the need for extreme scientific and editorial caution.

## II.

What is very conspicuous is that the article makes a direct link to the server network of Cranfield University in the UK, an institution that is substantially supported and financed by entities such as the airplane manufacturers **Boeing** and **Airbus**, **British Aerospace** and major airlines such as **British Airways** (see remark at bottom of the article: Please cite this article in press as: 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>).

It should be noted that there has been substantial critique expressed by renowned scientists and even the peer-reviewers of the Cranfield Institute of Environment and Health “Aircraft cabin air sampling study” published in 2011.

I have personally interviewed several sources who were present during some of the samplings conducted in the process of this study and who clearly stated that the sampling was flawed and that some of the aircraft that have been sampled came fresh out of the maintenance department and were not randomly selected.

### III.

I deliberately do not go into the details of the research findings of the paper; I will leave that to professional scientists, but I will comment on major flaws of this paper and their “history”.

Since the beginning of my own extensive research and reporting on the subject matter it has been an industry strategy to only focus on the measurable TCP content in the cabin air and the TOCP isomers in special;. Although it is well known that the Meta and Para isomers are also toxic, these were never sampled and analyzed. The problem here is that there is no commercially available standard for the meta- and the para- isomers in order to trace these compounds in GC analysis.

It is well known among scientists researching in this field that it is not sufficient to just focus on the TCP or TOCP but you have to look at the **synergetic mixture** of these and the other compounds that become released into the aircraft cabin air-conditioning system once they get pyrolyzed in one or all of the engines. Professor Dr. Dietrich Henschler has confirmed this to us in an interview on camera that we conducted in 2009 and again in a telephone conversation during a crosscheck of the so-called “Cranfield Study” in 2011.

The focus on TCP and TOCP really only serves the discussion in the public and the media as the matter is far too complex to be properly presented with all its facets to a common audience with no chemical, biological and medical background at all. This also applies to the internal communication of airlines towards their employees since the discussion about the subject started in 2008 in Europe and in other countries. Although there have been solid, peer-reviewed and published scientific findings already back in the late 1990ies in Australia and the USA, the issue has been considerably under-played by the aircraft and engine manufacturers and the airlines - at least in public. Internal documents received from sources and recently published by the media strongly indicate a much more severe problem.

As mentioned before we used the same sampling method (SKC106 tubes) during the six-month duration of our production for a TV documentary. We learned that the sampler is quite limited, which also applies to the reported findings. It only has a very low sampling flow and bears a high potential for mishandling, leading to false test results. For example: we used the *SKC* and the so-called *van Netten sampler* (the latter is officially approved for use on aircraft by the FAA, the others are not) in tandem during the same flight. While the *SKC* sampler showed “nothing” up to the detection limit of 0.9 ng the *van Netten sampler* showed a positive result slightly above the detection limit during a measurement taken aboard an Airbus A320 of UNITED airlines.

As mentioned before we also conducted blood sampling of a passenger present on most of all these flights and these samples were tested for an increase in auto-antibodies. It was interesting to notice that although there was no measurable TCP during most of these flights, the passenger’s auto-antibodies were raised quite remarkably after these flights. In the process of the experiment and filming we flew from Germany, via Australia, to the USA, Canada and back to Germany. Professor Dr. Mohamed B. Abou-Donia of the Duke University, NC analyzed these blood samples. The air samples were analyzed – as mentioned – by UBC.

We also conducted wipe samples during each of these flights and **all of them**, except two flights conducted on a Boeing 787 Dreamliner aircraft (which does not operate with bleed-air, thereby no contaminants can enter the aircraft cabin from the engines) tested positive for TCP.

#### IV.

On October 21<sup>st</sup>, 2013 I personally conducted an interview with **Professor Dr. Martin van den Berg**, lasting about 20 minutes, at his offices at the University of Utrecht in the Netherlands. For your information I may forward upon request the full transcript of this interview. In the following I have highlighted the respective paragraphs that – according to my opinion – are in direct contradiction to the presentation of facts and opinions in the article referenced above.

I would like to focus your attention on the following statements Professor van den Berg made in this interview, which were recorded **on camera** (emphasis added by the author), and a video-copy can be provided upon request:

1.TC 00:38:

MvdB: *"I think actually that **in general people including cockpit crews and cabin crews and passengers on airlines shouldn't be exposed to these highly toxic compounds which have similar...**"*

2.. TC 01:36:

MvdB: *"Because I think that actually the cabin and cockpit crew in the first place should not be exposed to these highly toxic compounds. These are compounds which are, have similarities to the toxicity, like nerve gases or certain pesticides and I think that you should be extremely careful in exposing people to these compounds because I believe that the underlying scientific experiments, which determine the safety thresholds are not according to person standards sufficient anymore."*

3. TC 03:20:

MvdB: *"No I don't think so, because actually we're basing ourselves on studies with only one compound and we have to realize that this is a group of compounds which can be found multiple of these compounds present in the cabin air, cockpit air and if you actually look at one compound it's like looking on the top of the iceberg. And scientific studies to determine the safety level have only been done with one compound. Well you have more compounds which we should be concerned about and at least you would expect these compounds based on how they work in the body to be additive. In other words you have to take the whole mixture into account."*

4. TC 04:58

TvB: *"**„Would you voluntarily inhale heated engine oil?"**"*

MvdB: *"**Of course not. Even not as a toxicologist** who is trying to do an experiment on myself. I would stay away from heated oil with these hydraulic fluids, because **these are neurotoxic compounds from which I have no clue what it will mean for the future for me if I inhale them,** if I'm not having any acute symptoms. So I would be very careful in having for example chronic exposure to these compounds because basically we don't know. We don't have any good experiments done according to the present safety standards which are acceptable to determine a safety level."*

5. TC 10:11

TvB: *"Now there's one thing that the industry always comes up with "Well, it's all the ortho-isomers that are toxic here in the TCP's, so we measured it and it's low and it's low in quantity already in the oil, so there is no problem." Is that a legitimate conclusion?"*

MvdB: *"I don't think that at this stage they can say that. I think they need more information especially about the more complicated mixtures which are acting in a similar way, so I won't say anything like that as a scientist until they give me the proof that the levels which are actually in the cockpit of the whole mixture which have similar mechanisms of toxicity are actually there and they are below the modern standard levels which we consider safe."*

6. TC 12:24 MvdB: *"What you're indicating now, is saying, ok look i have cautions at the compounds there and you should reduce it as much as possible, because you do not want occupation, exposure, ????. These are, we're talking about TOCP's, are not harmless compounds but neurotoxins and it's a different mechanism. **So in this case a threshold could be acceptable, if we would know, what a proper threshold is. But at present, we don't know that yet, because the experiments which we been using to arrive these thresholds are way too old.**"*

7. TC 12:59

TvB: *"We learned that one of these threshold limit values was derived from an accident and measurements taking after an accident in a British torpedo factory back in 1939. This were actually two measurements and this is the standard which is used by the British and the United States to establish this limit value for work space exposure of TCP's. Do you think this is still appropriate?"*

MvdB: *"I don't think such an accident in which you have a relatively acute exposure in a short term period is a relevant safety level standard compared with aircrews which are chronically exposed to low dose levels. From what we know of these compounds, at low level chronic exposure, they can have completely different effects and they can build up the effects, so becomes worse and progressive over time."*

TvB: *"What is your recommendation to the industry and what is your recommendation to politicians?"*

MvdB: *"Try to get the bleed air out of the cabin and the cockpit, because reduction of exposure as much as possible is always the best situation."*

8. TC 15:44

TvB: *"Anything you would like to contribute from your point?"*

MvdB: *"Determine better safety levels for these compounds because we're working with out of date experiments, which have been based on toxicological effects in animals, which are as we now know way beyond the levels in which we already see behavioral disturbances. **We're looking at pathological effects and we know nowadays with our present knowledge in toxicology that you will see neurobehavioral disturbances, cognitive changes already maybe effect of ten lower then when you see the pathological changes.**"*

(...)

MvB: *"That's because these are neurotoxic compounds with especially with chronic exposure are a risk for all kinds of neuro-toxicological effects and neuro-degenerative effects and you should stay out of these compounds as much as possible."*

TvB: *"So, what did you say in the Dutch parliament?"*

MvdB: *"I said there that I feel that humans should not be exposed to these type of compounds"*

*because the mechanism affection is a serious neuro-toxicological problem. If the levels are high enough, **we don't know enough of it we should have a precautional principal here until we know more about the safety levels.***"

TvB: "And what can you do to help here?"

MvdB: "Criticize the present uncertainties in the exposure situations and the fact that **we do not have adequate and modern toxicological tests to work on to determine a safety level.**"

Looking now at this interview, Professor Cranmer, and reading the published paper where this very same person is one of the authors, you may understand why I became significantly irritated and concerned about this change of "opinion" and "perspective", especially in the absence of any of the modern toxicological tests or the scientifically based establishing of the aforementioned "safe exposure limits" that Professor van den Berg emphasized, more than once, during this interview.

In addition especially his statements under # 5, 6 and 8 **are completely contrary** to the conclusions of the article.

In my opinion your publication has been "high-jacked" by an industry initiated, funded and a presentation in their best interest and with a predetermined outcome; it has all the hallmarks of a biased whitewash-paper that lacks a solid scientific approach and is not backed up by evidence outside the industry approach and single-sided presentation of facts.

I can only strongly recommend that you review this article, its authors and their intentions again and – if you decide to maintain it published as it is - to not deceive your readers, the scientific community and the public about the obvious conflict of interest that lies at the heart of the group of authors, their affiliation to the airline KLM and the aviation industry.

If you have any questions, please feel free to contact me any time.

Kind regards



Tim van Beveren  
- journalist -