

Researcher Dr. David Megson on Aerotoxic Syndrome:

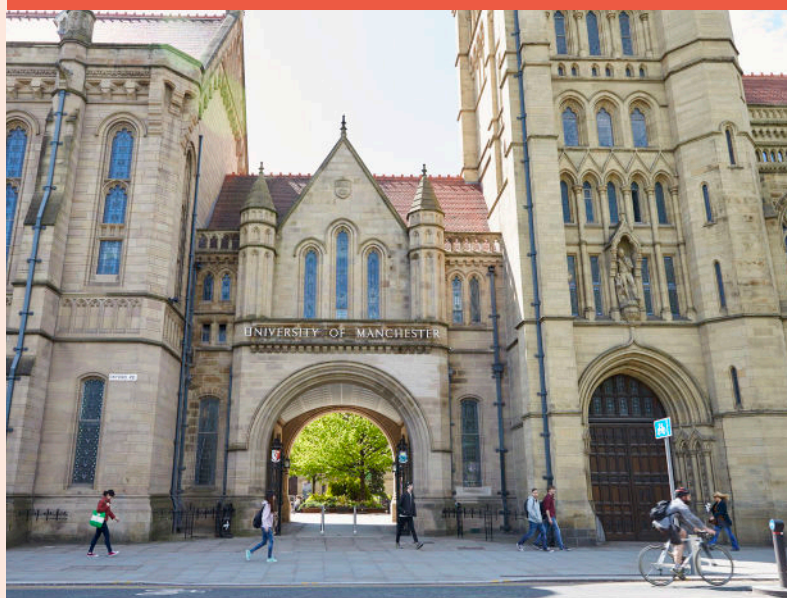
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## “Aircraft personnel are at increased risk of neurological damage”

*Dr. David Megson, Senior Lecturer in Chemistry and Environmental Forensic Research at Manchester Metropolitan University, has been studying the potential health risks of contaminants in aircraft cabins for years. He collaborates with Ronald van der Kuil on research into Aerotoxic Syndrome.*

### What research are you conducting on Aerotoxic Syndrome?

“My research focuses on identifying contaminants in the aircraft cabin to determine whether they pose a significant risk to human health. We also conduct environmental forensic work aimed at identifying the sources of pollution and have carried out multiple studies to characterize aircraft oil.”



### When did you first come into contact with Aerotoxic Syndrome?

“At one of our international network conferences on environmental forensic research. I am now the chair of this interest group within the Royal Society of Chemistry, but more than 10 years ago, I attended the meeting as a PhD student and got into a conversation with Dr. Jean-Christophe Balouet. We discussed his early work investigating Aerotoxic Syndrome. This quickly led to research collaborations where we used the advanced analytical techniques of my laboratory to provide him with a better understanding of the contaminants that might be causing the issues he observed in pilots and cabin crew.”

### What was your first reaction when you heard about this?

“I found it incredible that I had never heard of this issue before. I thought that something like this would surely be common public knowledge, but that was not the case.”

### What are you currently researching?

“There are several ongoing projects related to Aerotoxic Syndrome. In collaboration with Mount Royal University (Canada), we are conducting research to characterize contaminants in the aircraft cabin, and with Ronald van der Kuil, I am working on a PhD project to determine whether there is a link between exposure to organophosphates and the health of pilots and cabin crew.”

*Read more on the back*

## *Aerotoxic Syndrome:*

# An underrated danger in aviation

## What is Aerotoxic Syndrome?

"Aerotoxic Syndrome" describes health issues that arise when airline crew members and passengers are exposed to toxic substances in cabin air. "The breathing air in an aircraft is drawn in through the engines. These engines contain oil fumes and hydraulic vapors that, in the event of an incident, can mix with the air in the ventilation system," explains Van der Kuil.

## The problem

The problem primarily arises during "fume events," where visible smoke or fumes enter the cabin. However, even without visible incidents, toxic substances can be present — for example, from cleaning agents used to clean aircraft or de-icing fluids in winter.

According to Van der Kuil, some people are genetically more sensitive to these toxins. "If you lack certain enzymes in your liver, it becomes difficult to neutralize toxic substances before they are excreted. Everyone is susceptible to toxins to some degree, but for some people, the effects appear more quickly and severely than for others."

## Severe health effects

The health effects can be significant. "These toxic substances have a strong affinity for the nervous system, especially the prefrontal cortex, where cognitive functions such as attention and alertness are located," Van der Kuil explains. "Symptoms often begin with chronic fatigue and cognitive problems, but can extend to motor issues, headaches, weakened immunity, and heart rhythm disturbances."

"The difficult part is that many of these symptoms are non-specific," says Van der Kuil. The long-term consequences can be even more severe: early-onset dementia, Alzheimer's, Parkinson's, and ALS — all conditions that could potentially be directly linked to toxic exposure. "The symptoms are often misdiagnosed as 'burnout,' which is medically and ethically highly inappropriate."

*For decades, the aviation industry has faced a problem that, according to critics, has not received the recognition it deserves: Aerotoxic Syndrome (ATS). Ronald van der Kuil, a specialist in functional neurology, has extensively studied this issue and is currently working on a large-scale scientific study. "It's frustrating that, despite numerous scientific studies since 1951, there are still no concrete solutions," says Van der Kuil.*



## A life in ruins

The story of Thorsten Bush (see also NeuroToxic News 2) illustrates the severity of the problem. As a pilot, he had to give up his career after just two fume events. "It affected me," says Van der Kuil. "Someone who had a deep love for his profession, who had always dreamed of being a pilot, lost his entire professional career after just a couple of fume events."

For many victims, the consequences extend beyond their professional lives. "It immediately impacts the family. People lose income but still have mortgage obligations. I treated five female patients from Iceland — all five ended up divorcing because their partners said, 'I no longer have a healthy wife.'"

## The social and economic impact

The costs of ignoring Aerotoxic Syndrome are enormous. In the Netherlands alone, an estimated 19% of KLM staff are on sick leave with a 'burnout' diagnosis — a misdiagnosis, according to Van der Kuil, which often masks Aerotoxic Syndrome. "It's not just about individual health; it's about the costs for employers, insurers, and society. Sick employees must be paid, and medical treatments cost money. Prevention is ultimately much cheaper than curing."

## Scientific research

To better understand Aerotoxic Syndrome, Van der Kuil is working on an international study in collaboration with Manchester Metropolitan University, Amsterdam UMC, and Radboud UMC. "We want to go deep because previous studies have not produced new insights that would allow us to prevent or treat patients effectively."

The research focuses on specific biomarkers and inflammatory responses in the body. "When toxic substances enter the body, they trigger inflammatory responses, forcing the immune system to work hard. With repeated exposure, the system becomes overloaded, causing toxins to accumulate in the body."

The findings could have broader implications beyond the aviation industry. "The research could also provide valuable insights into the effects of exposure to other toxic substances, such as pesticides, herbicides, insecticides, and heavy metals."

## Denial in the industry

Despite growing evidence, the aviation industry remains reluctant to act. "They are afraid of legal consequences and lawsuits from sick employees," says Van der Kuil. "But that's not our goal. We want to collaborate with the industry to develop preventive measures and better protect staff. If they keep refusing, more employees will take legal action. Airlines are already losing lawsuits — and this is just the beginning."

## Financial challenges

The biggest obstacle for the research is funding. "This research requires a lot of money. We need at least €1.8 million," says Van der Kuil. Costs have risen recently because specific blood markers and tests have become more expensive. Attempts to secure funding from airlines or the government have so far failed. "We get no response at all," says Van der Kuil. "It seems like no one wants to touch this issue — probably out of fear of legal consequences."

To raise funds, Van der Kuil is planning a webinar featuring internationally renowned speakers. Among them are toxicology expert David Megson, former pilots Thorsten Buch and Michel Mulder, and forensic pathologist Frank van de Goot. "We hope to bring attention to the issue so that major institutions will take it seriously and start supporting us."

## A call for dialogue

Van der Kuil advocates for an open dialogue between all parties involved. "The goal is not to assign blame, but this problem has been documented since the 1950s — it's only getting worse." His message to the aviation industry is clear: "I believe every business leader wants a healthy workforce. Let's open up to each other and treat each other with respect. If you can act preventively, you could become the first airline in the world that truly cares for its staff."

## Preventive measures

Van der Kuil offers some preventive advice for passengers and flight crew:

- Shower immediately upon arrival, as toxins can linger in your hair and eyebrows.
- Take plenty of vitamin C — start three days before the flight, maintain it during the flight, and continue during your stay. However, these measures are only a small step. "It's like bailing out a sinking ship."

## How to Help

If you want to help, contact the Neuro-Toxicity Research Foundation or visit:

<https://neurotoxicityresearch.org>

# Would you like to help us?

Your donation would greatly support our research.  
You can easily donate via the QR code.



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## Why is this research so important?

“Our recent systematic review on Aerotoxic Syndrome (<https://doi.org/10.1016/j.scitotenv.2021.148742>) concluded that those working in aircraft cabins have an increased risk of neurological injury or disease due to their occupation. However, we could not explain the adverse health effects with the concentrations of chemicals that are routinely measured. It is therefore incredibly important to understand what is making people sick so that we can take measures to keep our pilots and crew members safe.”

## What do you hope to achieve with this research?

“We hope to provide more clarity on the potential health risks of exposure to organophosphates to determine whether they may be responsible for the symptoms reported in Aerotoxic Syndrome.”

## How did the collaboration with the Neuro Toxicity Research Foundation come about?

“Through conversations with Ronald van der Kuil. He approached me because he was concerned about the large number of people in the aviation industry he was treating for neurological disorders. He felt the need to better understand, from a scientific perspective, what could be causing this.”

## What does this mean for your research?

“It is great to collaborate with Van der Kuil because he brings a unique neurological perspective that complements my analytical chemistry skills. Our relationship has been extremely beneficial to my own research, as it provides me with a better understanding of how chemical contaminants can affect human health.”

# Chemical cocktail in your closet

Anyone who thinks that a new outfit poses no health risks is mistaken. Behind the glamour of fashion lies a world of harmful chemicals that can affect our health.

*Take the story of the Delta Airlines flight attendants. In 2018, they received new uniforms that seemed perfect at first glance. However, employees soon reported serious health problems: headaches, dizziness, hair loss, and breathing issues. Research revealed a cocktail of dangerous substances, including PFAS, formaldehyde, and specific dyes in the clothing.*

## An invisible threat

Clothing production is a chemical process that involves far more than the average consumer suspects. On average, thousands of chemicals are used to bleach, dye, strengthen, and protect fabrics. From pesticides used in cotton cultivation to plasticizers in synthetic fibers — every step of the production process adds potentially harmful substances. Some of these chemicals are linked to serious health issues. Plasticizers can act as endocrine disruptors, potentially causing fertility problems. Formaldehyde has been linked to cancer and skin irritation. Azo dyes can even break down into harmful aromatic amines, which may cause genetic damage.

## A global challenge

The problem goes beyond individual brands. A study by the European Chemicals Agency found that 78 percent of tested consumer products failed to meet European regulations. Factories outside Europe, especially in countries like Bangladesh and India, often follow less strict standards. Online retailers like Shein have recently come under fire. An analysis showed that some of their products contained hundreds of times more plasticizers than legally allowed. Toxicologist Lode Godderis warns, “The dangerous part is that illnesses often only appear years after exposure to these toxic substances.”

## What can you do?

Experts recommend taking a few concrete steps:

- Look for certifications such as OEKO-TEX or GOTS
- Avoid synthetic fabrics and bright colors
- Wash new clothes before wearing them — but be realistic: not all chemicals will disappear
- Check the origin: European countries apply stricter standards
- Trust your nose: if something smells chemical, don't buy it

## A call for transparency

Journalist Alden Wicker, author of the book *To Dye For*, calls for greater transparency. Just like with food and cosmetics, clothing should come with detailed information about the chemicals used in production. Until that happens, vigilance remains crucial. That new outfit might look great, but behind the scenes lies a complex chemical world with potential health risks.

