Information for Medical Staff, Crew & Passengers

INDOOR POLLUTION IN AIRCRAFT – Cabin Air Quality Incidents

If this is what you experienced then you should present a.s.a.p. at an ER/ doctor within a couple of hours, at the very latest within 24 hours. Give this to your doctor:

Dear Doctor

An increasing number of so-called "odour/smell/ fume" events in aircraft are reported on a daily basis. These "fumes" contain neurotoxic VOCs including substances from the chemical families of organophosphates and pyrethroids.

This patient may have experienced toxic fumes onboard, either visible or as strong chemical type or pungent "odours" which are often likened to wet dog, smelly socks, unaired gym, burnt oil, ‚exhaust' fumes. They may be reporting with symptoms such as feeling sick, dizziness, nausea, pounding headache, blurry vision, focusing problems, concentration issues, tingling in hands/ feet, balance problems.

This patient most likely has a poisoning after inhaling contaminated aircraft cabin air (also dermal contact). You will not know what type of toxic substance they have been exposed to. Please read the following:

In short these are the **three main leads** that can cause toxic fumes inside the aircraft:

1. **Pyrolised jet engine oils/ hydraulic oils** (which incl. a substance from the chemical family of organophosphates)
2. **Aircraft exhaust fumes/ kerosene fumes poisoning** (carbon monoxide)
3. **Pesticide/ insecticide poisoning** (from 'disinsection', which contain substances from the chemical family of pyrethroids)

Carbon monoxide occurs from incomplete combustion. The CO from jet engines can occur both from the ingestion of jet engine exhaust outside of the aircraft and internally from thermal breakdown and incomplete combustion of lubricating oil that bypasses (leaks) the engine bearing seals.

Specific substances can be tested (bio monitoring). A particular combination of chemicals can indicate a so called "finger-print" particular to jet-engine kerosene, jet-oils and hydraulic fluids. **(see graphic/image below)**

NOTE: Body fluid tests should be taken straight after, or latest within 48 hours of exposure to contaminated aircraft air. At least get blood drawn (2 samples at 5ml) and save (3) samples of urine. Store them in the deep freeze of your fridge until you can get them tested. **The CO tests must be done within 2 – 3 hours of exposure.**

Some Clues

Type of Symptoms
Patients who have been exposed to toxic compounds can show a variety of symptoms, depending on the type of toxin involved and the amount that has been inhaled. Often doctors will consult with their local Poison Control Centers, in order to make absolutely sure that they are treating the patient in the most effective way possible.

Blood Pressure
While many people may be familiar with the risks of hypertension in everyday life, hypotension "or low blood pressure" is a common symptom in poisoned patients and can result from a variety of factors, including dehydration or anaphylaxis (severe allergic reaction).

Seizures
Some toxins may cause seizures. Since the stability of our bodies depends on the balance of excitatory and inhibitory neurotransmitters, if this delicate balance is upset by poisoning, then seizures can occur.

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Have the following examined and documented – repeat if symptoms persist after a couple of weeks.

More tests can be done at a later stage, especially when symptoms persist; please also refer to information in the ‚Medical & Laboratory Protocol' ➔ https://www.aerotoxicteam.com/medical.html . Scientific articles can be found under ‚Science'.

1. Heart rhythm disorders
2. ECG recording
3. Shortness of breath
4. Lung function disorders

Brain related symptoms (cognitive test) :

5. Confusion/ word finding issues/memory and concentration issues
6. Dizziness/ brain fog
7. Hearing problems/sudden tinnitus
8. Vision problems/ i.e. tunnel vision/ blurred vision

Please give your patient copies of any and all results!

	Independent variable(compound)	Mean (ppb-V)	Max(ppb-V)	*MRL(ppb-V)	N	N>0	Actual (ppb-V)	Ng/m3	Mol weight	Volume mole of gas	1ng=10-6mg	Conversion factor
	Acetaldehyde	6,101	51,000	0,26	94	82	15,1954					
	Acetonitrile	16,891	595,600	TIC	94	45	42,0695					
	Acrolein	0,035	1,700	0,69	94	5	0,08717					
	Benzaldehyde	0,269	2,304	0,46	94	54	0,66998					
	Butanal	0,541	6,781	0,59	94	37	1,34744					
	Butane	0,564	8,414	1,0	94	10	1,40472					
X	2-Butanone (MEK) *	1,685	14,000	0,34	94	70	4,19674					
	Carbon Disulfide	0,405	8,400	0,32	94	27	1,00871					
	Carbon Monoxide	1764,6	6800	1000	92	77	4395					
	Crotonadehyde	0,138	2,400	0,61	94	16	0,34371					
	Ethane	1,637	11,000	1,0	94	44	4,07719					
	Ethyl Acetate ***	0,824	35	TIC	94	4	2,05229					
	Ethyl Benzeen	0,255	3,400	0,23	94	42	0,63511					
	Formaldehyde	8,135	47	0,26	94	75	20,2614					
X	Heptanal	0,214	4,282	TIC	94	12	0,533					
X	2-Hexanone *neurotoxic	0,072	2,900	0,24	94	7	0,17933					
	Hexanal (Caproaldehyde)	0,367	4,882	0,43	94	34	0,91407					
	Methyl tert-butyl ether	0,207	3,000	0,28	94	27	0,51556					
	3-Methylhexane	0,630	19,520	1,0	94	14	1,56911					
X	2-Methylpentane	2,852	56,74	1,0	94	27	7,10332					
	Nonane	1,126	38,144	0,24	94	45	2,80447					
	Octanal	0,294	7,628	TIC	94	14	0,73225					
X	Octane (18 isomers)	0,697	0,250	20	94	20	1,73598					
	Pentanal (Valeraldehyde)***	0,178	5,677	0,50	94	10	0,44334					
	Pentane	1,182	10,166	1,0	94	25	2,94394					
	Phenanthrene	0,005	0,131	0,001	94	18	0,01245					
	Phenol	0,043	0,779	TIC	94	11	0,1071					
X	2-Propanolol	17,247	420	0,52	94	54	42,9562					
	Propane	1,193	22,177	1,0	94	12	2,97134					
	Porprionaldehyde ***	8,125	367	0,54	94	40	20,2365					
	Styrene	0,096	2	0,23	94	21	0,2391					
X	Toluene	2,707	56	0,27	94	73	6,74218					
	TOCP ***	**	0,000996	0,001	94	1						
	TCP isomeren- non TOCP	0,277	6,800	0,005	94	49	0,68991	76,6	368,37			

the substances marked with an X were found in crew's bio-monitoring samples

** **NOTE Image**: these compounds marked with X have been found in the body fluids of countless crew members after (acute) exposure to such fume events, tested by Prof Dr Heutelbeck/ Jena University.*

The 127 substances measured by EASA can be viewed here https://www.aerotoxicteam.com/easa-list.html (FAA/ CAA refer in general to EASA findings).

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Reminder:

Note the aircraft type, tail number, flight number and date of the flight. Report the incident to the aviation authorities such as FAA (USA), CAA (UK), LBA (Germany) etc. and write a formal complaint also to the airline! Keep copies!

Find the relevant authorities here https://www.aerotoxicteam.com/report-an-incident.html .

*You are welcome to print out this leaflet for personal use and to have handy to give to a physician. If published or shared elsewhere (websites, social media, print media etc), please make reference to: ©**Aerotoxic Team** www.aerotoxicteam.com this document has been updated on 4th November 2019*