Minutes of public meeting of the PFAS Scientific Advisory Panel on Teams

10:00am on 11 December 2024

Panel Members present:	Dr Steve Hajioff – Independent Chair
	Dr Tony Fletcher – PFAS and Health member
	Professor Ian Cousins – PFAS and Environment member
In attendance:	Julia Head – Senior Public Health Officer
	Grace Norman – Deputy Director of Public Health
	Programme support team from I&E

Welcome:

The Chair welcomed everyone to the Panel meeting, and reminded people the meeting was being recorded.

Introductions

The Chair and Panel members introduced themselves.

Dr Steve Hajioff, Independent Panel Chair: A background as a GP for 25 years and a retired Director of Public Health from an area of London with two major international airports and a variety of other environmental hazards and challenges. Not a PFAS expert but has done lots of work with National Institute of Care Excellence and other groups about translating science into policy. Dr Hajioff has also worked a lot in the pharmaceutical industry.

Dr Tony Fletcher, PFAS and Health Panel Member: Environmental Epidemiologist at the London School of Hygiene and Tropical Medicine, working on PFAS since 2006 and member of the panel with experience of epidemiological studies on the health effects of PFAS in contaminated communities in West Virginia in the United States, in the Veneto region, in Italy, and in Ronneby, and is the health expert on the panel.

Professor Ian Cousins, PFAS and Environment Panel Member: A Professor in Environmental Chemistry at Stockholm University, an expert on PFAS, appointed as the environmental expert on this Panel and whose expertise on PFAS is on the sources, transport, fate, and exposure of PFAS.

Standing observer Grace Norman, Deputy Director of Public Health is present. Grace commissioned the panel on behalf of Government of Jersey. Support staff for programme management and administration were also in attendance. Dr Hajioff explained that the Regulation team are in attendance as they are taking over the process from January and it is important that they understand the process of the panel.

Declarations of Interest

No additional declarations.

Minutes of last meeting and matters arising

Dr Fletcher indicated that he had not fully reviewed the minutes due to illness. Dr Hajioff agreed that minor corrections can be taken after the meeting. If there are substantive corrections, then they should be brought back to the meeting.

August minutes

No matters arising. Minutes were signed off as true and accurate record of the meeting.

September minutes

Dr Hajioff commented that in some previous meetings the panel have used terminology differently which could cause confusion. 'Biomonitoring' was used by the panel to describe testing for the potential ***consequences*** of PFAS in the body, but this term is more routinely used in the literature to describe PFAS levels ***in*** the body. Therefore, the panel have changed their terminology regarding looking for things that could have been caused by PFAS such as cholesterol to "clinical testing". Where "biomonitoring" appears in minutes before the change (July 2024), the panel meant clinical testing and not PFAS level testing.

Prof Cousins commented that the first paragraph in the September minutes was confusing, as it references both biomonitoring and dust. Dr Hajioff agreed, and indicated it required an extra carriage return after the end of the first sentence. The minutes have been updated. The panel clarified their position on a discussion they had in July regarding the gathering of information about a household and whether tap water and dust samples should be gathered. They agreed that only gathering information on whether the household was on mains or borehole water would be sufficient to assess the potential for ongoing exposure. If households are on mains water, then exposure from water would be consistent across the island. If households are on borehole water, then there could be greater variation in the levels they are exposed to from water. As water forms the majority of the exposure in the exposed population around the airport, house dust is a smaller exposure source. The minutes have been updated to reflect the discussion.

Dr Hajioff commented that he is not sure what specific bile acid sequestrant preparation Dr Andersson was using in his study and asked Dr Fletcher if he knew. Dr Fletcher confirmed that cholestyramine powder was used in the study at the beginning but due to unpalatability and the fact that participants wanted to drop out of the trial, the participants were moved to capsules called Colestipol or Colesevelam. Dr Fletcher will speak with Dr Andersson to confirm the preparation used.

Dr Hajioff confirmed that the subject matter experts have approved these minutes.

Dr Klein has been unwell and best wishes have been sent by Dr Hajioff to him on behalf of the panel.

The minutes were accepted with slight changes as discussed in this meeting.

October minutes

No matters arising. Minutes were signed off as true and accurate record of the meeting.

November minutes

No matters arising. Minutes were signed off as true and accurate record of the meeting.

Additional findings since the last meeting

Dr Fletcher made some modifications to the elimination paper which was discussed in November's meeting based on the discussion in that meeting. Dr Fletcher has made some assumptions in the preparation of this paper and wished to discuss them with the panel; the paper was shown on screen.

Studies detailed in the report are either observational studies in the population, which are at risk of confounding, or interventional studies with or without a control group. The best studies to estimate the effect are those with a control group. Dr Fletcher commented that the panel have previously discussed how to present the impact of each intervention. The true half life is estimated from completely stopping exposure. This is displayed as a black curve on the graphs, but is purely theoretical as there is ongoing exposure to PFAS in the environment.

Dr Fletcher displayed his comments on diet in the paper, and concluded that diet does not make a large impact on elimination. The additional 9% excretion (considered to be from food) in addition to the normal rate of excretion is likely to be an overestimate, as there is a lot of uncertainty in this figure due to uncontrolled variables and different starting positions of PFAS levels in the study population.

Dr Fletcher has added information on haemodialysis to the paper. He described one study comparing people undergoing dialysis for kidney disease compared to two control groups, one without kidney disease and one with kidney disease but not undergoing dialysis. Those with kidney disease but not undergoing dialysis had a lower level of PFAS at the outset of the study than the controls. Comparing within kidney disease, the impact of dialysis in this study reduces serum levels from 4.2 to 0.29 ng/ml which is a similar magnitude to the cross sectional observational study with bile acid sequestrants. If this benefit was the same in healthy individuals without kidney disease, the benefit would be of similar magnitude to bile acid sequestrants. Dialysis is an invasive and onerous intervention and so it would be inappropriate to offer such an intervention to someone who does not have kidney disease, so the graphs have not been updated to include the impact of dialysis. Dialysis was discussed later in the meeting also.

Dr Fletcher continued to speak to his paper about studies estimating the benefits of phlebotomy. He explained about a study investigating the benefits of fibre, however due to the use of bile acid sequestrants in the same study, there is a concern about extrapolating from the results of this study to real life benefits of a high fibre diet alone for PFAS elimination.

Dr Fletcher moved on to summarise intervention studies on phlebotomy and plasma removal, including the Australian firefighters study discussed previously. This showed a drop due to phlebotomy and plasma removal. In Report 1, the Australian study, the intervention without control group and the pilot data from the Italian experience were summarised. It was a variable amount of reduction which was not consistent, and a global average benefit per phlebotomy procedure of approximately 4% was determined by the panel in Report 1. Dr Fletcher considers it sensible to stick with this figure.

However, during research for the current report, it appears that the benefit of plasma removal looks slightly greater than phlebotomy, and Dr Fletcher proposed that phlebotomy benefit should be modified to 3%, and plasma removal set at 4% to make a distinction between the two techniques. Dr Hajioff commented that this analysis is very complex and the demographics (age, weight, build) of individuals have effects on the amount of reduction from a given intervention. Within an individual there can be significant variations too, for example how hydrated the participant is on a particular day can affect PFAS levels. The intervention study was conducted on a small part of the population with ongoing exposure. Dr Hajioff concluded there would be little benefit in reworking this calculation from Report 1, it is a reasonable estimate, and it would not make a large difference overall. Dr Fletcher agreed with the decision.

The second intervention study, the Danish study showing an effect of bile acid sequestrants, showed a dramatic reduction of PFOS and a lower benefit for PFHxS in terms of percentage fall. The figures from the Swedish study summarised by Dr Axel Andersson at a previous panel meeting are not yet available.

Dr Fletcher has prepared a summary for all interventions over a 3 month period. There are assumptions made during the preparation of the table, including assuming average 4% for both plasma removal and phlebotomy, and the frequency of interventions. The rate of offering these interventions may be lower in practice.

Option	Source of data	PFHxS	PFOS	PFOA
Do nothing	Ronneby half life study	3.8	5.6	6.7
Additional impact of:				
Phlebotomy 1.5 procedure	Average impact of 4% per procedure	6	6	6
Plasma removal 3 procedures	"	12	12	12
Probenecid drug use	Ducatman study	0	0	0
Bile acid sequestrants drug use	Moller study	15	60	22
High fibre diet	Nhanes study	0	0.5	0.3
Probiotic supplements	Nhanes study	0	0.6	0.4

Dr Fletcher also plotted a graph showing the impact of each intervention if taken for a year and by compound. He commented that the intervention must be undertaken for the whole year to achieve these reductions which may not be achievable for the population.

Overall, use of bile acid sequestrants was considered to have the most potential impact if fully implemented, especially for PFOS.

Dr Hajioff commented that he has been considering the cost effectiveness analysis so that a price per intervention can be calculated. He asked if it would be possible to calculate the time taken to achieve a 50% reduction in order to form a common currency across each intervention. The panel agreed that it would be possible based on the information available at present. The panel agreed this would be a useful exercise and Dr Hajioff requested Dr Fletcher complete this work.

Prof Cousins commented how effective bile acid sequestrants are, and that a reduction to background levels can be achieved very quickly. Dr Hajioff agreed, and commented that it demonstrates how important gut reabsorption is to the half life of these compounds.

Dr Fletcher reminded the panel that the table comes with a caveat, in that there may be a plateau effect, and the modelling assumes that the reduction is a compound effect, based on the cross sectional data. Dr Fletcher commented that he must check whether the dose rate of the active ingredient is different between two different cholestyramine studies, as this would explain the difference between the results. Dr Hajioff indicated that the therapeutic cholesterol lowering dose was used in both studies, and a further study is planned with a lower dose which will have fewer side effects. Dr Fletcher predicted that the impact would be dose related but if side effects and costs were lower yet still resulted in a reasonable decrease of PFAS levels, it would be appealing.

Dr Hajioff commented that this work is extremely useful and important, and could also have an impact outside of Jersey as it may help inform what is done elsewhere in the world as well.

Agenda item 5 – Clinical testing review - Dr Fletcher

Dr Fletcher introduced clinical testing and showed a presentation. Clinical testing has three aspects:

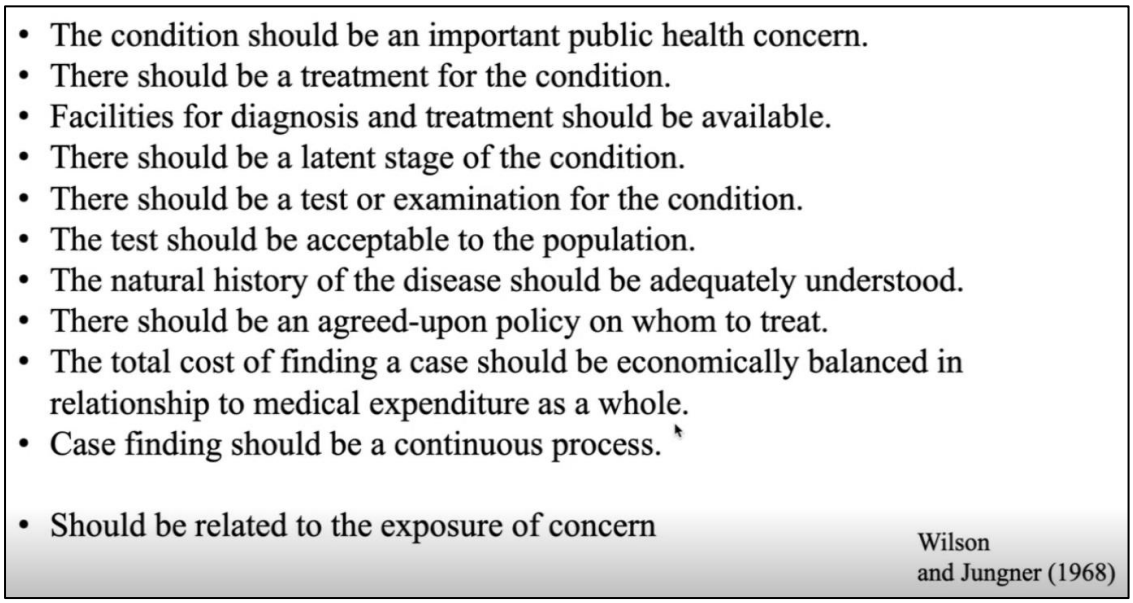
1. Detect if there is disease present, e.g. using scans or x-rays
2. Clinical blood or urine testing to identify markers of a disease e.g. PSA test
3. Clinical tests which do not identify a disease, but identify a risk factor for disease development, e.g. cholesterol levels

All these aspects must be considered by the panel in the PFAS context when considering whether it is appropriate to recommend clinical testing for people exposed to PFAS in the plume area. The purpose of offering testing to a population with raised PFAS exposure is to:

- Identify adverse effects in an individual with the benefit of earlier detection of diseases allowing early treatment and better individual outcome
- Gather information to analyse in relation to exposure to better understand the effects of PFAS
- Get a sample of the population to establish a representative average level for the indicator

There are comprehensive reviews which can guide the panel, for example the National Academies of Sciences, Engineering and Medicine (NASEM) report on Guidance on PFAS Exposure, Testing and Clinical Follow-up, which was published in 2022.

The internationally accepted criteria which need to be met for screening to be undertaken is included in this report and was summarised by Dr Fletcher:



Dr Fletcher summarised the health conditions related to PFAS exposure which are detailed in the NASEM report from general PFAS exposure, not specifically AFFF. He commented that different bodies have drawn different conclusions on different conditions, as the panel discussed in Report 2. The NASEM report concludes that screening for the identified diseases should be guided by the level of exposure for the individual. The authors used a pragmatic cut off of >20 ng/ml of the sum of PFAS. For this level, they recommend screening for cholesterol above age 2, thyroid testing, looking for signs and symptoms of kidney cancer, testicular cancer and ulcerative colitis. For the intermediate exposure range 2-20 ng/ml, they identify prioritising screening for high cholesterol, hypertensive disorders of pregnancy and screening for breast cancer. For the exposure range <2 ng/ml, they conclude no reason for concern and recommend normal screening programmes with no particular focus on PFAS conditions.

Dr Fletcher commented that this summarises the general approach to screening and how it has been converted to policies in the NAS report. He pointed out that the panel would not copy these guidelines in their report, but it is useful for them to review.

The C-8 medical monitoring programme was not a public health driven project, and instead came out of a legal case against the manufacturer. This is important as it affects the motivation for offering testing, screening or interventions. The C8 science panel, which Dr Fletcher was involved in previously, identified 6 diseases which showed evidence that they may be linked to manufacturing-related PFOS exposure (not AFFF). The C8 panel only looked where evidence existed. For the 6 diseases identified, the C-8 medical panel recommended conducting screening tests for 5 conditions for those who were exposed to PFAS. Guidance was given to General Practitioners to guide their work with patients. Pregnancy related hypertension was captured within normal screening for pregnant women in pre-natal visits. The take up for the screening tests was low. Many of the screening tests were completed as part of the routine medical surveillance in the US.

Dr Fletcher commented that there has been limited screening conducted in Ronneby in Sweden and none following on from the Flemish study where there was contamination from meat grazed on the contaminated land. Dr Fletcher has not yet summarised this information for the report but this will be included.

Dr Hajioff thanked Dr Fletcher for his presentation and commented that liver enzymes had been considered by the panel in Report 2 but that they felt that there was no evidence that elevated enzymes are related to liver disease. It was a blood test that is of no clinical importance. It was not one of the risk factors highlighted by the panel.

In relation to the diseases that were available for testing in the C8 report, Dr Hajioff provided the panel with more information about the effectiveness of approaches. Dr Hajioff cautioned that it is important not to misinterpret US information where services are not available in the same way as they are in Europe. There is no need for a targeted intervention in those which are exposed to PFAS if testing is routinely conducted anyway.

- Kidney cancer: Dr Hajioff also commented that he has had previous discussions with Professor Willie Hamilton who is an expert on cancer detection, and concluded that there is not a meaningful test for kidney cancer. Ultrasound testing can potentially be done, but it is not sensitive (i.e. good at finding true positives) or specific (i.e. good at finding true negatives) and so therefore may not identify early stage disease where is where it would be most useful in diagnosis. It is intrusive and relatively invasive.
- Testicular cancer: There is no test for testicular cancer apart from testicular self examination which was recommended by the panel in Report 2.
- Pregnancy induced hypertension: It is standard in clinical practice to screen for pregnancy induced hypertension in all pregnancies.
- Breast cancer: There is also breast cancer screening available everywhere in Europe including Jersey.
- Cholesterol: Dr Hajioff commented that there is universal cholesterol screening over age 40 in the UK, but not in Jersey.

Prof Cousins commented that there is overlap in the paper that he prepared on testing for PFAS, and that him and Dr Fletcher need to ensure that they include the same studies. For example, the Italian study also tested for health effects when they were testing for PFAS levels. He cautioned that the information does not need to be presented twice in the report, and that the overlap is carefully managed. Dr Fletcher agreed, and commented that there are also different policies, for example in the Swedish study, where they collected information on clinical markers for research purposes but the participants were not told their results. However, in the Italian study they were

informed of their results as a public health service beyond the research context. Dr Hajioff agreed, and commented that this topic needs to be discussed in the next meeting in January in the context of the work in Jersey about the health of the individual. It is important that the panel focus in on the potential benefits to those individuals of having that testing. Prof Cousins pointed out that policies on informing participants of results are different around the world. Dr Fletcher agreed, reminding the panel that some believe that it is unethical to withhold results from individuals. Dr Hajioff commented that there are harms of conducting tests including anxiety, and the panel should consider proportionality. If there is something common within a PFAS population and many of the criteria discussed previously in the meeting by Dr Fletcher apply, then it may make sense to screen for this condition. For conditions which are very rare, but slightly more common in PFAS exposure, then offering screening would subject a lot of people to a procedure which causes discomfort, stress and anxiety, as well as costs, for minimal overall benefit. This aspect needs to be part of the consideration by the panel as well.

Dr Hajioff stated that in his opinion, the panel needs to discuss cholesterol testing and kidney cancer screening. The panel does not need to discuss thyroid or liver enzyme levels, because small changes are not related to disease states and so would not be useful. Testicular screening has already been considered. Screening for breast cancer and pre-eclampsia are offered part of routine care to all eligible islanders, so do not need additional consideration by the Panel for people in the plume area. The panel agreed to discuss the vaccine response, as it is another interesting but not clinically actionable scenario, but it wasn't clear about how to screen for this scenario.

Agenda item 6 – Risks, costs and benefits of Haemodialysis – Dr Hajioff

Dr Hajioff commented that risks, costs and benefits have been completed for all treatments discussed to date in a previous meeting, and this paper is specifically about the risks, costs and benefits of haemodialysis. He summarised the paper, introduced dialysis, and explained how the treatment which filters the blood through specialised equipment is used for those patients with serious kidney diseases. The procedure is conducted 3 times a week for the remainder of the patient's life. The sessions take several hours in a specialised hospital setting.

Dr Hajioff explained that it is difficult to separate the risks and benefits of the treatment between the kidney disease and the procedure. As dialysis is not used in healthy individuals, it is unclear whether the side effects will be present in healthy individuals. It is an unpleasant, invasive procedure, impacts on psychological wellbeing and is has a large impact on quality of life. Dr Hajioff explained the side effects in detail as described in the paper.

Dialysis is a large logistical undertaking needing specialist and non-specialist equipment to deliver, and specialist staff are required to conduct the procedure. The cost analysis conducted by Dr Hajioff concluded that the service would cost £1,380,000 per annum for 50 patients receiving 10 sessions each, excluding the cost of managing any side effects of the process. Dr Hajioff concluded that all aspects taken together indicate that haemodialysis is not a feasible option for intervention for PFAS exposure in the plume area. The panel agreed.

Dr Hajioff commented that this paper will form part of the report for completeness however it is highly unlikely that this intervention will be recommended for humane and cost reasons.

Agenda item 7 – Body burden – Dr Fletcher

Dr Fletcher indicated that this section introduces two issues, and raises three points.

The first section is a refresh on language referred to in the paper. It confirms that body burden refers to the amount of PFAS accumulated in the body, assuming the body burden is proportionate

to the serum. It must be remembered that PFAS resides in other compartments in the body as well, for example, the liver, kidney and bile acid.

The second section refers to dose response relationships, and is a reminder that the studies which have been done attempt to characterise the dose relationship. In the available studies, dose response relationships are often displayed as a straight line (suggesting that there is a linear increase in PFAS based on exposure), but it depends on what is being measured in the study. Often, studies display this information differently from each other so this must be taken into consideration when comparing studies. Studies also show different effect patterns, for example having no effect on cholesterol at lower PFAS levels and then cholesterol increasing at a certain concentration, or effects at low levels then plateauing at higher concentrations of PFAS.

The final section of the paper covers whether or not, if exposure or body burden is reduced, then whether the health risks would be lower. It is important to note that it does not happen immediately due to a long half life. If there has been long term exposure, the individual will reach a steady state where the amount of PFAS which is being excreted is the same as the amount entering the body. Therefore, there may be a delay in the benefit of risk in terms of reducing the exposure. There is very little data on whether or not reducing exposure has been associated with a reduction in the health risks identified. Overall, the worldwide levels of exposure of PFOS and PFOA have been decreasing as legislative restrictions were implemented in the early 2000s. It is not known whether this reduction in global PFAS levels has been associated with a reduction in adverse health effects. It is known that for other examples such as smoking and ambient air pollution that stopping exposure does lead to a reduction in ongoing risk and reduction in disease and mortality. For immune effects, outcomes are improved if exposure is reduced. It is therefore plausible that if the exposures are reduced, the adverse risks associated with PFAS will reduce as well.

Two studies have been conducted on the dose-response relationship between PFAS and cholesterol; in the C8 population and an Italian study. In each, people had repeated measurements taken which showed that their PFOA levels were reducing. At the group level, there wasn't a clear reduction in cholesterol levels, thought to be because of other effects such as the population getting older in the time period, which would have counter-acted the benefit of lower PFAS levels. At the individual level, the more a participants' PFOA level went down, the more their cholesterol levels went down. There is some statistically significant (i.e. true) but small benefit in recovery of cholesterol levels when PFAS body burden was lowered.

In conclusion, Dr Fletcher commented that there are good reasons to be optimistic that there would be a health benefit from reducing exposure but it is hard to confirm or quantify.

Dr Hajioff thanked Dr Fletcher, and commented that in the paper, it is detailed that it is possible to prevent exposure by reducing body burden of women of childbearing potential. Any pregnancies occurring after a reduction in PFAS levels in the woman means the levels would be lower in the foetus and therefore would have lower risk to the foetus. Dr Fletcher commented that the long term effects of PFAS exposure may persist after exposure stops for the adult, as the effects may have been triggered when levels were higher.

Dr Hajioff commented that when the panel discuss the appropriateness of interventions, there are three groups they must consider:

1. Women of childbearing potential
2. People with elevated cholesterol
3. Everyone else, where lowering PFAS levels resulting in better health outcomes might be an assumption but not a provable assumption.

Dr Hajioff commented that it makes sense to consider these individually when considering interventions. The panel agreed.

Any other business

No other business was raised by the panel.

Date of next meeting

Wednesday 29 January 2025. It will be held 10am-1pm online.

The Chair thanked everyone for their contributions, those watching the meeting and Julia for her support throughout the whole process. He wished everyone a very Happy Christmas and New Year.

A reminder to the public that this meeting has been recorded and the video will be available online on request by emailing the PFAS mailbox. This will take a couple of days to make sure the observers are anonymised.

There being no further business, the meeting was closed.

To note that the Panel can be emailed via PFASpanel@gov.je.

Details of meeting dates and times can be found at PFAS in Jersey (gov.je)