

**To:** [redacted] [redacted] [redacted]@rivm.nl  
**From:** [redacted] [redacted]  
**Sent:** Wed 11/25/2020 7:05:21 PM  
**Subject:** Antw: PFAS en corona  
**Received:** Wed 11/25/2020 7:05:21 PM

Ha [redacted]  
 Ja, kunnen we doen. Tzt dan. Eerst maar even de 'gewone' Q&A's ;-)

Groet  
 [redacted]

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**Van:** [redacted] [redacted] <[redacted]@rivm.nl>  
**Datum:** 25 november 2020 om 19:59:37 CET  
**Aan:** [redacted] [redacted] <[redacted]@rivm.nl>  
**Onderwerp:** FW: PFAS en corona

Hi [redacted]

Zie onderstaand signaal van [redacted] Ik heb die link nog niet eerder gehoord, maar mogelijk moeten we er tzt een Q&A over opnemen.

Vriendelijke groet,

[redacted] [redacted]  
 Senior communicatieadviseur

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**Bedrijfsvoering | Communicatie en Documentaire informatievoorziening**  
**Rijksinstituut voor Volksgezondheid en Milieu**  
 Antonie van Leeuwenhoeklaan 9 | 3721 MA Bilthoven

.....  
**T** +31 [redacted]  
**M** +31 [redacted]  
 [redacted]@rivm.nl  
<http://www.rivm.nl>

.....  
**RIVM** *De zorg voor morgen begint vandaag*

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**From:** [redacted] [redacted] [redacted] <[redacted]@rivm.nl>  
**Sent:** maandag 23 november 2020 17:52  
**To:** [redacted] [redacted] <[redacted]@rivm.nl>; [redacted] [redacted] <[redacted]@rivm.nl>  
**Cc:** [redacted] [redacted] <[redacted]@rivm.nl>  
**Subject:** FW: PFAS en corona

Ter info. Uit een nieuwe Europese studie blijkt dat PFAS meer nadelige gevolgen kan hebben voor het immuunsysteem dan eerder gedacht. Als een immuunsysteem is aangetast, zijn mensen meer bevattelijk voor ziekten en werken vaccinaties minder goed. Dat is de redeneerlijn hierin. Zie artikel Guardian onder deze mail. Als je meer wil weten [redacted] bel je me dan even?

Hartelijke groet, [redacted]

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**From:** [redacted] [redacted] <[redacted]@rivm.nl>  
**Sent:** maandag 23 november 2020 16:08  
**To:** [redacted] [redacted] [redacted] <[redacted]@rivm.nl>; [redacted] [redacted] <[redacted]@rivm.nl>  
**Cc:** [redacted] [redacted] <[redacted]@rivm.nl>  
**Subject:** FW: PFAS en corona

Ter info. De link PFAS – corona is gelegd. Wellicht goed hier een Q&A over op te nemen. Ik ga nu verder met het actueelbericht, stuur hopelijk later vandaag een nieuwe versie.

Groet,

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Centre for Safety of Substances and Products | Centrum voor Veiligheid van Stoffen en Producten  
National Institute for Public Health and the Environment | Rijksinstituut voor Volksgezondheid en Milieu

visitors: Antonie van Leeuwenhoeklaan 9 | 3721 MA Bilthoven | The Netherlands

correspondence: Postbus 1 | 3720 BA Bilthoven | The Netherlands

phone: +31(0) 5.1.2e mobile phone: +31 (0)6 5.1.2e

email: 5.1.2e @rivm.nl

5.1.2e

**From:** 5.1.2e 5.1.2e <5.1.2e @rivm.nl>

**Sent:** maandag 23 november 2020 15:48

**To:** 5.1.2e 5.1.2e <5.1.2e @rivm.nl>; 5.1.2e 5.1.2e <5.1.2e @rivm.nl>; 5.1.2e 5.1.2e <5.1.2e @rivm.nl>

**Subject:** PFAS en corona

Zie weeknieuws 5.1.2e

Ongetwijfeld zal dit een keer gaan spelen.

### ACC rejects idea PFAS could limit effectiveness of Covid-19 vaccine

19 November 2020

#### Responds to comments by expert in academia quoted by Guardian

The American Chemistry Council (ACC) has rejected the idea that per- and polyfluoroalkyl substances (PFASs) could limit the effectiveness of Covid-19 vaccines following a *Guardian* article that quotes an expert in academia.

Philippe Grandjean, adjunct professor of environmental health at the Harvard School of Public Health, told the newspaper there was a risk that the immune response to any vaccine may be weaker in individuals highly exposed to the substance group.

"At this stage, we don't know if it [PFAS exposure] will impact a corona vaccination, but it's a risk," he is quoted as saying in an article published on 17 November. "We would have to cross our fingers and hope for the best."

However, the ACC said in a blog post published later the same day that the available human evidence provides "conflicting results" about the potential effects of exposure to certain PFASs on immune response.

A 2012 study led by Professor Grandjean found that elevated PFAS levels were associated with reduced immune response in children aged five and seven following routine childhood vaccination. Further research, published in 2017, found specifically that children exposed to PFASs as infants later had significantly lower antibody concentrations after receiving tetanus and diphtheria vaccinations. This research has since been used for regulatory risk assessment. In particular, earlier this year, the European Food Safety Authority ([Efsa](#)) published an Opinion setting a new group tolerable intake threshold for four PFASs, with decreased response of the immune system to vaccination as the critical endpoint.

"While Professor Grandjean has reported a reduction in vaccine antibodies, other researchers have not observed similar effects," the ACC said in its blog post.

As evidence, the trade association pointed to a 2014 study that found no association between PFOA – a much studied PFAS – and the number of self-reported episodes of cold or influenza following vaccination.

However, that study did find an association between elevated PFOA serum concentrations and reduced antibody response.

"It is possible that the extent of suppression in the vaccine response associated with PFOA exposure is insufficient to change an individual's risk of infections, particularly in a small population," the scientists of the 2014 study said in their paper. "Given the high background rate of respiratory infections, with over 70% of adults reported having experienced an episode in the preceding 12 months, there is not much scope to detect an increase in infections."

The ACC also said that "many types of PFAS" are "actively used in the fight against Covid-19", citing, for example, disease testing equipment, production of ventilators and medical PPE, such as hospital gowns.

*US federal research*

A range of US federal agencies are currently investigating the immunosuppressive potential of PFAS in response to widespread concern about the chemical class:

- the National Institute of Environmental Health Sciences (NIEHS) is funding five longitudinal epidemiology studies to determine whether PFASs impact immune effects over time and across life stages;
- the Agency for Toxic Substances and Disease Registry (ATSDR) is leading a multi-site, cross-sectional study that will include evaluation of the association between PFAS exposure and several immune-related biomarkers and outcomes; and
- the National Institute for Occupational Safety and Health (NIOSH) is leading a cross-sectional feasibility study of workers in industry with high to moderate PFAS use that examine inflammatory and immunological response.

In some cases, these efforts specifically target Covid-19:

- the Centers for Disease Control and Prevention (CDC) is leading a Covid-19 study of healthcare workers and first responders that includes a sub-study examining the impact of PFAS exposure;
- the ATSDR is planning a prospective study of exposure assessment participants to provide additional information on the association between PFAS exposure and susceptibility to viral infections, including Covid-19; and
- the NIEHS is funding research at North Carolina State University and the University of Georgia into the potential association between PFASs and Covid-19.

At an online workshop on federal government human health PFAS research run by the National Academies of Science (NAS) on 26-27 October, several experts said that immunosuppression was a particularly complex hazard endpoint.

"When you're talking about PFAS and infectious disease, you have to be clear about what question you're trying to answer," said Andrea Winquist from the CDC. "Because there are several questions that could be asked. One question could be: does an impact on the immune system increase the risk of infection, given exposure? You could also ask: does it increase the severity of disease, given infection? You could also ask: does it impact the antibody response to an infection that might impact the risk of reinfection? And then there's also this question of an effect on underlying conditions that might put a person at risk of more severe infection."

#### *Immunosuppression*

There is growing concern in the scientific community about the potential for environmental chemicals to adversely affect the immune system. A review of the literature relating to endocrine disrupting chemicals (EDCs) published last year found that both *in vitro* and *in vivo* research shows that the substances can "modulate various levels of immunological response". The scientists concluded that "a direct effect of EDC exposure is the suppression of inflammatory processes, which may lead to an insufficient immune response against bacteria, fungi, viruses and cancer cells".

Immunosuppression caused by environmental chemicals may have more than one quantifiable outcome. It may, for example, make the body more susceptible to infection, or it may increase the severity of the disease following infection. Alternatively, it may reduce the effectiveness of a vaccine as a preventative measure by reducing the antibody response following vaccination.

In some cases, it may do all of these things, or just some, or none.

The enormous impact of the rapid spread of SARS-CoV-2 in the early part of this year has focused the burgeoning concern about immunosuppression on Covid-19. This has led to studies suggesting an association between environmental chemicals and the disease.

Today, *Environment International* published a computational study of the potential mechanisms by which EDCs, including PFASs, may affect the severity of Covid-19. The study team, which included Professor Grandjean, concluded that the results "appear as a promising initial step toward systematically linking a major group of environmental chemicals to the severity of Covid-19". However, they added that the findings needed to be further supported by high-throughput screening tests, as well as clinical and experimental data.

#### **FURTHER INFORMATION**

**ACC blog post**

**Guardian article**

**2012 study**

**2017 study**

**2019 review**

**Study published today**

5.1.2e 5.1.2e

+31.6 5.1.2e  
5.1.2e @rivm.nl

RIVM, Centre for Safety of Substances and Products  
Antonie van Leeuwenhoeklaan 9 | 3721 MA Bilthoven | The Netherlands

