NC DEPARTMENT OF HEALTH AND HUMAN SERVICES

ROY COOPER • Governor
MANDY COHEN, MD, MPH • Secretary
MARK T. BENTON • Assistant Secretary for Public Health
Division of Public Health

July 14, 2020

MEMORANDUM

TO: North Carolina Clinicians

FROM: Rick Langley, MD, MPH, Medical Consultant
Occupational and Environmental Epidemiology Branch

SUBJECT: **Per- and Polyfluoroalkyl Substances (PFAS) Education for Medical Providers**

Since 2017, the NC Department of Health and Human Services (NCDHHS) has been responding to concerns about chemicals known as per- and polyfluoroalkyl substances (PFAS). NCDHHS Occupational and Environmental Epidemiology Branch recognizes you have likely received questions from patients regarding PFAS exposure in your area, testing, and possible health effects. The purpose of this memo is to provide clinicians in the affected communities relevant PFAS information and education materials to better respond to patient questions and concerns.

PFAS Basics

PFAS are a large group of man-made chemicals that have been used in industry and consumer products worldwide since the 1950s. These chemicals are used to make products to resist stains, grease, and water. PFAS are also used to make fire-fighting foam. PFAS are found in people, wildlife, and fish all over the world. Most PFAS do not break down easily in the environment. Some PFAS can stay in people's bodies a long time.

In communities with contaminated drinking water supplies, ingesting water is the primary way a person is exposed to PFAS. In these areas, using certain types of water treatment systems or switching to a PFAS-free source of drinking water greatly reduces overall PFAS exposure. Secondary exposure routes may include eating contaminated food, including fish caught from contaminated waterways, or breathing contaminated air.

The potential for health effects from PFAS in humans is still being studied. Researchers are working to better understand how exposure to PFAS might affect people's health. Although more research is needed, some studies of people have shown that certain PFAS may:

- affect growth, learning, and behavior of infants and older children;
- lower a woman's chance of getting pregnant;
- interfere with the body's natural hormones;
- increase cholesterol levels;
- affect the immune system; and,
- increase the risk of certain types of cancer

PFAS Resources

There are several resources available to help you talk with your patients about their health concerns related to PFAS exposure. NCDHHS' Occupational and Environmental Epidemiology Branch's website has information about PFAS along with factsheets for the public. The Agency for Toxic Substances and Disease Registry (ATSDR) provides free PFAS continuing education for clinicians. ATSDR also has PFAS information and guidance for clinicians.

For more information about PFAS related health concerns, or to discuss serum testing for PFAS, NCDHHS has a medical consultant on staff who is knowledgeable about PFAS and other environmental exposures. You may contact us at (919) 707-5900 or nchace@dhhs.nc.gov.

Attachment: Laboratory information for per- and polyfluoroalkyl substances (PFAS) serum testing

Attachment: Laboratory information for per- and polyfluoroalkyl substances (PFAS) serum testing

The following is a partial list of laboratories, as of May 2020, that can measure various PFAS in serum. NCDHHS has neither vetted these laboratories for quality, nor endorsed any specific laboratories. There may be other laboratories, not listed, that can do the work. This list is provided purely for informational purposes for individuals and clinicians who may be considering serum testing.

It is important for providers to explain to their patients that there are limitations to PFAS serum testing. A serum test will not predict the occurrence of disease in an individual and cannot explain an individual's current or future health problems. A serum test cannot be used to guide medical treatment decisions or tell someone where or how they were exposed. Test results will only tell patients the levels of PFAS in their serum. There are no health-based screening levels for specific PFAS that clinicians can compare to concentrations measured in serum samples. As a result, interpretation of measured PFAS concentrations in individuals is limited in its use.

Table 1. Private laboratories that can measure various PFAS compounds in human serum samples

Lab Name	Contact Info	PFAS Measured	Cost	Other Information
Vista Analytical Laboratory	1-916-673-1520	PFBA PFPeA PFHxA PFHpA PFOA PFNA PFDA PFUnA PFDoA PFTrDA PFTeDA PFBS PFPeS PFHxS PFHpS PFOS PFDS 4:2 FTS 6:2 FTS 8:2 FTS PFOSA MeFOSAA EtFOSAA	Approximately $850 for single individual Volume discount can apply if multiple specimens	No minimum samples. Physician can order.
Quest Diagnostics	1-866-697-8378	PFBS (as the linear isomer) PFHpA (as the linear isomer) PFHxS (as the linear isomer) PFNA (as the linear isomer) PFOS (as the linear isomer) PFOA (as the linear isomer)	$657	No minimum samples, physician can order. The tests are sent out to NMS labs for analysis.
NMS Labs	1-866-522-2206 e-mail: nms@nmslabs.com	PFBS (as the linear isomer) PFHpA (as the linear isomer)	$617	No minimum samples. Physician can order.

		PFHxS (as the linear isomer) PFNA (as the linear isomer) PFOS (as the linear isomer) PFOA (as the linear isomer)		
SGS AXYS	1-888-373-0881 https://sgsaxys.com	PFBA PFPeA PFHxA PFHpA PFOA PFNA PFDA PFUnA PFDoA PFTrDA PFTeDA PFBS PFPeS PFHxS PFHpS PFOS PFNS PFDS PFDoS 4:2 FTS 6:2 FTS 8:2 FTS PFOSA MeFOSAA EtFOSAA N-MeFOSA N-EtFOSA N-MeFOSE N-EtFOSE HPFO-DA ADONA 9C-PF3ONS 11Cl-PF3OUdS	Minimum batch size of 8 samples is $455. The cost is dependent on how many samples.	SGS runs batches of samples, individual physicians can submit minimum of 8 samples. SGS can measure 33PFAS in 0.5 mL of serum.

Table 2. PFAS names and abbreviations

Acronym	Name
PFBA	Perfluorobutanoic acid
PFBS	Perfluorobutane sulfonic acid
PFPeA	Perfluoropentanoic acid
PFPeS	Perfluoropentane sulfonic acid
PFHxA	Perfluorohexanoic acid
PFHxS	Perfluorohexane sulfonic acid
PFHpA	Perfluoroheptanoic acid
PFHpS	Perfluoroheptane sulfonic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonic acid
PFNA	Perfluorononanoic acid
PFNS	Perfluorononane sulfonic acid
PFDA	Perfluorodecanoic acid
PFDS	Perfluorodecane sulfonic acid
PFUnA	Perfluoroundecanoic acid
PFDoA	Perfluorododecanoic acid
PFDoS	Perfluorododecane sulfonic acid
PFTrDA	Perfluorotridecanoic acid
PFTeDA	Perfluorotetradecanoic acid
MeFOSAA	N-Methylperfluorooctanesulfonamidoacetic acid
EtFOSAA	N-Methylperfluorooctanesulfonamidoacetic acid
PFOSA	Perfluorooctanesulfonamide
N-MeFOSA	N-Methylperfluorooctanesulfonamide
N-EtFOSA	N-Ethylperfluorooctanesulfonamide
N-MeFOSE	N-Methylperfluorooctanesulfonamidoethanol
N-EtFOSE	N-Ethylperfluorooctanesulfonamidoethanol
HFPO-DA (GenX)	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid
ADONA	4,8-dioxa-3h-perfluorononanoic acid
9Cl-PF3ONS	9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid
11Cl-PF3OUdS	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid
4:2 FTS	4:2 fluorotelomersulfonate
6:2 FTS	6:2 fluorotelomersulfonate
8:2 FTS	8:2 fluorotelomersulfonate