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Roundtable Discussion

EPA scientists explain the Agency's coordinated approach to inquiry and action on asthma. Experts include: Dan Costa, Office of Research and Development, Alisa Smith, Indoor Environments Division, Susan Stone, Office of Air and Radiation and moderator Melissa Anley-Mills, Office of Research and Development.

MAM= Melissa Anley Mills (Office of Research and Development)

Melissa Anley Mills: Hello and welcome to the asthma edition of EPA's Science Notebook, where EPA researchers and experts talk about the science behind decision making on asthma. I'm Melissa Anley Mills from EPA's Office of Research and Development. Did you know that asthma affects more than 23 million Americans, including an estimated seven million children? Air pollution, both outdoors and indoors, is a significant risk factor for increasing asthma severity and the frequency of asthma attacks. EPA scientists have invested lots of time and resources into studying disparities in asthma, environmental risks, as well as reducing exposure. But how do the various parts of the agency come together to address these issues? Today I'm talking to three experts from across EPA. From the Office of Air and Radiation, we have Alisa Smith, a biologist in the Indoor Environments Division, and Susan Stone, a health scientist in the Ambient Standards Group. We also have an expert with us today from the Office of Research and Development, Dan Costa, the National Program Director for Air Quality Research. Thank you all, and thank you for being here.

MAM: Dan, let's start with the basics. What is asthma, and why is it such a serious issue?

Dan Costa: Well, thanks Melissa. I think that's a really important question. Asthma is a lung disease, and it's a complicated lung disease actually encompassing many different kinds of ailments, all of which have an impact on the airways. And as a result, because it's a lung and we breathe, and everything in the air is potentially accessible to the lungs, things in the air such as air pollutant contaminants, as well as allergens, or dust particles that are from natural origins can end up in the lung. And as a result, anything that they may carry in the way of allergenicity, you know things that can make them allergic, or toxicity are going to affect these airways that are already diseased and these airways that are diseased are intrinsically more sensitive, a bit more twitchy, if you were, if you will. The twitchiness of airways has to do with wheezing and the inability to breathe when you are running, which is why the kids have to use inhalers, for example. So all of those elements are really important, and it's also important to understand that asthma as a fairly prevalent disease, at about 5-10 percent of the population, appears to afflict children particularly, disproportionately, and it also has an environmental justice element. Kids in inner cities exposed to a number of allergens indoors that may not be quite so prevalent elsewhere, having to do with cockroaches and dust mites and that sort of thing, is really a special problem, and is of interest to the Agency.

MAM: So given that, what type of research is ORD doing to help reduce exposure?

Dan Costa: The work that we do is at a number of different levels. We have work that looks at the epidemiology of environmental impacts on asthma. In other words, looking at people in their living

environment, trying to look at assessments having to do with exposures, and what constitutes an exposure that may be a risky exposure for certain populations, again, looking at kids as well as adults. We are also looking in more empirical situations with just adults in clinical studies where we can look at human subjects exposed to air pollutants and how that may affect their responsiveness to that air pollutant with different degrees of sensitivity. You have mild asthmatics and asthmatics that are a little bit more sensitive, are they at a higher risk? I think a lot of us are familiar with the radio programs on hot summer days where they say, "Ozone is going to be high today," or "PM is going to be high. People with respiratory disease should be careful about exercising outdoors." Well, it is trying to get at those questions. What makes people sensitive? And why are they responsive? And it relates, not just to gaseous air pollutants, but particulate air pollution, and we are looking at those elements and how they ultimately have an impact on public health.

MAM: Well that's interesting. So are there areas of research that seem to be offering novel or new insights into asthma?

Dan Costa: Well, the agency is looking at asthma from the perspective of environmental triggers. There's a lot of research being conducted on asthma; looking at primarily from the allergens side, the National Institute of Health has a whole agency that focuses on asthma and allergy. What we're interested in are those environmental triggers that relate to air pollution in particular and susceptible sub-populations that may be at higher risks, you know, kids outdoors in the summer time. Some of the insights that we have been gaining have to do with some of the underlying mechanisms that may make someone susceptible. It's interesting that the asthma in kids tends to be more of an allergic type than asthma in adults. So when we look at adults from their sensitivity, does that translate over to how kids are sensitive? Does it relate to any of the allergy components? We have studies in experimental animals, for example, where we are looking at the combination of allergens and pollutants at the same time, where you can actually look to see whether the pollutants make those allergens more potent. And there seems to be some evidence. So while air pollutants are going down in the environment, while you are exposed to an allergen, the pollutant itself may be part of that sensitization process. So it's not just the worsening, the exacerbation of people who already have asthma, but pollution may actually be involved. It's much harder to detect at the actual initiation step. And obviously those are issues that we would like to deal with.

MAM: Thank you, Dan. So Susan, this sets an interesting stage for the work that you and your colleagues do in the Office of Air and Radiation. Can you tell us a little bit about your group and what the team does?

Susan Stone: Sure, Melissa. The Ambient Standards Group is the group that integrates the scientific evidence on outdoor air pollution that Dan just talked about with policy considerations to set national ambient air quality standards that protect public health, including the health of sensitive groups such as people with asthma. We also use that same information in the Air Quality Index.

MAM: So this Air Quality Index, can you tell us a little bit more about that, please?

Susan Stone: Well, the Air Quality Index, also sometimes called the AQI, is an index for reporting daily air quality: how clean or polluted the air is and associated health effects, if any. It reports the levels of five common air pollutants, including carbon monoxide, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide on a scale of 0-500. Lower values reflect better air quality. The 100 level is typically the level of the short term standard. So if the AQI is above 100, it's above the levels of the short term standard. The Air Quality Index reports also describe who might be affected and what they can do to reduce their exposure. People with asthma are sensitive to most AQI pollutants, so it is important for them to pay attention to it. It's color coded like weather maps, so people can look at AQI forecasts and get it, the way they do weather reports. The AQI is usually reported with the weather, since weather can influence pollution levels. It's also available in the major media, such as USA Today and the Weather Channel, as well as local TV, radio and newspapers. You've probably heard of it: code red or code orange days. People with asthma may want to get more detailed information, which we have available on our Air Now website at www.airnow.gov.

MAM: Great, thank you. Yes, definitely familiar with code red days here. So shifting a little bit, can we talk about whether there are major studies or asthma issues with respect to the Air Quality Index that you are aware of?

Susan Stone: Well, yes. We use epidemiological information to help define which groups of people or which life stages, that would be children or older adults, will be especially sensitive to an air pollutant. Two major studies that have been especially important in providing specific information for people with asthma are the Inner City Asthma Study, which was conducted in several major metropolitan areas, and the California Children's Health Study, which was conducted in several locations in Southern California. These studies told us about such things as the symptoms people with asthma might experience, their likelihood that they would use additional medication, the timing of the effects. They told us that the effects typically occur the day after air pollution levels will be high, and also such things like exposure to air pollution near roadways can be important. We use controlled human exposure studies. These are studies where we put healthy volunteers in chambers and expose them to air pollution to describe the symptoms that people feel when they are exposed to a particular pollutant. And we provide this information in the Air Quality Index, and this helps people link cause and effect. One issue that comes up every year are high particle levels during wildfire events. And this is one situation that we work especially closely with the Indoor Environments Division. It happens every year, and information from both divisions is important so that people aren't exposed to high particle levels both indoors and outdoors.

MAM: Thanks so much, Susan. So Alisa, some of these studies speak directly, and Susan mentioned the connection between indoor environments and asthma. Could you expand upon that please?

Alisa Smith: Sure, Melissa. In addition to the outdoor air pollutants that Susan talked about and the importance of coordinating our messages around wildfires in particular, there are other indoor exposures that impact people with asthma. These include things such as secondhand smoke and allergens from dust mites, mold, pet dander and from pests, in particular cockroaches and rodents.

MAM: And what about the tools that are being used to communicate with the public and professionals that are concerned about asthma?

Alisa Smith: We have a variety of tools and technologies that we use to communicate the important action messages that people should take to reduce their exposures. We have a lot of free brochures and other educational materials, in particular for parents and children, and these are available in English and Spanish. They can be downloaded on our website or ordered for free, and that website is www.epa.gov/asthma. We also use a variety of online approaches. We host webinars as a training for health care professionals and for community advocates. And we also host an annual conference, the National Asthma Forum, to bring people together face-to-face, where they share successful approaches and best practices in asthma care. We try very hard to meet people where they are with the tools and resources that they need to manage asthma and reduce exposures both indoors and outdoors.

MAM: Thanks very much. So, clearly each part of the Agency has a role to play in asthma management, from research into the biology and environmental triggers to developing tools that reduce exposure and minimize the frequency of asthma attacks. Thanks Dan and Susan for not only taking the time to speak with me today, but for sharing your expertise in helping to raise asthma awareness. If you are interested in learning more about asthma and how sound science is shaping how EPA works to reduce its impact, explore more of the asthma edition of EPA's Science Notebook at epa.gov/epahome/sciencenb or go to EPA's asthma website at epa.gov/asthma. Thanks so much.