

Smoking inhibits lung's immune cells

Epidemiologic studies indicate cigarette smokers are more susceptible than nonsmokers to respiratory infections but not to other infections. Working with rats, scientists have now found a possible biological basis for this. They report that cigarette smoke preferentially depresses the function of immune cells in lymph nodes that lie within the lung tissue, and that only prolonged smoke exposure induces changes in immune cells stored in other parts of the body. They also found that the smoke primarily affects antibody-producing B-lymphocytes rather than other immune cell types, shedding light on the mechanism of immune suppression, says study coauthor Mohan L. Sopori, an immunologist at Lovelace Medical Foundation in Albuquerque, N.M.

Previous animal studies have shown cigarette-induced immune dysfunction, but these did not focus on lung-associated lymph nodes and did not reveal what types of immune cells were primarily affected. Human studies have yielded inconsistent results, probably because these studies haven't looked at the lung-associated lymph nodes, says George M. Shopp, also at Lovelace.

Shopp, Sopori and their co-workers exposed rats to cigarette smoke for varying time periods and compared them with two age- and sex-matched control groups. The smoke-exposed rats, strapped in restraint devices, had their noses attached to a chamber fed by a burning cigarette. Some control rats also were restrained but hooked to a smoke-free inhalation chamber. Others were treated normally. After the exposure period, the researchers removed the rats' lymph nodes to measure antibody secretion by B-cells as well as macrophage and T-cell function.

They found that cigarette exposure for 21 weeks or more significantly depressed B-cell function in the lung-associated lymph nodes, while exposure for more than 35 weeks affected immune cells in other lymphoid tissues such as the spleen. The team saw no significant effect on the function of other immune cell types from the lymph nodes or the spleen, they report in the *MARCH 1 TOXICOLOGY AND APPLIED PHARMACOLOGY*.

Shopp warns that non-immune-related factors — such as the breakdown of lung tissue or emphysema — also could contribute to smokers' increased susceptibility to respiratory infections.

Fostering more orphan-disease research

Dustin Hoffman's award-winning performance in "Rain Man" helped publicize an uncommon developmental disorder called autism. But 20 million people in the United States suffer from about 5,000 diseases so rare that many doctors don't even recognize their symptoms. Now a federal panel is urging Congress to increase research funding and establish a new federal office to educate the public and the medical community about such "orphan" diseases.

Lack of basic research forms a major barrier to prevention and treatment of rare disorders, according to the Rockville, Md.-based National Commission on Orphan Diseases, which last week sent 54 recommendations to Congress and to Health and Human Services Secretary Louis W. Sullivan.

"Research is critical," adds panel chairman Jess Thoene, who serves as medical director of the Joseph P. Kennedy Jr. Foundation in Washington, D.C. "We must make it clear to doctors and investigators that the treatment of rare diseases is a national priority."

The federal government spent \$1.3 billion on rare-disease research in fiscal year 1987. But more than half that amount went to study 200 rare forms of cancer, leaving only \$640 million for researchers studying the remaining orphan diseases, says the commission.

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Seafloor maps no longer secret

In a reversal bound to excite oceanographic researchers, fishermen, mineral explorers and myriad others, the U.S. Navy has decided to allow the release of highly detailed maps of seafloor topography in the nation's Exclusive Economic Zone (EEZ), a 200-mile-wide border extending from U.S. shores. Established by President Reagan in 1983, the EEZ covers an area slightly larger than that of U.S. land.

In an effort to survey this new frontier, the National Oceanic and Atmospheric Administration (NOAA) has been mapping the EEZ floor both with Sea Beam, a high-resolution bathometer that measures water depth, and with extremely precise navigation systems. Yet most of these maps have never surfaced in the public domain. Concerned that detailed maps would help foreign submarines navigate undetected through U.S. waters, the Navy persuaded the White House in 1985 to prohibit release of Sea Beam data without Defense Department approval (SN: 3/15/86, p.170). For the last four years, NOAA officials have tried to convince the Navy to reconsider.

This year the appeals paid off. In late March, Oceanographer of the Navy Admiral Richard F. Pittenger wrote a letter to NOAA Administrator William Evans announcing that "most" data from the EEZ could soon be released for public use. One exception, exit routes for ballistic missile submarines, will remain controlled. Lt. Bruce Hillard of NOAA's Ocean Mapping Section in Rockville, Md., says the agency has yet to receive official notice concerning which specific areas will remain classified, but that NOAA hopes to begin releasing the Sea Beam data shortly. So far, the agency has produced some 25 maps, covering roughly 2 percent of the EEZ.

The high-resolution maps will be vast improvements over old bathymetric plots. Sea Beam's sonar covers a broad swath of seafloor, allowing a ship to map an entire area by tracking back and forth in well-spaced lines. Older techniques measured only the depths directly beneath a ship. Since mapping ships made tracks 5 to 10 miles apart in offshore areas, cartographers had to fill the gaps with their imagination, making the available maps very subjective, Hillard says.

Methane clouding up the twilight

Rising concentrations of atmospheric methane may be creating a phenomenon called noctilucent clouds that light up the twilight in certain areas of the world. Forming at the top of the mesosphere, about 85 kilometers above the surface, these clouds are the highest on Earth. They appear in summertime at latitudes between Paris and the Arctic Circle and at comparable latitudes in the Southern Hemisphere.

"What we're seeing here is a very visible, very dramatic sign that the atmosphere is changing," says Gary E. Thomas of the University of Colorado in Boulder. In the April 6 *NATURE*, Thomas and his colleagues report that methane — accumulating at a rate of more than 1 percent per year — has stimulated the formation of noctilucent clouds because it breaks down to form water vapor upon reaching the stratosphere. This water vapor rises into the extremely dry mesosphere and condenses onto particles to form clouds.

Before the late 1800s the mesosphere was too dry to create visible clouds, but since then methane levels have slowly added enough water vapor to form noctilucent clouds, Thomas says. Indeed, no sightings of the clouds appear in historical records before 1885, a year when the clouds developed in great numbers. The researchers attribute the many clouds observed in that year to a large volcanic eruption on the Indonesian island of Krakatoa two years earlier, which temporarily injected both water vapor and particles into the mesosphere. Without the eruption, the clouds would have appeared gradually during the early 1900s.

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