

Estimating UV's human cancer risk

Since 1985, the Antarctic's seasonal ozone hole has riveted attention on the importance of stratospheric ozone — that natural filter of the sun's cancer-causing ultraviolet (UV) light. But Jan C. Van der Leun's concern over ozone thinning began even earlier, when modelers were calculating the threat posed by supersonic jets. Though researchers could model how much UV would seep through a thinner ozone layer, Van der Leun knew they couldn't knowledgeably predict human skin's response. So he launched what would become a 20-year investigation to do just that at University Hospital Utrecht in the Netherlands, using the hairless mouse as a human surrogate. In the October *HEALTH PHYSICS*, he and colleague Frank R. de Gruijl describe the culmination of that effort.

It takes about the same UV dose to induce sunburn in humans as it does in hairless mice. What's vulnerable to carcinogenic transformation, however, is not the surface skin, but the proliferating cells below, de Gruijl explains. So he and Van der Leun fine-tuned data on UV's skin carcinogenicity — its action spectrum — in this mouse to account for the longer path UV rays must traverse through human skin.

This adjustment for the long-wavelength (A) portion of the UV spectrum now indicates that UV-A offers five times the human cancer risk seen in the mouse action spectrum. The finding supports earlier warnings about the cancer threat posed by tanning salons that use lamps emitting UV-A (SN: 5/3/86, p.281). In the 1980s, many salons switched to such lamps when cancer concerns erupted over shorter, UV-B wavelengths emitted by the sun and conventional sunlamps. The new human action spectrum now indicates that the longer UV-A exposures needed to create a tan would pose about the same cancer risk as a UV-B tanning dose.

The new human UV action spectrum also indicates that when it comes to a permanent thinning of Earth's ozone, each 1 percent drop in stratospheric ozone could increase the incidence of nonmelanoma skin cancers by 2 percent.

Are your halogens naked?

Two years ago, scientists at the University of Genoa in Italy reported in a letter to *NATURE* data indicating that ultraviolet light from tungsten halogen quartz lamps could induce skin lesions. Their findings came from three gene-toxicity tests and a carcinogenicity assay in 12 mice. Francesco D'Agostini and Silvio De Flora now update that report with data from five separate experiments involving 243 rodents. Their new work demonstrates the ability of halogen light to induce skin tumors in three strains of hairless mice.

All those exposed to the brightest light (10,000 lux) for 12 hours daily developed grossly deforming lesions within 8 months. However, benign and cancerous tumors occurred even with exposure conditions that emulated a 50-watt spotlight at a distance of 2 meters, De Flora and D'Agostini report in the Oct. 1 *CANCER RESEARCH*.

In contrast, the researchers failed to find any tumors in mice exposed to halogen lamps whose UV rays had been filtered out by inserting a plain glass cover over the bottom of the spotlight. Several nations already require such a glass cover for certain models of lamps, though its purpose is to protect consumers if the halogen lamp were to shatter.

The scientists say their findings "leave little doubt that uncovered halogen lamps may be potentially carcinogenic in humans." Frank R. de Gruijl of University Hospital Utrecht agrees, but notes that a colleague's rough calculations suggest long-term exposure to halogen's UV rays would only quadruple a Dutch citizen's lifetime risk of nonmelanoma skin cancer — to perhaps about 4 chances in 100, well below the risk faced by Texas farmers who spend a lot of time in the sun.

Tuberculosis takes off in the air

Although airborne diseases such as influenza and tuberculosis (TB) are no more likely to be transmitted in an airplane than in any other confined space, investigators at the Centers for Disease Control and Prevention (CDC) in Atlanta only now have documented a case of infectious TB caught in flight.

An airline attendant later diagnosed with active pulmonary TB worked on 167 flights while contagious, according to a report in the Oct. 5 *JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION* by CDC's Cynthia R. Driver and her colleagues.

Of the 110 crew members and 59 passengers whom researchers identified as exposed to the attendant when she was most contagious, 30 percent of the crew members and 6.7 percent of the passengers later tested positive on the tuberculin skin test, the authors report. Two of the crew had tested negative before flying with the attendant; none of the others had been tested previously.

The investigators examined the types of aircraft on which the attendant had flown and the air ventilation systems in use but did not uncover any correlation with the transmission of *Mycobacterium tuberculosis*, the bacterium that causes infectious TB.

The authors conclude that the risk of TB was associated with the length of time the crew members and passengers were exposed to the infectious flight attendant.

Testing the waters for gastroenteritis

Scientists and public health officials have long recognized that swimming in ocean water can result in gastrointestinal illness. To monitor water quality, officials in Europe and North America commonly measure the presence of fecal coliform or enterococcal bacteria, both of which can cause gastroenteritis.

Now, a new study shows they apparently have been counting the wrong bacterium in fecal coliform and suggests the need to revise the standards for swimming water quality.

After a 4-year investigation, scientists from the United Kingdom and the United States uncovered evidence that fecal streptococcal bacteria may prove better indicators of water quality than the traditional coliform bacteria. David Kay of the University of Leeds in England, Jay M. Fleisher of the State University of New York Health Sciences Center at Brooklyn, and their colleagues report their findings in the Oct. 1 *LANCET*.

For the study, the scientists sent 1,216 adult volunteers to four U.K. coastal sites that had met European Community water quality standards based on coliform bacteria counts the previous summer. The volunteers were randomly divided into two groups: swimmers and nonswimmers.

The scientists interviewed participants about episodes of gastroenteritis, as indicated by vomiting or diarrhea and either indigestion or nausea accompanied by fever. Of the 548 participants who entered the water, 14.8 percent reported symptoms, while only 9.7 percent of the nonswimmers reported symptoms. No other risk factors, such as consumption of certain foods, could account for the difference in the two groups, the authors say.

The researchers took water samples at regular intervals to measure the number and type of bacteria during the time each volunteer spent in the water. They found no link between the number of fecal coliform bacteria and the occurrence of gastroenteritis. According to the report, the presence of fecal streptococci in the water showed the greatest correlation to the illness.

"Fecal coliform bacteria seem to be of little use in predicting gastrointestinal illness," says Kay. "These findings call into question the relevance of the existing European Community standards for coastal bathing waters."