Temperatures Rising

Sprawling Cities Have the Most Very Hot Days

The urban heat island effect, the phenomenon in which a city has higher temperatures than surrounding countryside, is known to contribute to higher rates of heat-related mortality in summer months when temperatures soar. Although extreme heat events have become more common in large U.S. cities, a new study indicates that sprawling cities experience more than double the rate of extreme heat events in the summer compared with more compact urban areas [*EHP* **118(10):1425–1428; Stone et al.**].

The authors considered 53 U.S. metropolitan areas for which data were available on sprawl and extreme heat event. Sprawl had been assessed in a 2003 study using an index based on land use data from the 2000 census along with measures of population density, average street block size, proximity of homes to businesses, and land use mix. Extreme heat events were defined as days on which the minimum, maximum, or average temperature exceeded the 85th percentile of a base period of 1961–1990.

The authors compared the extent of sprawl for each metropolitan area with that area's average annual rate of extreme heat events from 1956 through 2005. Over the 50 years examined, the number of extreme heat events increased by an average of 14.8 days in cities with the most sprawl (e.g., Atlanta, Tampa, and Grand Rapids), whereas more compact cities (e.g., Chicago, Boston, and Baltimore) saw a lower average increase of 5.6 days of very high temperatures. The observed connection between extreme heat and sprawl was independent of climate zone and variations in size and growth of metropolitan populations. However, data analysis indicated that between 1992 and 2001 the deforestation rate in the most sprawling areas was more than double that of the most compact cities.

The study did not allow for an examination of the differences in rates of heat-related morbidity and mortality between sprawling and compact cities. However, the authors write that the numerous adverse effects associated with urban sprawl (e.g., high levels of ozone, poor water quality, and decreased physical activity) signal a need for public health officials to adopt more risk-reduction strategies such as preserving regional green space, installing green roofs, and replacing vehicular traffic with more public-transit options. They note that many of these strategies can also increase urban resilience to other climate-related risks including increased severe precipitation.

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A Compendium of Challenges

Assessing the State of the Science on Occupational Carcinogens

Uncertainties abound about the adverse health effects of exposure to carcinogens found in today's workplaces. Even with substantial toxicologic evidence of carcinogenicity, cancer risks for humans often remain inconclusive, thus delaying regulatory action and the search for safer alternatives. A new systematic review by the International Agency for Research on Cancer (IARC) identifies research gaps and needs for 20 agents prioritized for review on the basis of evidence of widespread human exposures and potential carcinogenicity in animals or humans [*EHP* **118(10):1355–1362; Ward et al.**].

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Drawing from an international collaboration by 25 health and research agencies and institutions, the report summarizes recommendations and broaches key topics pertaining to several chemicals, metals, dusts, and physical agents for which there is widespread human exposure, predominantly in occupational settings. The authors emphasize that carcinogenic agents can act through multiple pathways and mechanisms, including oxidative stress, epigenetic mechanisms, and immuno- and hormonal modulation. They then discuss overarching issues pertinent to the study of these mechanisms. For example, regarding the validation of oxidative stress biomarker assays, they write, "Research is needed to examine the relationship between exposure to toxic agents and oxidative stress biomarkers, and between these biomarkers and risk of cancer, while controlling for the many individual factors that contribute to oxidative stress."

Concerning genetic susceptibility to carcinogenic exposures, the authors caution that stable and reproducible associations are few. Examining genetic polymorphisms related to carcinogen metabolism and/or DNA repair may aid the identification of higher cancer risks in susceptible subgroups and clarify the role of specific agents in mixed exposures. Nonetheless, the magnitude of such associations may be modest and could entail multiple genes or metabolic pathways—thus making them hard to detect.

The report deals with only a fraction of the potentially carcinogenic agents found in today's workplaces, most of which have sufficient evidence of carcinogenicity in animals but limited evidence for carcinogenicity in humans. Because of a paucity of well-designed animal bioassays and human studies, insufficient evidence exists to evaluate animal or human carcinogenicity for most other agents. The report ends on a somber note, noting that substantial challenges for the study of environmental carcinogens remain, including a recent decline in funding for occupational cancer research, and that fewer scientists are entering the fields of epidemiology, toxicology, and exposure assessment.

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