SPRING 2024

CLIMATE QUARTERLY

The Newsletter of the Expert Resource Group on Climate Change and Environmental Affairs

DON'T MISS THESE EVENTS AT THE 2024 SOCIETY OF INVESTIGATIVE DERMATOLOGY ANNUAL MEETING!

Wednesday, May 15, 2024 | 1:00–5:00 PM | Dallas, TX

PROGRAM

- 1:00-2:00 PM - Climate Change and Dermatology
- 2:00-3:00 PM - Climate Change and Skin Aging
- 3:00-4:00 PM - Climate Change: Clinical Perspectives, Unmet Needs
- 4:00-5:00 PM - Climate Change and Infectious Diseases

IN THIS ISSUE

CLIMATE CHANGE IN THE MEDICAL LITERATURE

by Jordan Bui, MS3 and Markus Boos, MD, PhD

Increased ambient outdoor temperatures are associated with increased disease flaring in hidradenitis suppurativa

Singh R, Fathy R, Kassamali B, et al. Increased ambient outdoor temperatures are associated with increased disease flaring in hidradenitis suppurativa. Arch Dermatol Res. 2023;316(1):49. Published 2023 Dec 18. doi:10.1007/s00403-023-02759-3

A retrospective chart review of patients with HS presenting to the emergency department or dermatology outpatient clinics with disease flares between January 2017 and January 2022 was conducted. Average, maximum, and minimum temperstures during this time frame were obtained from the National Oceanic and Atmospheric Administration and were recorded from the day of visit and 3- and 7-days prior to account for flare development lag time. Statistically significant relationships between increased temperature and HS flares were noted with the highest correlation coefficient associated with the temperature recorded on the 3-day lag time. Previous studies suggest that heat could be a trigger for HS flares, but this study is the first to demonstrate a small but consistent association with increased temperature and disease flares. As a result, incorporating proper sweat management and heat avoidance into management guidelines for HS should be considered, as well as policies aimed to improve indoor cooling and outdoor accommodations. This is especially important as neighborhood-level temperature disparities of up to 25 °F have been identified in urban areas, with lower socioeconomic status associated with higher land surface temperatures compared to neighboring higher socioeconomic status areas. This suggests differential impacts of HS flares on various communities associated with their built environment and socioeconomic status. Understanding the role of heat in precipitating HS flares is crucial for adapting to and treating potential increases in the global burden of HS as Earth's temperature rises.

How climate change is impacting skin care

Doolan, K. How climate change is impacting skin care NPD. Cosmetics Design Europe. Published online March 18, 2024.

When the world reached its highest temperatures in July 2023, Antonio Guterres, the Secretary General of the United Nations said, "the era of global warming has ended, the era of global boiling has arrived." With more heatwaves, droughts, wildfires, and changing air quality, consumers are looking for climate adaptive and protective skin care options. The effects of heatwaves are amplified for individuals living in cities because buildings and roads act as heat islands and re-emit the sun's heat. Businesses are incorporating more natural ingredients from plants or herbs that endure these harsh environmental changes. More companies are also incorporating more sustainable practices such as using raw materials from sustainable and renewable sources and applying green chemistry (the process of reducing the use or generation of hazardous waste).

Heat Island Effect Diagram

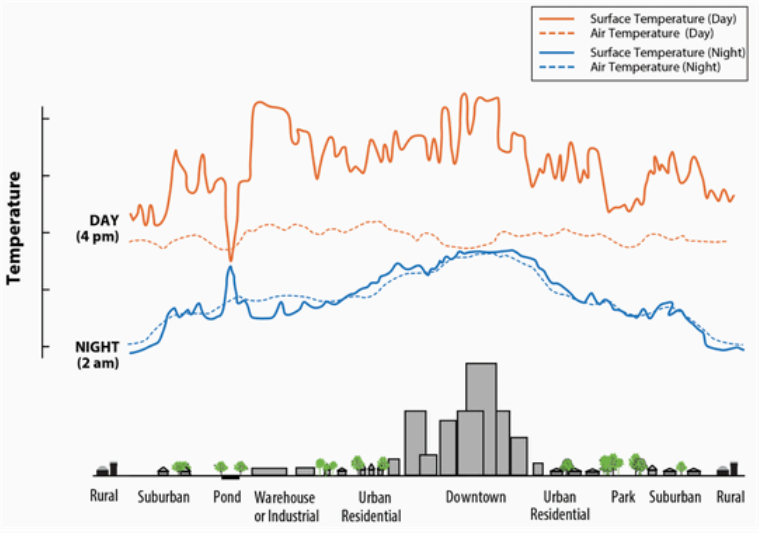


Figure Credit: U.S. Environmental Protection Agency

CONT...CLIMATE CHANGE IN THE MEDICAL LITERATURE

by Jordan Bui, MS3 and Markus Boos, MD, PhD

Environmental exposure to polycyclic aromatic hydrocarbons: An underestimated risk factor for systemic lupus erythematosus onset and progression

Jin H, Zhao C, Chen Y, et al. Environmental exposure to polycyclic aromatic hydrocarbons: An underestimated risk factor for systemic lupus erythematosus onset and progression. Sci Total Environ. 2024;926:171841. doi:10.1016/j.scitotenv.2024.171841

Polycyclic aromatic hydrocarbons (PAH), a type of environmental pollutant found in cigarette smoke and air pollution, may enter the human body through inhalation, ingestion, or dermal contact. Because an association with PAH and systemic lupus erythematosus (SLE) is hypothesized, the authors conducted a case-control study to evaluate the relationship of lifestyle PAH exposure (smoke, passive smoke, residence in an industrial area/proximity to roadways, lack of kitchen exhausts, burning coal/wood for cooking, central heating) and occupational PAH exposure (firefighters, automobile drivers, highway toll collectors, cooks) on SLE incidence. They found patients with active SLE had higher serum long-term PAH concentrations (measured by benzo[α] pyrene-diol-epoxides, a reliable indicator of medium to long-term exposure to PAH) compared to healthy controls. No association between occupational PAH exposure and SLE incidence was found. The authors suggest that the impact of PAH on SLE may be driven by cumulative lifetime exposure underscoring the need to reduce lifestyle-related PAH exposures to prevent SLE onset and progression.

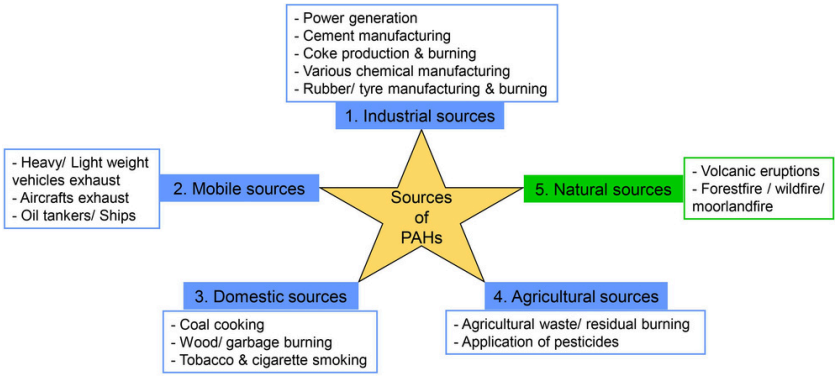


Figure Credit: Patel AB, et al. Polycyclic Aromatic Hydrocarbons: Sources, Toxicity, and Remediation Approaches. Front Microbiol. 2020;5;11:562813.

Impact of climate change on atopic dermatitis: A review by the International Eczema Council

Wang SP, Stefanovic N, Orfali RL, et al. Impact of climate change on atopic dermatitis: A review by the International Eczema Council. Allergy. 2024. doi:10.1111/all.16007

Atopic dermatitis (AD) is the most burdensome skin disease worldwide and is impacted by environment exposures. Individuals with AD are more susceptible to climatic factors such as temperature, humidity, and UV because they can lead to barrier impairment, immune dysregulation, and dysbiosis.

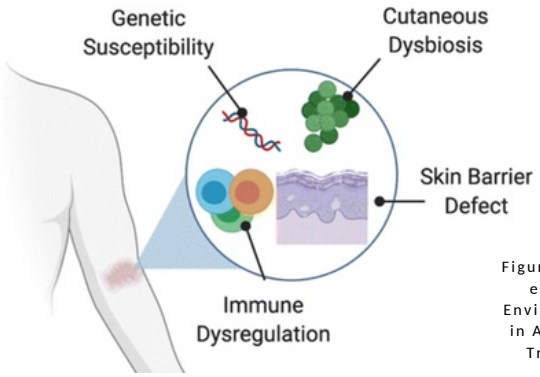


Figure Credit: Stefanovic N, et al. The Role of the Environment and Exposome in Atopic Dermatitis. Curr Treat Options Allergy. 2021;8:222–41

This review highlights the most significant cumulative climatic hazards correlate with an increase in AD prevalence across multiple nations and regions. As clinicians, it is important to recognize how disruptive climate change can be to patients. This includes weather-driven flares that increase healthcare utilization, interruption of access to medications preventing early and effective management of AD, and consideration of how environmental events may trigger psychological stress which can also exacerbate AD.

Advocating for increased clean energy use to reduce our carbon emissions, as well as designing systems to manage periodic surges of healthcare utilization to care for displaced and vulnerable populations is essential. Below, the various climatic factors and their effects in individuals with AD are summarized.

CONT...CLIMATE CHANGE IN THE MEDICAL LITERATURE

by Jordan Bui, MS3 and Markus Boos, MD, PhD

- **Global Warming**: Increased temperatures induce production of proinflammatory cytokines and pruritus that drives the itch-scratch cycles and perpetuates AD. Higher temperatures may also cause earlier and more intense pollen seasons exacerbating allergen-driven flares. However, suberythrogenic UV doses can improve skin barrier function through stimulation of lipid synthesis, activation of antimicrobial peptides, and reduction of S. Aureus colonization. Notably, heat may also have a multifactorial role depending on baseline temperatures and other geographic factors.
- **Wildfires**: Particulate matter from wildfire smoke triggers oxidative stress, inflammation, impaired skin barrier function, aryl hydrocarbon receptor signaling and dysbiosis. The authors noted three studies which demonstrated increasing clinic visits for AD in pediatric patients and older adults (>65 years old) but not in patients ages 18-64 years old.
- **Precipitation**: Studies have shown mixed results on the impact of rainfall and AD. One U.S. study demonstrated that children living in states with higher average annual precipitation had an increased risk of having AD and another study in Korea demonstrated a greater number of clinic visits for AD after heavy rainfall. More research in diverse settings is needed to fully understand the impact of precipitation on AD.
- **Floods**: Taiwanese studies demonstrated increased AD visits among all age groups in a 2-month period following a typhoon and increased pediatric ER visits for AD associated with flooding due irritants in flood water and an increase in allergenic molds. No study directly examined sea level rise and AD; however sea level rise is hypothesized to influence AD via flooding risks and/or human migration.
- **Land Cover Change**: Although evidence supports that AD is more common in urban vs rural environments, two studies that looked at green space exposure and land cover found neither affected AD prevalence. However, what is considered "urban" and "rural" remains vague.

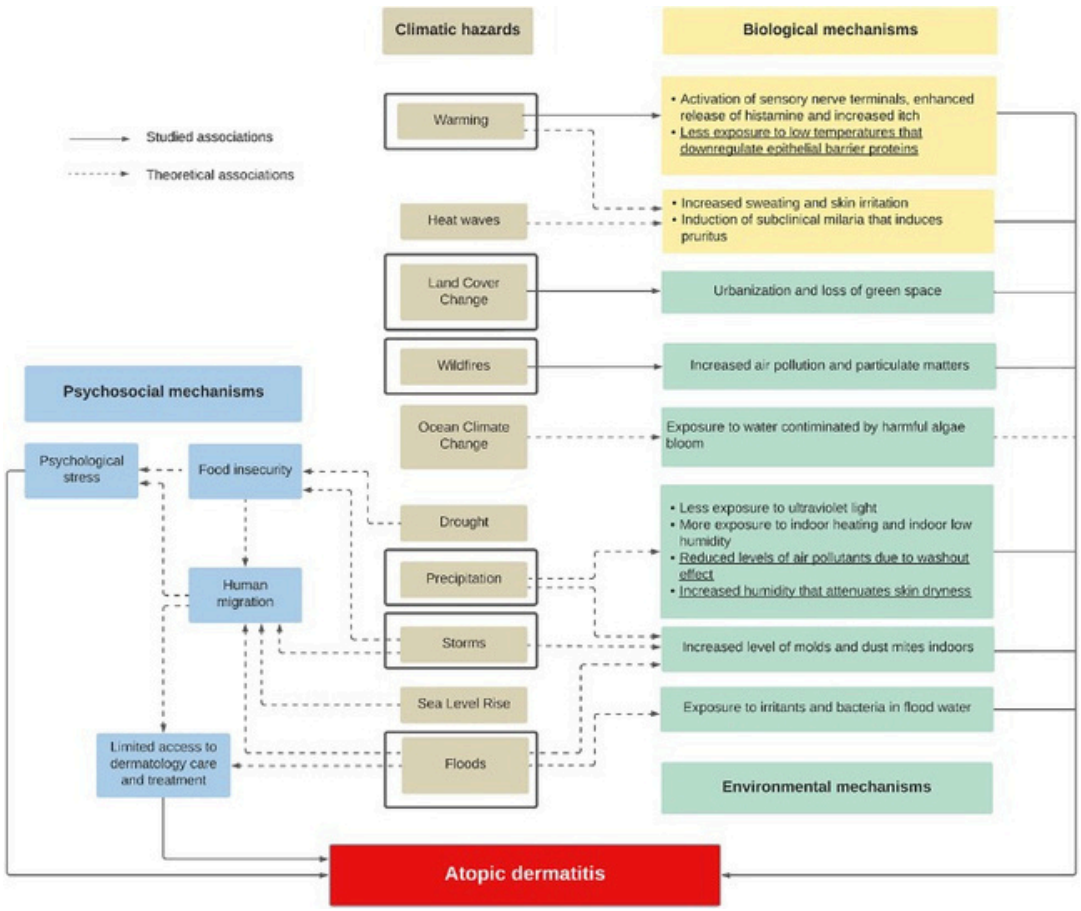


Figure Credit: Wang SP, et al. Impact of climate change on atopic dermatitis: A review by the International Eczema Council. Allergy. 2024.

POLICY UPDATE: PLASTIC POLLUTION'S TOLL ON HEALTH

by Sheng-Pei Wang, MD, MPH and Eva Rawlings Parker, MD, DTMH

In the global fight against plastic pollution, recent policy developments and reports underscore the urgent need to address its detrimental impact on human health. The World Health Assembly's (WHA) adoption of resolution WHA76.17, coupled with the World Health Organization (WHO) Director-General's report on "Climate change, pollution and health: Impact of chemicals, waste and pollution on human health," signal a pivotal moment in recognizing and addressing the health harms of plastic waste and pollution. This is further supported by the efforts of non-governmental organizations including Health Care Without Harm (HCWH), Medical Society Consortium on Climate and Health (MSCCH) and researchers working in this space.

WHA76.17: A Call to Action

Resolution WHA76.17, adopted by the World Health Assembly, amplifies the urgency of addressing the health implications of plastic pollution. It emphasizes the need for comprehensive strategies to mitigate the adverse effects of plastic waste on human health, urging member states to implement measures that reduce plastic production, consumption, and disposal. The resolution was supported by approximately 40 delegations including Canada, Columbia, Costa Rica, Ecuador, Maldives, Mexico, Panama, and the European Commission [1].

Photo Credit: Unsplash

Key highlights of the resolution include:

1. Acknowledgment of Health Risks
WHA76.17 recognizes the significant health risks posed by plastic pollution, including the release of harmful chemicals into the environment and their subsequent impact on human health.

2. Global Strategy and Roadmap:
Member states are urged to strengthen the implementation of global strategies and roadmaps related to health, environment, and climate change, taking a health-in-all-policies approach.

3. Regulatory Frameworks
Encouragement is given for the development and updating of regulatory frameworks, including protocols for national human biomonitoring and surveillance programs for chemicals of concern.

4. Cross-Sectoral Collaboration
The resolution emphasizes the importance of recognizing and acting upon linkages between chemicals, waste, and pollution within the context of other health priorities, and encourages collaboration among different sectors.

5. International Instruments
Member states are encouraged to engage in international negotiations for new regulatory instruments concerning chemicals and waste management, and international bodies are invited to consider the resolution.

6. WHO Actions
The resolution requests the WHO Director-General to undertake various actions, including publishing reports on the health implications of chemicals, waste, and pollution, updating reports on specific topics, providing technical support to countries, and advocating for multisectoral approaches to addressing pollution.

7. Reporting and Monitoring
The Director-General is also asked to report on the implementation of the resolution to subsequent World Health Assemblies and submit progress reports.

CONT...POLICY UPDATE: PLASTIC POLLUTION'S TOLL ON HEALTH

by Sheng-Pei Wang, MD, MPH and Eva Rawlings Parker, MD, DTMH

WHO Director-General's Report: Insights into Health Impacts

The WHO Director-General's report on "Climate change, pollution and health" delves deeper into the intersection of environmental degradation, including plastic pollution, and its consequences for human health [2]. The report discusses the impacts of chemicals, waste and pollution globally and highlights the following key insights:

1. Complex Health Impacts

Climate change, pollution, and the proliferation of chemicals, waste, and plastics have far-reaching implications for public health, exacerbating existing health disparities and increasing the burden of disease.

2. Emerging Evidence

The report underscores the emerging evidence linking plastic pollution to a range of health concernsincluding respiratory ailments, dermatological conditions, and potential carcinogenic effects. It is targeted towards ending plastic pollution from the environment including the marine environment to the greatest possible extent by employing all potentially available resources.

3. Call for Action

It emphasizes the urgent need for coordinated action to mitigate the health risks associated with plastic pollution, urging governments, policymakers, and stakeholders to prioritize environmental health and adopt evidence-based strategies to address the root causes of pollution. It also calls for the need to develop proposals for independent science-policy panels under the United Nations Environment Assembly's Resolution 5/8.

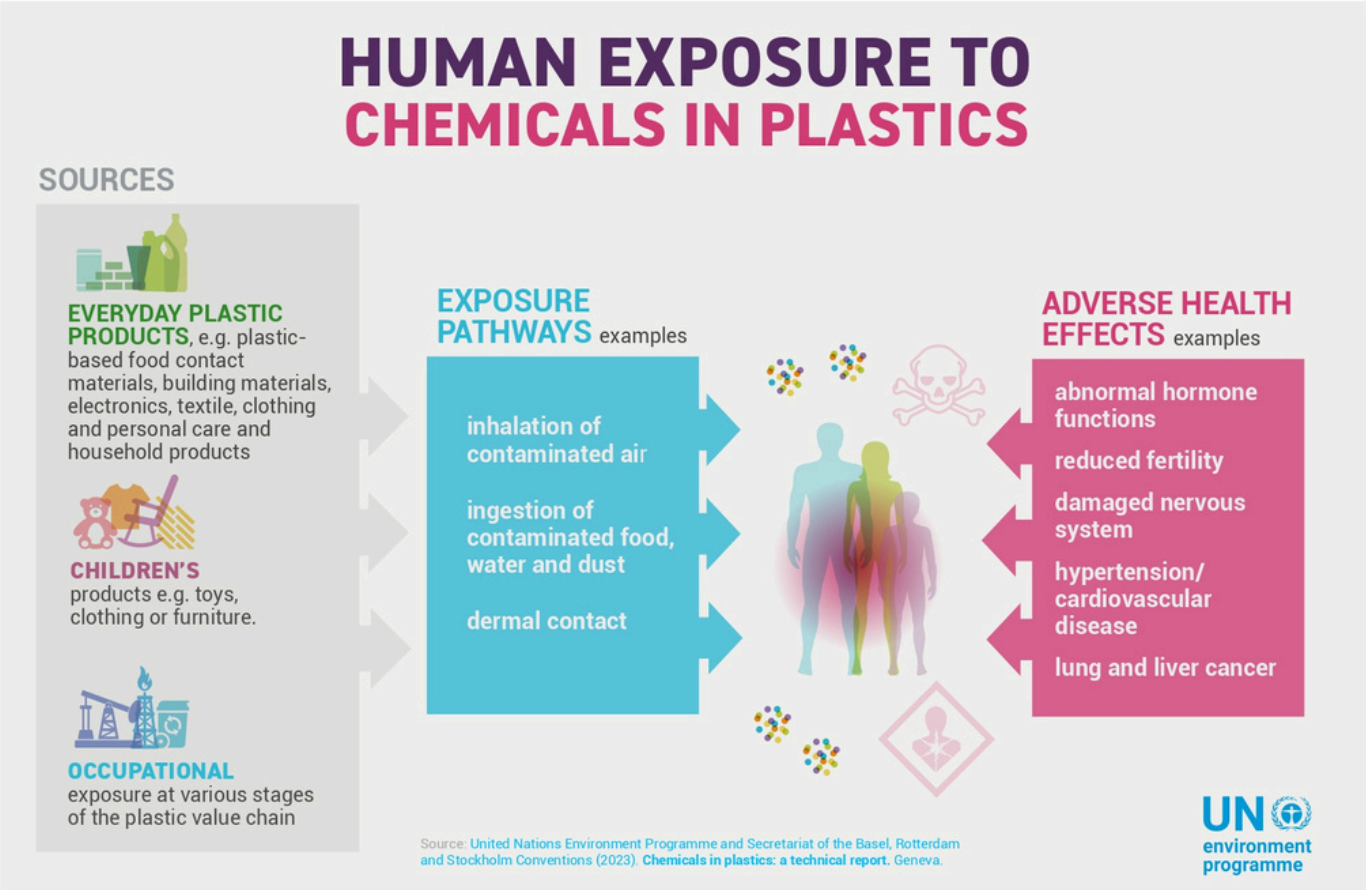


Figure Credit: United Nations Environment Programme

CONT...POLICY UPDATE: PLASTIC POLLUTION'S TOLL ON HEALTH

by Sheng-Pei Wang, MD, MPH and Eva Rawlings Parker, MD, DTMH

Voices from the Medical Community

The Medical Society Consortium on Climate and Health (MSCCH) and Health Care Without Harm (HCWH) have also raised their voices in support of addressing the health impacts of plastic pollution [3]. In a joint letter, they underscored the critical importance of integrating health considerations into policies aimed at reducing plastic waste and pollution [4].

In medical practice, plastic waste is prevalent, ranging from medical supplies and equipment to pharmaceuticals and skincare products, and poses significant environmental and health risks. With over 200 types of solid plastics accumulating in oceans, including microplastics, the extent of their impact on health is alarming [5]. Recent human studies reveal measurable serum concentrations of industrial chemicals which are linked to plastic pollution, highlighting the potential for harm, particularly with respect to carcinogenesis, embryogenesis, endocrine and metabolic dysfunction, neurotoxicity, and homeostatic mechanisms [3,5-10]. Increasingly, research is defining the impact of microplastics on environmental and human health. However, the ubiquitous prevalence of microplastics in the environment, coupled with our continued knowledge gaps regarding these interactions, underscores the urgent need for further investigation into the health risks posed by plastic pollution [5].

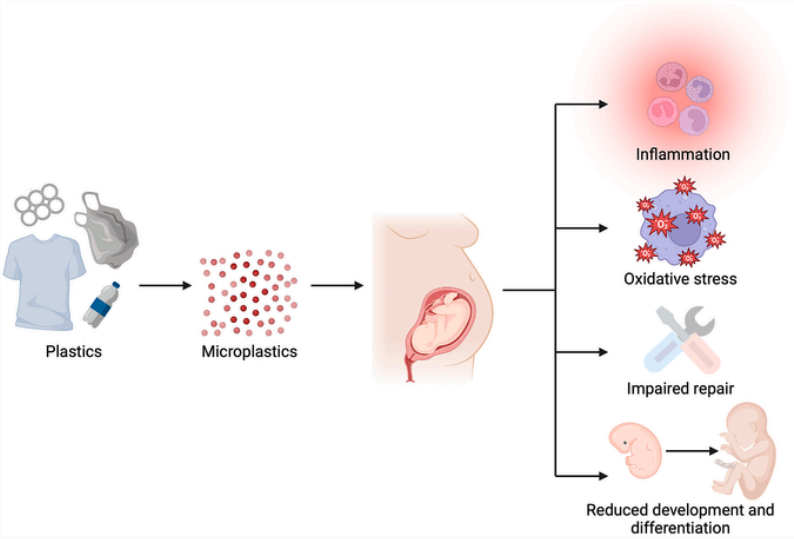


Figure Credit: Hofstede LT, et al. Microplastics: A threat for developing and repairing organs? Cambridge Prisms: Plastics. 2023;1:e19.

Individuals, medical practices, healthcare systems, and medical societies may sign in support of the Open Letter from Health Professionals on the Plastics Treaty. Additionally, HCWH has valuable resources to support healthcare facilities in transitioning to more sustainable practices, reducing their reliance on single-use plastics, and promoting environmentally conscious healthcare delivery [3].

Conclusion

As evidence mounts regarding the health harms of plastic pollution, it is imperative that policymakers, healthcare professionals, and the public alike prioritize collective action to curb its proliferation. The recent policy developments and reports serve as a clarion call to address the intertwined challenges of environmental degradation and public health, paving the way for a healthier and more sustainable future for generations to come.

References

1. World Health Organization. The impact of chemicals, waste and pollution on human health. 76th World Health Assembly, Agenda Item 16.3. 2023. https://apps.who.int/gb/ebwha/pdf_files/WHA76/A76_R17-en.pdf
2. World Health Organization. Climate Change, Pollution and Health—Impact of Chemicals, Waste and Pollution on Human Health. Executive Board 154th Session, Provisional Agenda Item 22. 2023. https://apps.who.int/gb/ebwha/pdf_files/EB154/B154_24-en.pdf
3. Health Care Without Harm. Plastics and Health: An urgent environmental, climate, and health issue. Health Care without Harm. 2022. https://noharm-global.org/sites/default/files/documents-files/7272/HCWH%20-%20Plastics%20and%20health.pdf
4. Open Letter from Health Professionals on the Plastics Treaty, April 2024. https://docs.google.com/document/d/13UULvW-a1YjlB40FffUn5YTeG6mElzQCKcYdsoDYbdQ/edit
5. German Dermatological Society. Plastics in Dermatology.Working Group on Sustainability in Dermatology. 2023. https://agderma.de/en/topics/plastic-in-the-dermatology/
6. Leslie HA, van Velzen MJM, Brandsma SH, et al. Discovery and quantification of plastic particle pollution in human blood. Environ Int. 2022;163:107199. doi: 10.1016/j.envint.2022.107199
7. Akpojevwe Abafe O, Harrad S, Abou-Elwafa Abdallah M. Assessment of human dermal absorption of flame retardant additives in polyethylene and polypropylene microplastics using 3D human skin equivalent models. Environ Int. 2024;186:108635. doi: 10.1016/j.envint.2024.108635
8. Li Y, Tao L, Wang Q, et al. Potential Health Impact of Microplastics: A Review of Environmental Distribution, Human Exposure, and Toxic Effects. Environ Health. 2024;1(4):249–57. https://doi.org/10.1021/envhealth.3c00052
9. Wang Y, Xu X, Jiang G. Microplastics exposure promotes the proliferation of skin cancer cells but inhibits the growth of normal skin cells by regulating the inflammatory process. Ecotoxicol Environ Saf. 2023;267:115636. https://doi.org/10.1016/j.ecoenv.2023.115636
10. Aristizabal M, Jiménez-Orrego KV, Caicedo-León MD, et al. Microplastics in dermatology: Potential effects on skin homeostasis. J Cosmet Dermatol. 2024;23(3):766–72. https://doi.org/10.1111/jocd.16167

ENVIRONMENTALLY SENSITIVE DISEASE: HEALTH HARMS ASSOCIATED WITH MICROPLASTICS

by Eva Rawlings Parker, MD, DTMH and Joshua Kotlyar, MS3

As a reflection of the enormous environmental impact of humans on the planet, the present geological epoch in which we live is deemed the Anthropocene. Beyond the ongoing crisis created by human-driven climate change, our prolific production of and dependence on plastic products is increasingly recognized for its profound effects on both ecosystems and human health. Globally, 430 million metric tons of plastics are produced yearly, with manufacturing predicted to triple by 2060 [1]. Because of their durability and persistence, plastics are now ubiquitous in the environment, and their detrimental impacts carry an enormous economic burden estimated to be $600 billion USD annually, leading many to further dub this epoch the Plasticene [2,3].

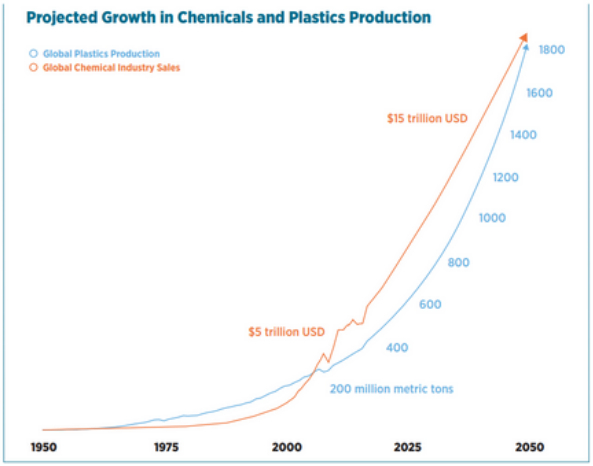


Figure Credit: Center for International Environmental Law. [12]

Fossil fuels are used in 99% of plastic manufacturing, along with >10,000 additive chemicals incorporated during polymerization, many of which are deemed toxic or hazardous [3,4]. Plastic particles are categorized based on size: macroplastics (> 5 mm in size), microplastics (< 5 mm), and nanoplastics (< 0.1 µm) [5]. Primary micro- and nanoplastics (MNPs) are manufactured for inclusion in personal care products, cosmetics, and cleaning products; whereas secondary MNPs result from the breakdown of a macroplastics via physical fragmentation, UV photodegradation, hydrolysis, oxidation, and enzymatic processes [5-7]. Due to their size, ability to float, and durability, MNPs can travel long distances through the air, become incorporated into soil, and easily enter waterways, where they bioaccumulate and are introduced into our food and water supply [6,8].

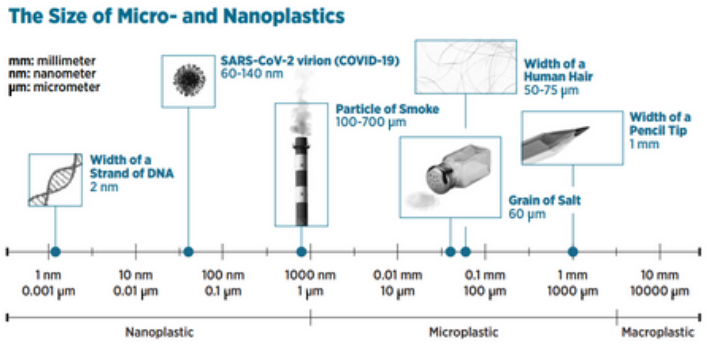


Figure Credit: Center for International Environmental Law. [12]

Because of their tiny size, MNP particles routinely enter the human body through inhalation, ingestion, and transcutaneous absorption via follicular and eccrine ostia [5,7]. In fact, it is estimated that humans ingest ~5 gm of MNPs weekly, analogous to the weight of a credit card [4]. MNP particles may enter the systemic circulation where they bind plasma proteins, cross the blood-brain barrier, are endocytosed, and accumulate in human tissues [4,5,8]. Alarmingly, these particles have been detected in human blood, feces, semen, breast milk, placental tissue, carotid atheromas, and embedded in lung tissue and induce inflammatory pathways, immunologic reactions, endocrine disruption, cytotoxicity, and carcinogenicity [4,5,8-11]. Emerging research has linked MNP exposure to neurodevelopmental and neurocognitive toxicity including behavioral changes, autism, reduced IQ and dementia; reproductive and pregnancy complications such as polycystic ovarian syndrome, infertility, preeclampsia, preterm delivery and low birthweights; cardiometabolic impacts including obesity, diabetes, hyperlipidemia, myocardial infarction, stroke and cardiovascular-related deaths; pulmonary disease including asthma flares, chronic obstructive pulmonary disease and interstitial lung disease, and malignancies including colorectal cancer [1,4,5,8-13].

Little is known about potential cutaneous toxicity arising from MNP exposure in vivo. Cell culture studies have linked MNPs to the production of reactive oxygen species (ROS) and activation of the NLRP3 inflammasome, leading to apoptosis in healthy cell lines and tumor cell proliferation in squamous cell carcinoma lines, suggesting MNPs may play are role in cutaneous carcinogenesis [14].

CONT...ENVIRONMENTALLY SENSITIVE DISEASE: HEALTH HARMS ASSOCIATED WITH MICROPLASTICS

by Eva Rawlings Parker, MD, DTMH and Joshua Kotlyar, MS3

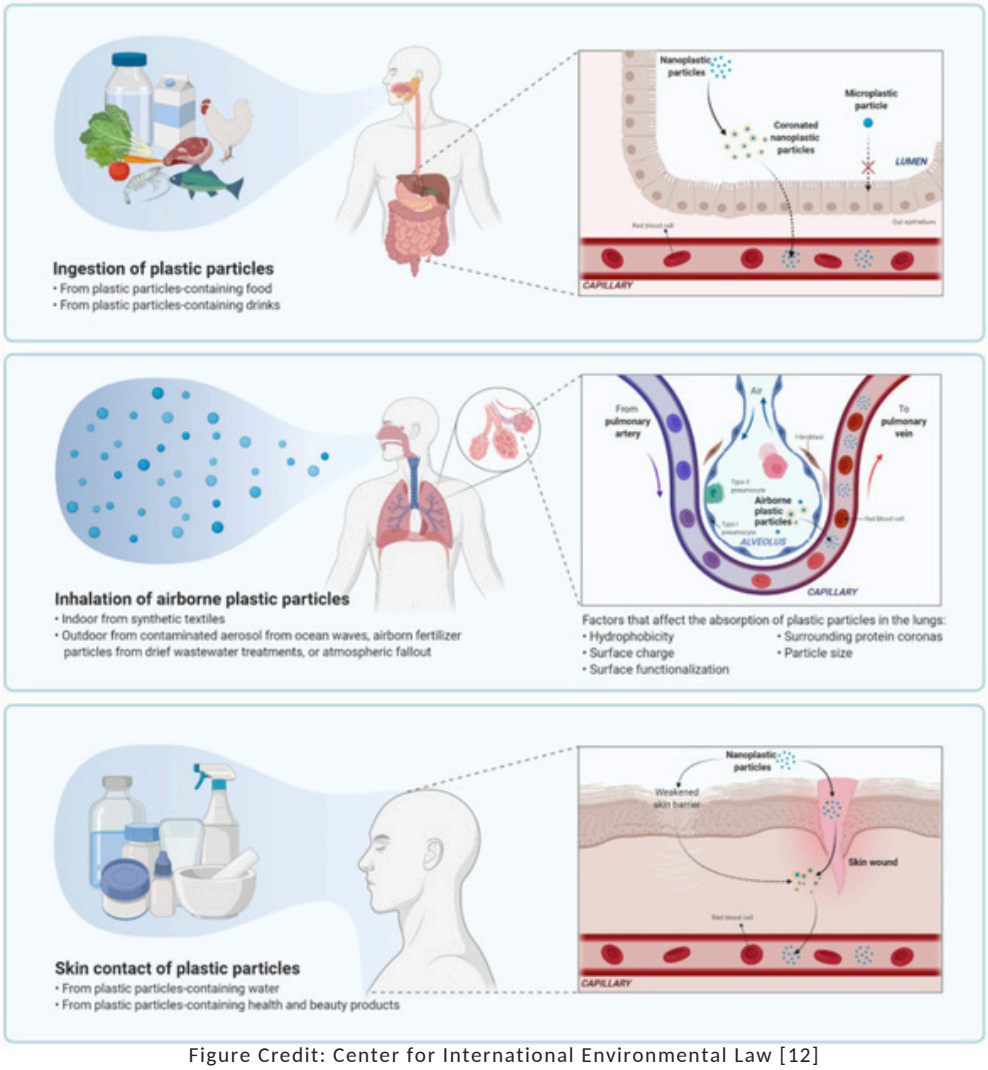


Figure Credit: Center for International Environmental Law [12]

Additionally, MNPs induce genotoxic effects in HaCaT keratinocyte cell cultures including oxidative stress, activation of signaling pathways via the Nrf2 transcription factor, induction of the AIM2 inflammasome, cytokine release (interleukins-1, 6, 10, 18, 17, 22 and tumor necrosis factor alpha), alteration in cellular architecture, cell senescence, and apoptosis [7,15,16]. Exposure to polystyrene MNPs in mouse models similarly demonstrated induction of ROS and apoptosis in skin and hair follicles as well as structural alteration of the hair follicle through disruption of tight junctions, promoting delayed anagen and subsequent alopecia [17]. Whether these pathways induce or exacerbate autoinflammatory or neoplastic processes and translate directly to skin disease pathogenesis is largely unknown. Although prenatal exposure to bisphenol A (BPA) and phthalates, compounds that commonly leach from MNPs, is linkedto the development of infantile atopic dermatitis, few other human studies exist [18]. Consequently, our understanding of the impacts of MNPs systemically and locally in the skin remains limited with respect to the precise molecular pathways and epigenetic modifications that may lead to cutaneous disease.

Beyond the downstream detrimental effects on ecosystems and humans that stem from MNP exposure, it is important to note the front end environmental and health harms that result from the production of plastics. Petrochemicals for plastic manufacturing are largely sourced through fracking. Additionally, large quantities of greenhouse gases and pollution are released during their industrial manufacture with an estimated 232 million tons of CO_2 equivalent emissions annually. In the U.S., plastic production is concentrated in Texas and Louisiana with

CONT...ENVIRONMENTALLY SENSITIVE DISEASE: HEALTH HARMS ASSOCIATED WITH MICROPLASTICS

by Eva Rawlings Parker, MD, DTMH and Joshua Kotlyar, MS3

manufacturing facilities situated in communities of color and low-income neighborhoods [2]. As a result, these fenceline communities face disproportionate health impacts from the pollution produced by plastic manufacturing, underscoring how increasing plastic consumption perpetuates environmental injustice and health disparities.

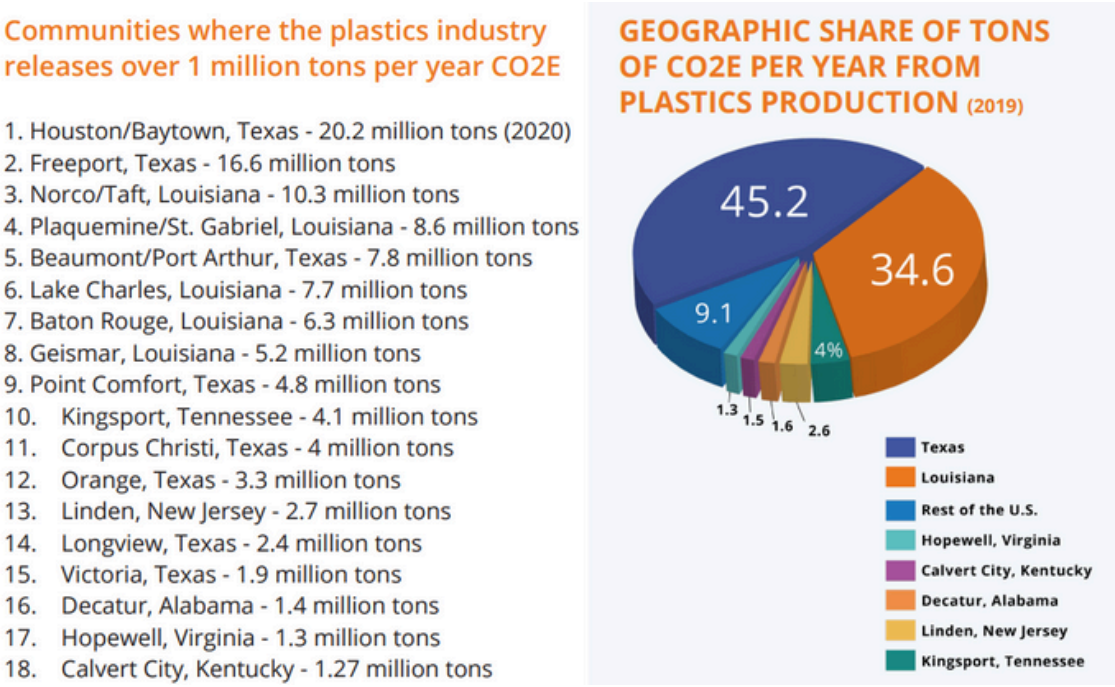


Figure Credit: Vallette J, et al. Beyond Plastics Report [2]

Plastics dominate our daily lives and are found in everything from clothing to food packaging to furniture, while single use medical supplies and packaging for pharmaceutical and personal care products serve as important sources of plastic pollution stemming from our delivery of dermatologic care [1,4,6]. Limiting our profession's contribution to plastic pollution will require strong policies rooted in science along with meaningful commitments from the health sector. These include leveraging innovation in the development of non-petrochemical-based, biodegradable plastic alternatives, improved sustainability of the supply chain, reduction in the consumption of plastics in our practices and personal lives, novel disposal options, and greater commitments to a circular economy such as reprocessing of single use items when appropriate and expansion of plastic upcycling and recycling programs. Additionally, we can insist upon institutional divestment from the fossil fuel and petrochemical industries and push our medical societies for improved education on the health harms of MNPs and greater advocacy and lobbying for reduction in plastic pollution. Lastly, to close the existing knowledge gaps, much more research is needed in dermatology to elucidate the role of MNPs in the exposome and its influence on epigenetic, immunologic, inflammatory, metabolic, and neoplastic processes that result in cutaneous disease.

References

1. World Health Organization. Climate Change, Pollution and Health—Impact of Chemicals, Waste and Pollution on Human Health. Report of the Director-General. Executive Board 154th Session, Provisional Agenda Item 22. 2023. https://apps.who.int/gb/ebwha/pdf_files/EB154/B154_24-en.pdf
2. Vallette J, et al. The New Coal: Plastics & Climate Change. Beyond Plastics Report. Bennington, VT. 2021. https://www.beyondplastics.org/s/REPORT_The_New-Coal_Plastics_and_Climate-Change_10-21-2021.pdf
3. Williams AT, et al. The past, present, and future of plastic pollution. Mar Pollut Bull. 2022;176: 113429. doi: 10.1016/j.marpolbul.2022.113429
4. Plastic Pollution Coalition. Microplastics, Nanoplastics, and You. 2023. https://www.plasticpollutioncoalition.org/blog/2023/1/27/microplastics-nanoplastics-and-you#
5. Yee MSL, et al. Impact of Microplastics and Nanoplastics on Human Health. Nanomaterials. 2021;11(2):496. doi:10.3390/nano11020496
6. Duis K, et al. Microplastics in the aquatic and terrestrial environment: Sources with a specific focus on personal care products, fate and effects. Environ Sci Eur. 2016;28(1):2. doi:10.1186/s12302-015-0069-y
7. Aristizabal M, et al. Microplastics in dermatology: Potential effects on skin homeostasis. J Cosmet Dermatol. 2024;23(3):766-72. doi:10.1111/jocd.16167
8. Browne MA, et al. Accumulation of Microplastic on Shorelines Woldwide: Sources and Sinks. Environ Sci Technol. 2011;45(21):9175-9. doi:10.1021/es201811s
9. Li Y, et al. Potential Health Impact of Microplastics: A Review of Environmental Distribution, Human Exposure, and Toxic Effects. Environ Health. 2023;1(4):249-57. doi:10.1021/envhealth.3c00052
10. Gruber MM, et al. Plasma proteins facilitates placental transfer of polystyrene particles. J Nanobiotechnology. 2020;18(1):128. doi:10.1186/s12951-020-00676-5
11. Marfella R, et al. Microplastics and Nanoplastics in Atheromas and Cardiovascular Events. N Engl J Med. 2024;390(10):900-10. doi:10.1056/NEJMoa2309822
12. Carlini G. Breathing Plastic: The Health Impacts of Invisible Plastics in the Air. Center for International Environmental Law Brief. 2023. https://www.ciel.org/wp-content/uploads/2023/03/Breathing-Plastic-The-Health-Impacts-of-Invisible-Plastics-in-the-Air.pdf
13. Li S, et al. Could Microplastics Be a Driver for Early Onset Colorectal Cancer? Cancers (Basel). 2023;15(13):3323. doi:10.3390/cancers15133323
14. Wang Y, et al. Microplastics exposure promotes the proliferation of skin cancer cells but inhibits the growth of normal skin cells by regulating the inflammatory process. Ecotoxicol Environ Saf. 2023;267:115636. doi:10.1016/j.ecoenv.2023.115636
15. da Silva Brito WA, et al. Sonicated polyethylene terephthalate nano- and micro-plastic-induced inflammation, oxidative stress, and autophagy in vitro. Chemosphere. 2024;355:141813. doi: 10.1016/j.chemosphere.2024.141813
16. Han W, et al. Nano-sized microplastics exposure induces skin cell senescence via triggering the mitochondrial localization of GSDMD. Environ Pollut. 2024;349:123874. doi: 10.1016/j.envpol.2024.123874
17. Li Q, et al. Aged polystyrene microplastics exacerbate alopecia associated with tight junction injuries and apoptosis via oxidative stress pathway in skin. Environ Int. 2024 Apr;186:108638. doi: 10.1016/j.envint.2024.108638
18. Lee S, Park SK, Park H, et al. Joint association of prenatal bisphenol-A and phthalates exposure with risk of atopic dermatitis in 6-month-old infants. Sci Total Environ. 2021;789:147953. doi: 10.1016/j.scitotenv.2021.147953

GREEN OFFICE TIPS: EASY WAYS TO REDUCE PLASTIC IN YOUR PRACTICE

by Eva Rawlings Parker, MD, DTMH, David Fivenson, MD, Rachel Goodman, MS4, and Genevieve Silva, MS4

- **Sharps Sustainability**: Consider using plain razor blades for shave biopsies in lieu of dermablades which have a plastic casing.

- **Reusable Surgical Instruments**: Utilize reusable, autoclavable curettes and scalpel handles rather than disposable ones which have plastic handles.

- **Handwashing**: Encourage staff to prioritize handwashing over glove usage when appropriate, reducing unnecessary plastic waste.

- **Plastic Alternatives:** Use paper bags for product samples given to patients, not plastic bags. Also explore biodegradable bags and liners for trash cans.

- **Green Cleaning Practices**: Use environmentally friendly cleaning products and refillable containers to reduce carbon footprint, toxic chemicals, and plastic waste.

- **Biologic Home Delivery:** If allowable by insurance, consider prescribing a 3-month supply for patients and using pharmacies such as Optum which ship in reusable, biodegradable coolers.

- **Procurement:** Collaborate with suppliers to identify sustainable medical products/equipment to avoid hazardous plastics and reduce overall consumption.

- **Recycle and Reuse:** Recycle or reuse common use plastic and when appropriate, donate expired and unused medications, products, and supplies to an underserved clinic or animal rescue.

- **Circular Economy:** Partner with organizations such as Polycarbin, a circular resource organization specializing in upcycling scientific plastics into new products rather than disposing of them.

- **Eco-Friendly Dining:** For catered lunches, use paper plates and cups and biodegradable utensils, or better yet get rid of all disposables and invest in glassware, metal utensils, and ceramic dishes.

- **Hydration Innovation**: Eliminate single-use plastic water bottles in favor of installing a filtered water dispenser and gifting employees reusable water bottles with your practice logo.

STUDENT SPOTLIGHT: CLIMATE-HEALTH EDUCATION PILOT LECTURE AT GEORGETOWN UNIVERSITY SCHOOL OF MEDICINE

by Jordan But, MS3

Medical students recently delivered Georgetown University's first ever required climate-health didactic during the pre-clinical curriculum. This idea was conceived by Dean Susan Cheng, who recruited four students serving on Georgetown's Council on Diversity Affairs to bring this to fruition: Marguerite (Daisy) Furlong, Jordan Bui, Maya Shah, and Presley Simmons. We began with the Planetary Health Report Card (PHRC), which evaluates institutional commitments to sustainability and climate-health education within medical school curriculum in order to advocate for increased climate-health engagement and education.

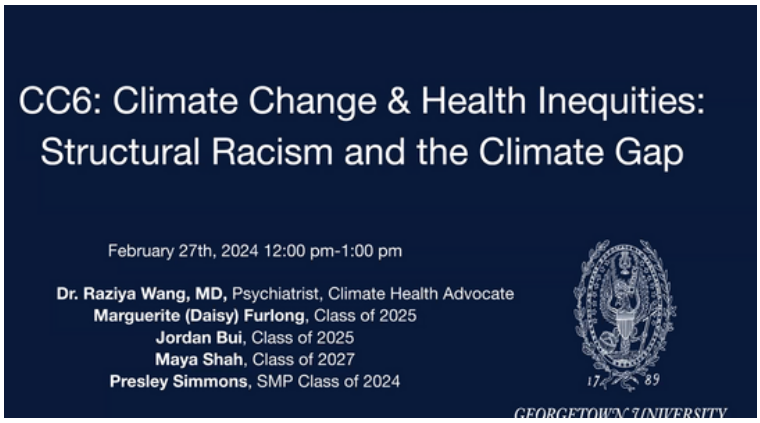


Photo Credit: Georgetown University School of Medicine

Because Georgetown's curriculum was among low-scoring medical schools nationally, receiving a PHRC grade of C for our curriculum, we sought to rectify this by designing a one-hour virtual lecture to cover a broad range of climate-health topics. We invited Dr. Raziya Wang, a psychiatrist and climate-health advocate, to give an introduction on climate change and its impacts on our health. During the second half of the lecture, we used the Climate Resources for Health Education (CRHE) templates from the Global Consortium for Climate and Health Education to lead interactive discussions on three clinical vignettes, while also sharing climate-related information specific to the Washington DC area. The selected vignettes focused on the top 3 impacts of climate change as identified by the World Health Organization's 2022 Health and Climate Change Urban Profile of Washington DC including lower air quality, extreme/urban heat, and flooding.

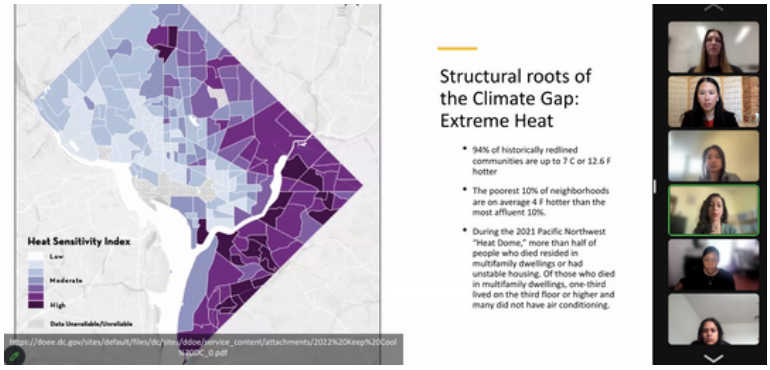


Photo Credit: Georgetown University School of Medicine

The pilot lecture received tremendous positive feedback with many students in attendance expressing gratitude for this new opportunity to engage in dialogue around climate-health topics. This first lecture was just the beginning, as medical students at Georgetown University are now designing a comprehensive curriculum for climate and health to be incorporated longitudinally throughout their medical education. To learn how your institution ranks, check out the results of the 2024 PHRC. Critically evaluating the planetary health curriculum at your medical school may spark similar initiatives to develop robust educational opportunities around the health impacts of climate change, the need for sustainable healthcare, and our role in advocacy as healthcare providers. For those eager to incorporate climate-related education into their lectures, check out CRHE's dermatology-specific slide decks and problem-based learning cases on skin cancer and autoinflammatory diseases.

Photo Credit: Georgetown University School of Medicine

ERG HAPPENINGS

FOCUS ON CLIMATE CHANGE AT UPCOMING DERMATOLOGY MEETINGS

SOCIETY OF INVESTIGATIVE DERMATOLOGY 2024 ANNUAL MEETING

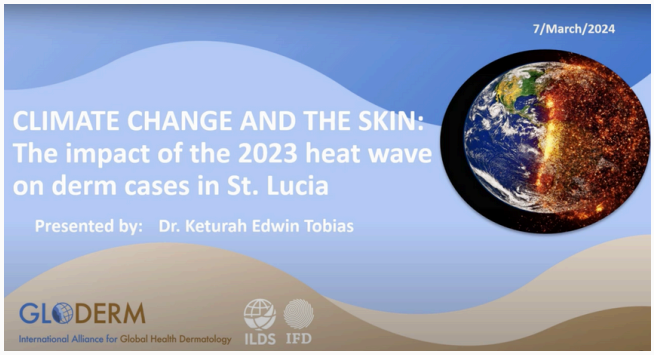
Wednesday, May 15, 2024 | 1:00–5:00 PM | Dallas, TX
Program: https://www.sidannualmeeting.org/schedule/
1:00-2:00 PM - Climate Change and Dermatology
2:00-3:00 PM - Climate Change & Skin Aging
3:00-4:00 PM - Climate Change: Clinical Perspective Unmet Needs
4:00-5:00 PM - Climate Change & Infectious Diseases

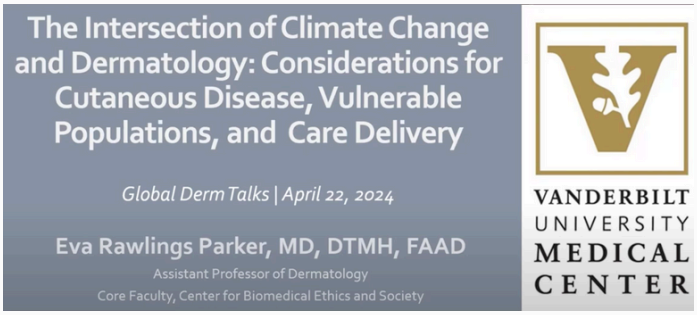
2024 AMERICAN ACADEMY OF DERMATOLOGY INNOVATION ACADEMY

SUNRISE SESSION: SUN01 - PRACTICAL ENVIRONMENTAL SUSTAINABILITY FOR DERMATOLOGISTS
Friday, August 2, 2024 | 7:30–8:30 AM | Seattle, WA
Program: https://www.aad.org/member/meetings-education/ia24/education
Session details: https://ia2024.aad.org/sessions/17164

EXPLORE THE CLIMATE-SKIN HEALTH NEXUS: RECENT TALKS & INSIGHTS

The **GLODERM Pre-AAD Scientific Meeting** took place in San Diego, CA on March 7, 2024. The meeting centered on the topic of "Global Skin Health in Vulnerable Populations: The Impact of Neglected Diseases and Climate Change." Check out the recordings here.





On April 22, 2024, **Global Dermatology Talks** features a special Earth Day webinar on "The Intersection of Climate Change and Dermatology: Considerations for Cutaneous Disease, Vulnerable Populations, and Care Delivery."

LEARN ABOUT ENVIRONMENTAL JUSTICE

MEDICAL SOCIETY CONSORTIUM ON CLIMATE AND HEALTH: CLIMATE & HEALTH EQUITY WEBINAR SERIES 2024

Register here for this virtual event.

As the effects of climate change become increasingly evident, we are faced with a growing number of extreme weather events such as severe storms, hurricanes, droughts, and flooding. These events have a significant impact on human health, especially in vulnerable communities. In this webinar, Dr. J. Marshall Shepherd, Georgia Athletic Association Distinguished Professor of Geography and Atmospheric Sciences at the University of Georgia, will share his insights on the role of meteorologists in climate education and how physicians might collaborate with them to address climate and health equity, particularly in underserved communities and communities of color.

CLIMATE CHANGE & HUMAN HEALTH ECHO PROGRAM

Join the **University of New Mexico's Climate Change & Health ECHO Program**, focusing on "Global Nuclear & Environmental Threats Critical to Climate Change & Human Health."

When: 1st & 3rd Wednesdays, Bi-Weekly, 11 a.m.-12 p.m. PT/12 p.m.-1 p.m. MT/ 2 p.m.-3 p.m. ET, March 6 – May 15

Future Session:

- **May 15th:** Environmental Justice and Environmental Toxicities Panel

Program: Visit the webpage for details.

How to Join: Register via Zoom.

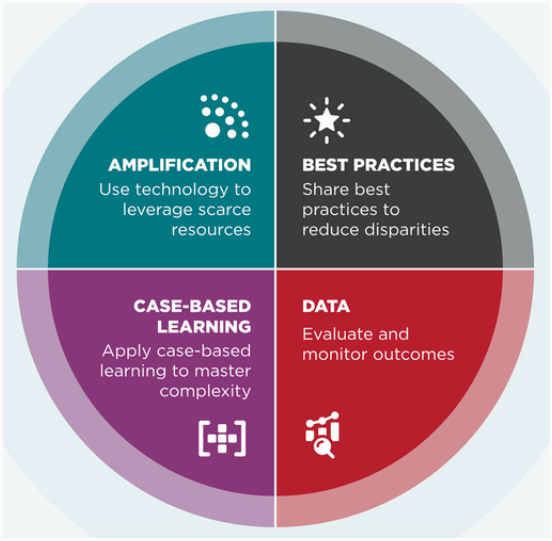


Photo Credit: UNM Health Sciences, Project ECHO

GET INVOLVED & STAY INFORMED

We have an ERG website: www.climatedermatology.com which includes archived editions of our Newsletter. Stay tuned as we build out more content on this site.

Do you have an idea for the Newsletter or want to write an article? Great! We welcome your contributions. Please submit your idea **here**.

We also have multiple opportunities for medical students, residents, fellows, and practicing dermatologists to engage in meaningful work with our ERG's Committees including Communication & Education, Outreach, and Special Projects & Initiatives. Sign up **here** or contact us at **climatedermatology@gmail.com** if you would like to volunteer or join our ERG's mailing list.

ERG Leadership

Misha Rosenbach, MD – ERG Co-Chair

Eva Rawlings Parker, MD, DTMH – ERG Co-Chair

Tim McCalmont, MD – ERG Secretary/Treasurer

Mary Maloney, MD – AAD Representative to MSCCH

Mary Williams, MD - Immediate-Past ERG Co-Chair

Divya Sharma, MD – Assistant to the ERG

ERG Newsletter Staff

Editor – Eva Rawlings Parker, MD, DTMH

Student Editor – Rachel Goodman, MBA, MS4

Contributors - Markus Boos, MD, PhD

David Fivenson, MD

Sheng-Pei Wang, MD, MPH

Genevieve Silva, MS4

Jordan Bui, MS3

Joshua Kotlyar, MS3

ERG members at the 2024 American Academy of Dermatology Annual Meeting