SPRING 2025

CLIMATE QUARTERLY

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

DERMATOLOGISTS FOR CLIMATE ACTION

Welcome to our spring newsletter! We have many exciting announcements to share. Our members led outstanding sessions on climate change and dermatology at the AAD 2025 Annual Meeting which were met with overwhelming enthusiasm and support, and our largest turn out yet. We are excited to continue our work in climate advocacy this academic year, and we hope you will join us!

IN THIS ISSUE

CLIMATE CHANGE IN THE MEDICAL LITERATURE

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

Dermatological societies and their climate change and sustainability commitment through 2024

Niebel D, Tso S, Parker E, Rosenbach M, et al.
JEADV. 2024, doi:10.1111/jdv.20488

A three-question survey was sent to 201 dermatological associations assessing: 1) does the society acknowledge climate change 2) does the society incorporate measures about climate change or environmental sustainability, and 3) is there member activity around these topics. Of the twenty two respondents, 19 stated their organizations explicitly acknowledge climate change and 8 implemented measures around this topic into their governance. The authors also found that there was a gap in member interest and activities such as research projects, review articles, advocacy, and presentations and larger organizational efforts. They hypothesize that the low response rate may be indicative of a lower priority of climate change and sustainability in dermatologic professional associations. Because of the importance in medical associations in leading policymaking, dermatologic societies should acknowledge climate change and its impact and advocate for sustainable healthcare solutions. Potential problem-solving areas proposed by the authors include the following:

- Increased utilization of teledermatology to reduce patient and staff travel.
- Prioritization of research funding on greenhouse gas (GHG) emissions for therapeutic interventions with the intent of incorporating environmental impacts in clinical decision making.
- Incorporation of sustainability and climate change into educational curricula for trainees and nurses.
- Provision of a virtual or hybrid conference formats to reduce travel-related GHG emissions.

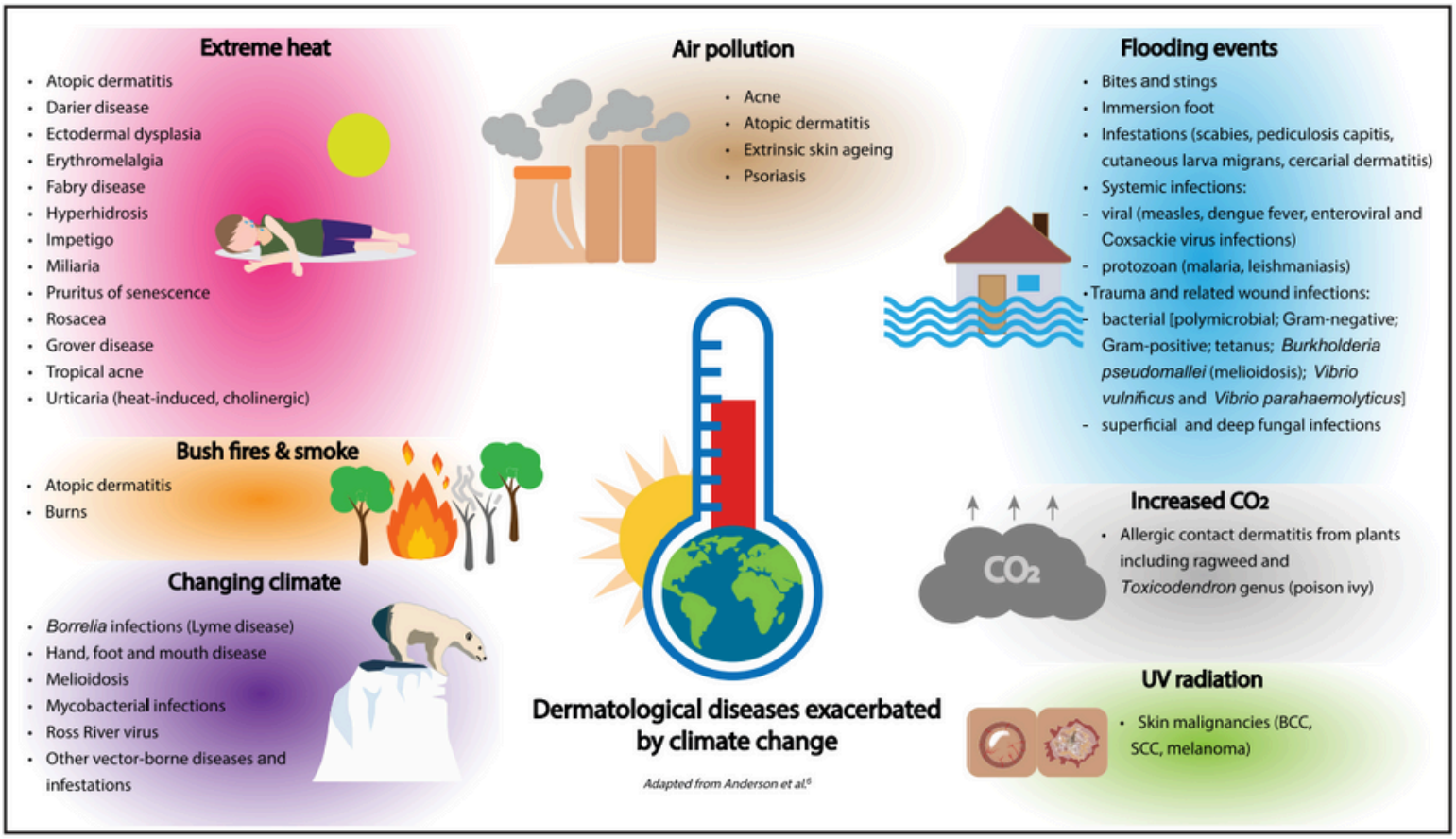
Dermatological care in a changing climate: a framework for patient management

Tan E, Scarff C, Anderson A, Saunderson R, et al.
Clin Exp Dermatol. 2024;49(11):1450-2.
doi:10.1093/ced/llae227

The authors developed a framework to help clinicians manage dermatologic conditions while also considering climate change (see figure on page 3). The first step is to recognize skin conditions worsened by climate change and those populations more susceptible to these risks, including the elderly, pregnant women, children, Indigenous Peoples, and individuals with an intellectual disability or pre-existing dermatological conditions. Dermatologists should then take a comprehensive, climate-change focused history including exposure to heat, UV, air pollution/wildfire smoke, and extreme weather events to tailor adaptive strategies for patients such as encouraging hydration, monitoring air quality indices, or minimizing time outdoors when UV index, temperature, or mosquito populations are high. Thus, patients feel empowered to respond to the changing climate and remain vigilant about their health. The final step is to provide specific medical treatment for patients' respective concerns including topical steroids for inflammatory conditions or wound dressings for infections. Besides dermatologists, primary care physicians, nurses, and the general public must also be aware of the effects of climate change on skin and general health to optimize patient care.

CONT...CLIMATE CHANGE IN THE MEDICAL LITERATURE

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

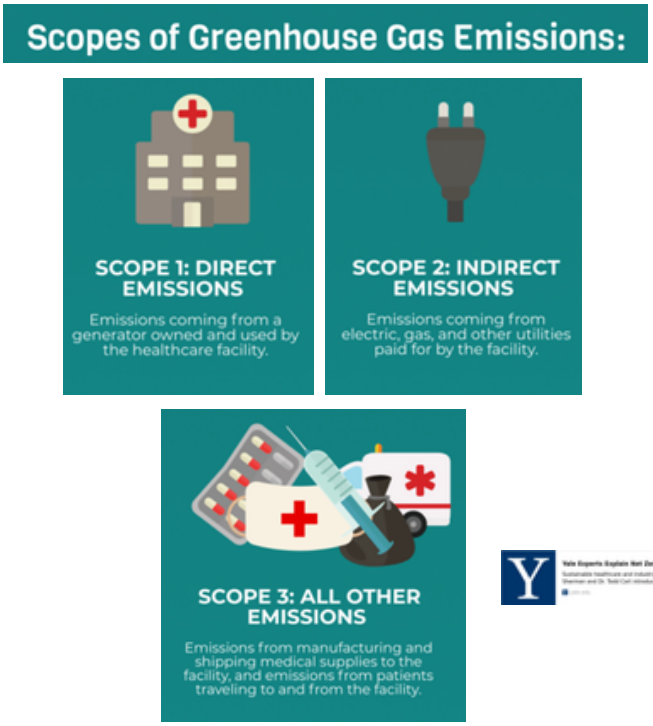


With permission from the authors Tan et al. 2024. doi:10.1093/ced/llae227

Carbon Footprint Analysis of an Outpatient Dermatology Practice at an Academic Medical Center

Silva GS, Waegel A, Kepner J, et al. JAMA Dermatol. 2025;161(2):191-7. doi:10.1001/jamadermatol.2024.5669

Carbon footprint analyses can help identify areas for sustainable improvement in healthcare settings. The authors of this paper conducted a comprehensive carbon footprint analysis of an outpatient dermatology clinic at Penn Medicine in Philadelphia, which has nearly 30,000 annual visits. Following the GHG Protocol Corporate and Corporate Value Chain reporting standards, the total carbon footprint in FY 2022 was 323.6 tCO2e.



CONT...CLIMATE CHANGE IN THE MEDICAL LITERATURE

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

Carbon Footprint Analysis of an Outpatient Dermatology Practice at an Academic Medical Center (*Continued*)

These emissions were composed of the following:

Scope 1 (direct GHG emissions from sources owned or controlled by Penn Medicine): 8.2 tCO2e (2.5%)

- Includes refrigerants (type, number, volume of chillers located in the dermatology clinic).

Scope 2 (emissions from the generation and import of energy carriers, such as steam and electricity, consumed in the clinic): 149.9 tCO2e (46.3%)

- Includes steam, chilled water, and electricity (listed in descending order of contributing emissions).
- In calculating electricity usage, a manual audit was performed after operating hours to record number and type of light fixtures and appliances requiring outlets in all clinic areas.

Scope 3 (indirect emissions generated by upstream and downstream activities associated with the clinic): 165.5 tCO2e (51.1%)

- Includes waste, purchased goods and services and upstream transportation such as business, employee and patient travel.
- The majority of emissions came from purchased goods and services including chemical and pharmaceutical products and medical instruments. Regulated medical waste (RMW), which made <50% of clinic waste measured by weight, accounted for the majority of GHG emissions from waste. This disproportionate impact is consistent with the high emissions produced from processing RMW.

The study's results were consistent with prior literature characterizing the carbon footprint of healthcare, with Scope 3 contributing the most to emissions. This highlights the substantial impact purchasing decisions have on carbon footprints and how health systems could encourage suppliers to perform life cycle analyses to identify interventions to reduce their emissions. With patient travel being the second highest contributor to Scope 3 emissions, the authors suggest supporting lower-carbon transportation through programs such as subsidized public transit passes and electric vehicle charging stations. Increased utilization of telehealth could also reduce emissions generated from transportation. Additionally, improved waste stewardship is another potential solution. To help mitigate Scope 1 and 2 emissions, departments may invest in energy-efficient devices, LED light bulbs, and motion- or timer-controls for lights or other devices that may remain powered after hours. Beyond the clinic, health systems may advocate for increased utilization of a cleaner energy mix in regional electric grids. The key takeaway from this study is that we can meaningfully contribute to sustainable practices by advocating for solutions at the clinic level in our care delivery.

POLICY UPDATES: THE SHIFTING POLICY LANDSCAPE AND ITS IMPACT ON DERMATOLOGIC HEALTH

By Genevieve Silva MD, MBA and Klint Peebles, MD

Recent changes across the United States (U.S.) federal government have included substantial rollbacks in environmental protections and climate-health initiatives. A ProPublica report revealed that the National Institutes of Health will halt funding for climate-health research, the Office of Climate Change and Health Equity in the Department of Health and Human Services has been shuttered, along with its associated online resources for patients and health professionals, and the Environmental Protection Agency terminated its environmental justice branch.[1,2,3] Additional actions have structurally weakened environmental standards, including U.S. removal of support for the United Nations global climate resiliency fund, cuts to domestic clean energy programs, and reduction in staffing at the National Oceanic and Atmospheric Administration, all of which pose serious threats to public health and impact disaster preparedness.[4,5,6] Further EPA proposals to diminish regulation on wastewater contaminants, greenhouse gases, and toxic air pollutants risk undermining decades of progress. As just one example, mercury pollution standards alone had been estimated to prevent up to 11,000 premature deaths, 4,700 heart attacks, and 130,000 asthma attacks annually, starkly illustrating the likely impacts of regulatory rollbacks.[7,8,9]

Despite these setbacks, the U.S. healthcare community has mobilized to safeguard environmental protections. At the Our Planet, Our Health convention this March, health leaders gathered in support of protecting environmental health and highlighted the multifaceted benefits of policies like the Inflation Reduction Act and Infrastructure Investment and Jobs Act.[10] These

drive investment in clean energy and transportation, reducing air pollutants associated with fossil fuel activity, and have been projected to prevent tens of thousands of deaths and nearly a million asthma attacks by mid-century.[11] While such systemic health risks are relevant to all physicians delivering holistic care, evidence specifically links dermatologic disease to ambient environmental pollution.

A growing body of research highlights the skin's heightened vulnerability to pollution and environmental change, underscoring the importance of this issue for dermatologists. Pollutants such as particulate matter, polycyclic aromatic hydrocarbons, and volatile organic compounds have been linked to flares of atopic dermatitis, pemphigus, psoriasis, and other inflammatory skin diseases.[12-20] Mechanisms may include oxidative stress, barrier disruption, and microbiome imbalance. These pollutants have been associated with fossil fuel activity, traffic exhaust, and wildfires, the intensity of which is exacerbated by anthropogenic climate change and correlated with spikes in dermatologic disease. For example, one study found an

CONT....POLICY UPDATES: THE SHIFTING POLICY LANDSCAPE AND ITS IMPACT ON DERMATOLOGIC HEALTH

By Genevieve Silva, MBA and Klint Peebles, MD

increase in psoriasis visits weeks after the California wildfires.[21] Another study demonstrated that maternal exposure to nitrogen dioxide (NO2) is linked to childhood eczema, suggesting significant prenatal impacts. Other skin conditions in which pollution is implicated include acneiform eruptions, cutaneous lupus erythematosus, scleroderma, and skin cancers.[12,22] Although more research is needed to fully understand the relationship between climate-driven environmental factors and skin cancer incidence, existing evidence points to a connection between atmospheric ozone depletion, air pollution, ground-level ozone accumulation, and shifting UV intensity and increased rates of cutaneous malignancies.[23] The impacts of climate change on dermatologic health are not limited to air pollution; effects associated with natural disasters, temperature/humidity fluctuations, and infectious disease vector distribution have been outlined in other reviews of dermatologic disease.[24,25]

Dermatology has a strong history of advocacy engagement within organized medicine. Within the American Academy of Dermatology, the Expert Resource Group on Climate Change and Environmental Issues has influenced numerous policy and educational initiatives that center climate action and planetary health in public health research, clinical practice management, and equitable care. As the national regulatory landscape continues to rapidly evolve, dermatologists, along with the broader house of medicine, have a critical role to play in protecting the interwoven health of our planet and ability of current and future generations to thrive.

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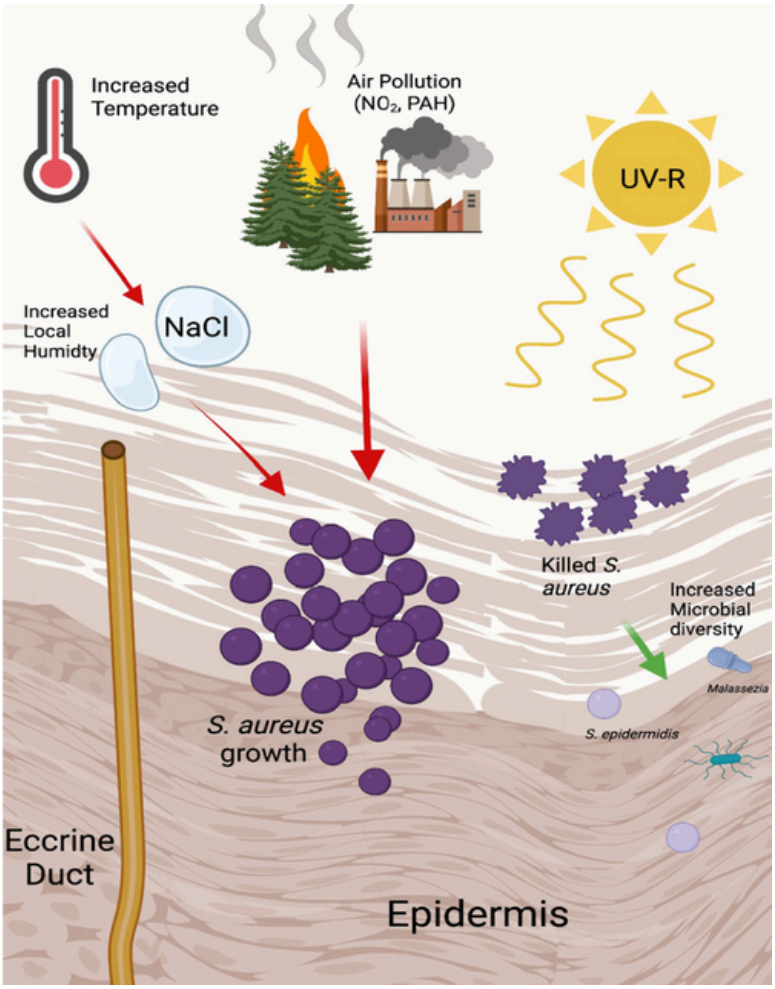
CLIMATE-SENSITIVE DISEASE:
HOW ENVIRONMENTAL IMPACTS ALTER THE SKIN MICROBIOME

By Isabella Tan, MS2 and Eva Rawlings Parker, MD, DTMH

Climate change is reshaping global health landscapes, with dermatological diseases emerging as a key area of concern.[1] One critical, but often overlooked, factor in this trend is the role of the skin's microbiome, which is highly sensitive to environmental changes and an important driver of climate-related cutaneous diseases. The diversity of the skin's commensal microorganisms play crucial roles in inhibiting pathogenic microbes, modulating immune responses, supporting skin barrier function, and cutaneous disease pathogenesis.[2] Disruption of the microbiome's composition (dysbiosis), by extreme heat, altered humidity, UV radiation, or air pollution may contribute to the development of inflammatory skin diseases such as atopic dermatitis (AD), acne vulgaris, and psoriasis.[2]



Air Pollution

Air pollution is primarily derived from the combustion of fossil fuels but also includes natural sources such as wildfires which are increasing in intesity and frequency due to drought and heat waves.[1] Pollution impacts skin disease through skin barrier disruption, oxidative stress, proinflammatory signaling, and immune dysfunction.[1] Specifically, particulate matter and volatile organic compounds contribute to transepidermal water loss and amplify inflammatory cascades through NF-kB and aryl hydrocarbon receptor activation.[1-3] In addition to reduced skin barrier integrity, evidence suggests that air pollution also alters the skin microbiome, promoting dysbiosis characterized by reduced microbial diversity, which favors pathogenic strains such as increased in Staphylococcus aureus colonization.[2,3] Additionally, exposure to higher concernatrations of air pollution was associated with increased transepidermal water loss and increased growth of Malassezia and Aureobasidium species underscoring pollution's role in skin barrier dysfunction and dysbiosis.[4] These pollution-related impacts on the cutaneous microbiome may exacerbate inflammatory dermatoses including AD, acne and psoriasis.[2]

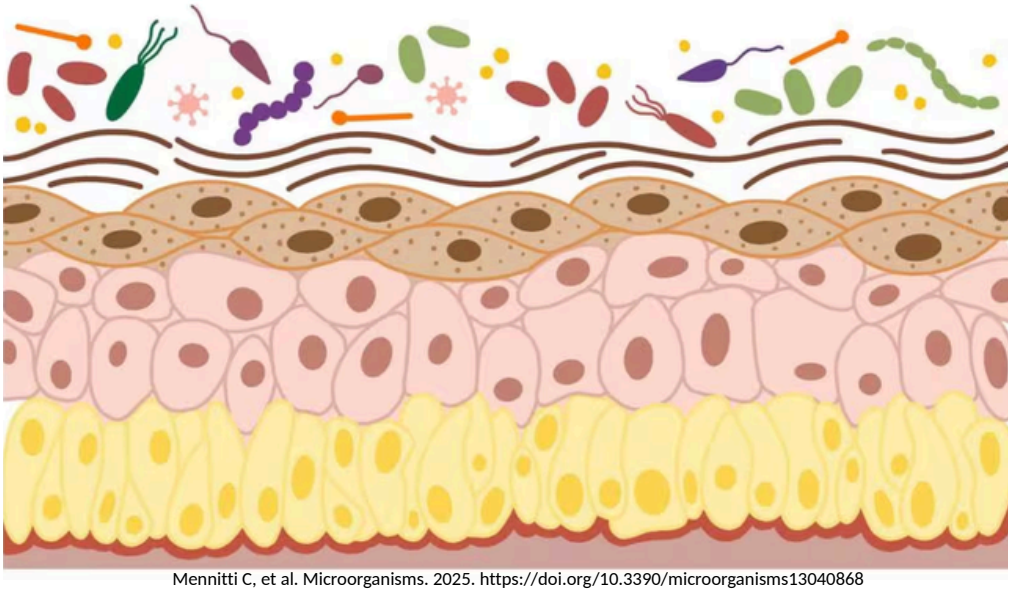
Impact of Temperature, Humidity, and UVR

Climate change-driven variations in temperature and humidity can alter the skin microbiome, enhancing microbial overgrowth in humid conditions and disrupting microbial balance in dry environments, ultimately compromising skin barrier integrity.[2] The optimal temperature for skin bacteria including Staphylococcus and Cutibacterium is 33.2–35.0°C, with increased temperatures promoting bacterial colonization and sebum production, which in turn further favors

Isler et al. Int J Dermatol. 2022;62(3):337-45. doi:10.1111/ijd.16297

CONT....CLIMATE SENSITIVE DISEASES: HOW ENVIRONMENTAL IMPACTS ALTER THE SKIN MICROBIOME

By Isabella Tan, MS2 and Eva Rawlings Parker, MD, DTMH



Mennitti C, et al. Microorganisms. 2025. https://doi.org/10.3390/microorganisms13040868

Cutibacterium and as well as proliferation of yeast specias such as Malassezia.[2] Humidity also plays a role, with increased moisture prolonging bacterial survival, particularly gram-negative bacteria.[2] Additionally, perspiration-induced salt shifts favor S. aureus over S. epidermidis, while low humidity has been linked to filaggrin degradation, which compromises skin barrier integrity and contributes to microbiome dysbiosis in conditions like AD.[2] Anthropogenic activities, including chlorofluorocarbon-induced stratospheric ozone depletion, has increased ultraviolet radiation, which is also implicated in dysbiosis and may play a synergistic role with other climate-related impacts in the pathogenesis of cutaneous diseases.[1,5]

Mitigating the Effects of Climate Change on Skin Health

Each patient visit affords an opportunitiy to weave in simple counseling to help our patients mitigate the impacts of climate change on skin health, in general, and reduce climate-induced dysbiosis and skin barrier disruption, specifically. This includes standard sun protective measures – SPF, UPF clothing, broad-brimmed hats, seeking shade, avoidance of midday sun – which reduce both UV and heat exposure. Additionally, long sleeves and pants further protect from particulate matter pollution. Prior to engaging in outdoor activities, we can encourage patients to use the weather app on their smart phones to access temperature and humidity data and indices for heat, UV, and air quality. However, as research continues to define the impacts of the exposome on the cutaneous microbiome and a broad range of skin dieases, dermatologists must be increasingly aware of emerging skincare products and paharmaceuticals that offer novel solutions to preserve barrier function, modulate the microbiome, and reduce the adverse effects of climate change on skin health.[6]

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ERG HAPPENINGS

THE VOICE OF THE AMERICAN DERMATOLOGICAL ASSOCIATION: 2025 OFFICIAL POLICY STATEMENT ON CLIMATE CHANGE

The American Dermatological Association (ADA) is the oldest dermatology society in the U.S. and recently published an Official Policy Statement on Climate Change in its entirety in the Journal of Investigative Dermatology.[1] The significance of the policy statement was further highlighted in the Archives of Dermatological Research.[2]

The statement reflects "a robust position on and accounting of climate impacts on cutaneous disease, delivery of care, and disparities, while offering strategic opportunities to fulfill the duty to educate dermatologists and to reduce our professional carbon footprint,"[2] underscoring the critical role dermatologists must play in climate advocacy, education, and sustainability. This call to action urges dermatologists and medical societies to embrace climate leadership to protect the health of both patients and planet, improve the delivery of environmentally responsible dermatological care, and preserve access to equitable care through action in five key areas:

1. **Decarbonization**
2. **Education**
3. **Advocacy and Health Equity**
4. **Research and Data Collection**
5. **External Engagement**

The ADA's comprehensive, dermatology-specific Policy Statement on Climate Change aligns with those of prestigious medical societies nationally and internationally who recognize climate change as a fundamental threat to planetary and human health and advances our voice in the House of Medicine on this urgent and consequential public health issue.[2]

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CLIMATE CHANGE AND DERMATOLOGY FEATURED IN THE MEDIA

Our ERG Members continue to be in demand for climate-related interviews and features by media outlets and podcast producers. Check out these interviews:

In February, Dr. Eva Parker discussed the Environmental Challenges and Skin Disease: A Dermatologist's Perspective in GLODERM's podcast Stories of Our Skin.

Both Dermatology Times and EMJ European Medical Journal featured the scientific forum, Skin-Environmental Interface: Dermatologic Challenges of Our Changing Climate and Environment at the AAD's 2025 Annual Meeting in Orlando, in their conference coverage.

The April 2025 issue of DermWorld interviewed Dr. Misha Rosenbach and Genevieve Silva to discuss their study "Carbon Footprint Analysis of an Outpatient Dermatology Practice at an Academic Medical Center" featured in JAMA Dermatology (see summary above on pg 2).

On May 1, 2025, Dr. Misha Rosenbach will be the featured guest on Episode 17 of the Skin To It Podcast to discuss "Climate Change & Skin Health Risks."

CONFERENCE COVERAGE

Climate Change and Emerging Infectious Diseases in Pediatric Dermatology at 2025 Pre-AAD SPD Meeting

Dr. Eva R. Parker spoke on “Climate Change and Emerging Infectious Diseases in Pediatric Dermatology” at the Society of Pediatric Dermatology Pre-AAD event. Important takeaways from the talk included:

- Children <5 years-old bear 90% of the climate-induced disease burden.
- Intergenerational inequities exist such that future generations will bear disproportionate climate impacts.
- There is an URGENT need for policy action, global cooperation, healthcare adaptation strategies, and targeted risk communication (check in with your patients - do they have an evacuation plan that includes relevant supplies or a go-bag in cases of extreme weather)

2025 Climate Change and Environmental Issues ERG Annual Meeting

ERG Co-Chairs, Misha Rosenbach and Eva Parker led another amazing session. This year’s meeting featured **Dennis Niebel, MD** from the German Dermatological Society who shared about his work abroad. We also had scientific abstract presentations from medical students and future climate leaders who shared their important work in the field incldung:

- **Jordan Bui, BS** - Surveying Waste Practices Around Intralesional Triamcinolone in Dermatology
- **Jimmy Dhillon, BS** - Climate Change, Harmful Algal Blooms, and Cutaneous Diseases
- **Charbel Bou Khalil, BS** - Climate Change in Undergraduate Medical Education: Assessing Medical and Physician Assistant Students' Attitudes and Evaluating the Impact of Dermatology and Psychiatry Curricular Interventions.
- **Natalie Baker, BS, MS** - Integrating Climate Health into Dermatology Residency: Development of a Longitudinal Graduate Medical Education Curriculum.

CONTINUED....CONFERENCE COVERAGE

Dennis Niebel, MD visited from Germany to share with the ERG the incredible accomplishments of the Working Group on Sustainability, Deutsche Dermatologische Gesellschaft (German Dermatological Society). Their efforts focus on sustainable interventions in clinics, external certification modalities, and implementation of environmental considerations in clinical guidelines. We are very grateful to have the opportunity to collaborate with our international colleagues!

2025 AAD Annual Meeting: Skin-Environmental Interface: Dermatologic Challenges of Our Changing Climate and Environment

- **Eva R. Parker, MD**: Introduction and Overview of the Impacts of Climate Change on Health, Equity, and Healthcare
- **David P. Fivenson, MD**: Climate Advocacy for Dermatologists
- **Nathan Archer, PhD**: Stemming the Rising Tide: Antibiotic Resistance and Climate Change
- **Annika Belzer, MD:** Forever Chemicals in Dermatology
- **Dennis Niebel, MD:** Microplastics in Dermatology
- **Divya Kumar Sharma, MD**: Reducing Red Bag Waste in Your Practice
- **Alexandra P. Charrow, MD**: The Effects of Heat and Pollution on Autoinflammatory Skin Disease

2025 AAD: Climate Advocacy in Dermatology: Protecting Skin Health and Equity in a Warming World

Dr. Parker was an invited speaker for the Advocacy in Dermatology with the Experts: Intersections to Safeguard the Specialty. She discussed resources that are available for our patients and how we can engage on climate issue to be the best advocates for skin health and the specialty of dermatology.

CONTINUED...CONFERENCE COVERAGE

2nd WHO Global Meeting on Neglected Tropical Diseases of the Skin

Geneva, Switzerland | March 24-26, 2025

Dr. Parker was invited to speak about climate impacts at the World Health Organization's Skin NTD meeting in March, where leaders from around the world gathered to address the burden of NTDs, which affect more than 1 billion people worldwide. Dr. Parker's talk highlighted how climate change is intensifying the challenges of diagnosis, management, and prevention of these diseases and highlighted the urgency of climate action in global health.

UPCOMING EDUCATIONAL EVENTS

UPCOMING CLIMATE MEETINGS AND WEBINARS

CleanMed 2025
May 6-8, 2025 | Atlanta, Georgia with Virtual Option

St Luke's 2025 Climate and Health Lecture Series: Impacts of Heat on Vulnerable Populations
May 21, 2025 | Virtual

2025 WHO/PAHO Global Conference on Climate and Health
July 29-31 2025 | Brasilia, Brazil

Yale School of the Environment: The 2025 New Horizons in Conservation Convening
May 8-10, 2025 | New Haven, Connecticut

Medical Society Consortium on Climate & Health: Climate and Health Equity Webinar Series
May 9 - November 14, 2025 | Virtual

UPCOMING DERMATOLOGY MEETINGS WITH CLIMATE SESSIONS

International Society of Dermatology's XIV International Congress of Dermatology
June 18-21, 2025 | Rome, Italy
SY38 - Environment & The Skin
Saturday, June 21 | 8:30 AM - 10:30 AM
Location: Yellow Room

American Academy of Dermatology's 2025 Innovation Academy
July 10-13, 2025 | Chicago, IL
SUN11 - Practical Environmental Sustainability for Dermatologists
Saturday, July 12 | 7:30 AM - 8:30 AM
Location: TBD

European Academy of Dermatology and Venereology's 2025 Congress
September 17-20, 2025 | Paris, France
Will feature 2 climate sessions:

- https://eadvapps.m-anage.com/eadvcongress2025/en-GB/pag/session/6439
- https://eadvapps.m-anage.com/eadvcongress2025/en-GB/pag/session/6315

GET INVOLVED & STAY INFORMED

The ERG has a website, www.climatedermatology.com, which includes archived editions of our Newsletter. Stay tuned as we build out more content.

If you haven't had a chance to check our **Climate Change and Cutaneous Diseases** curriculum, visit the AAD Learning Center to get access to these 4 modules.

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 have multiple opportunities for medical students, residents, fellows, and dermatologists to engage in meaningful work with our ERG. 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

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