

Health Impacts of Extreme Heat

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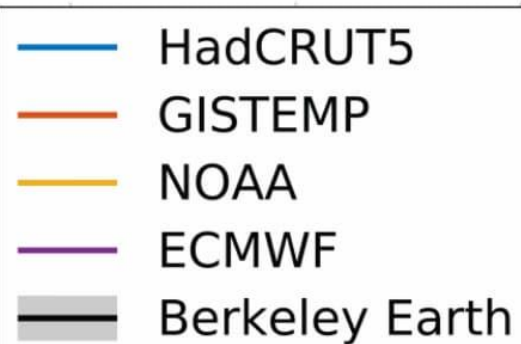
Faculty of Medicine & Health

The University of Sydney

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Global Warming 1850 to 2024



95% confidence interval shown for Berkeley Earth
Temperature anomalies relative to 1850-1900 average

Global Temperature Anomaly (°C)

1860 1880 1900 1920 1940 1960 1980 2000 2020

European heatwave killed over 47,000 people in 2023, more women than men

It was continent's second deadliest year on record for heat-related mortality after 2022

Pakistan: A burning emergency: Extreme heat and the right to health in Pakistan

June 4, 2023, Index Number: ASA 33/6823/2023

Northern India Endures a Heat Wave, and a Wave of Deaths

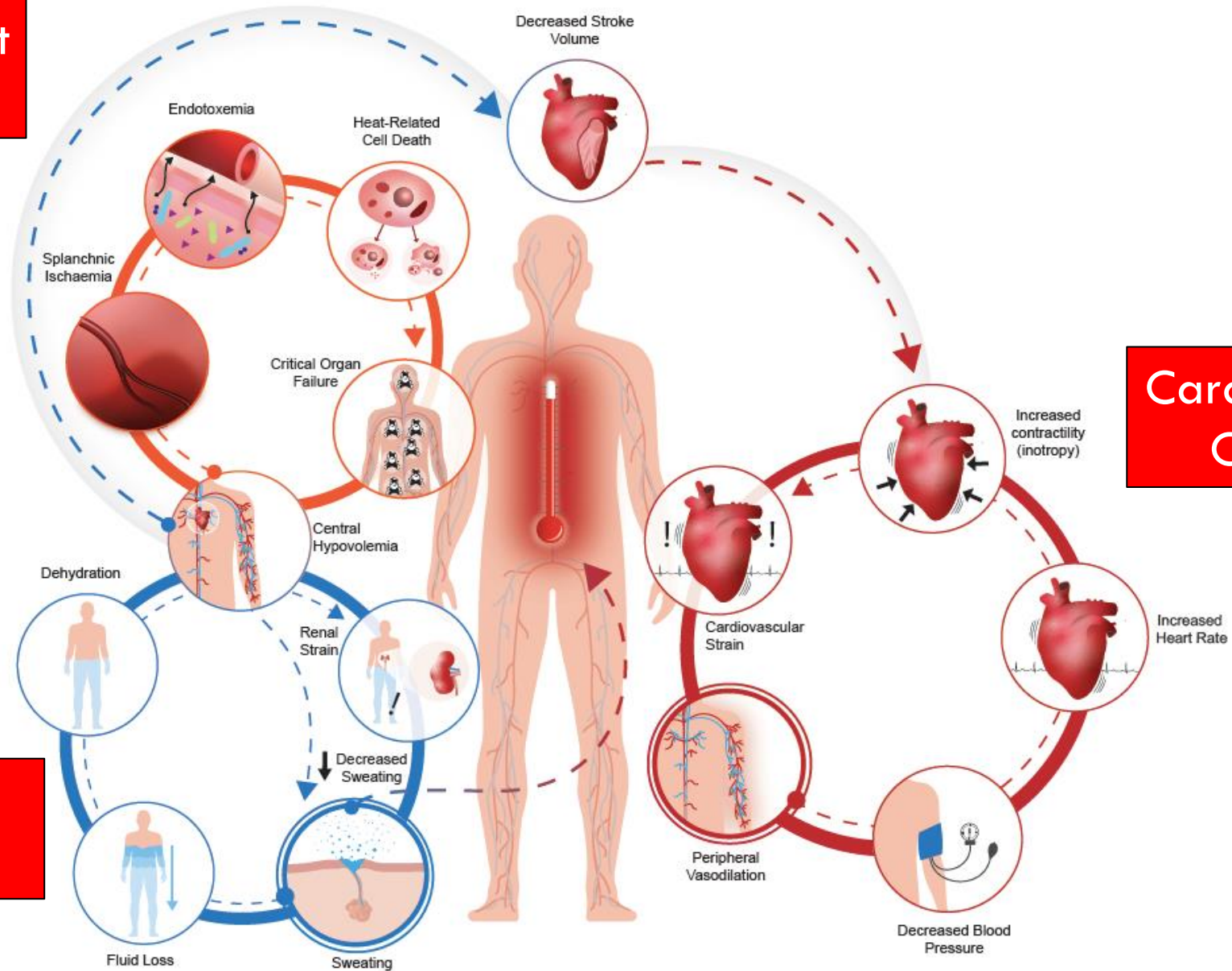
Historic heat waves leave more than 100 million Americans under heat alerts

Record high temperatures are expected in cities around the country.

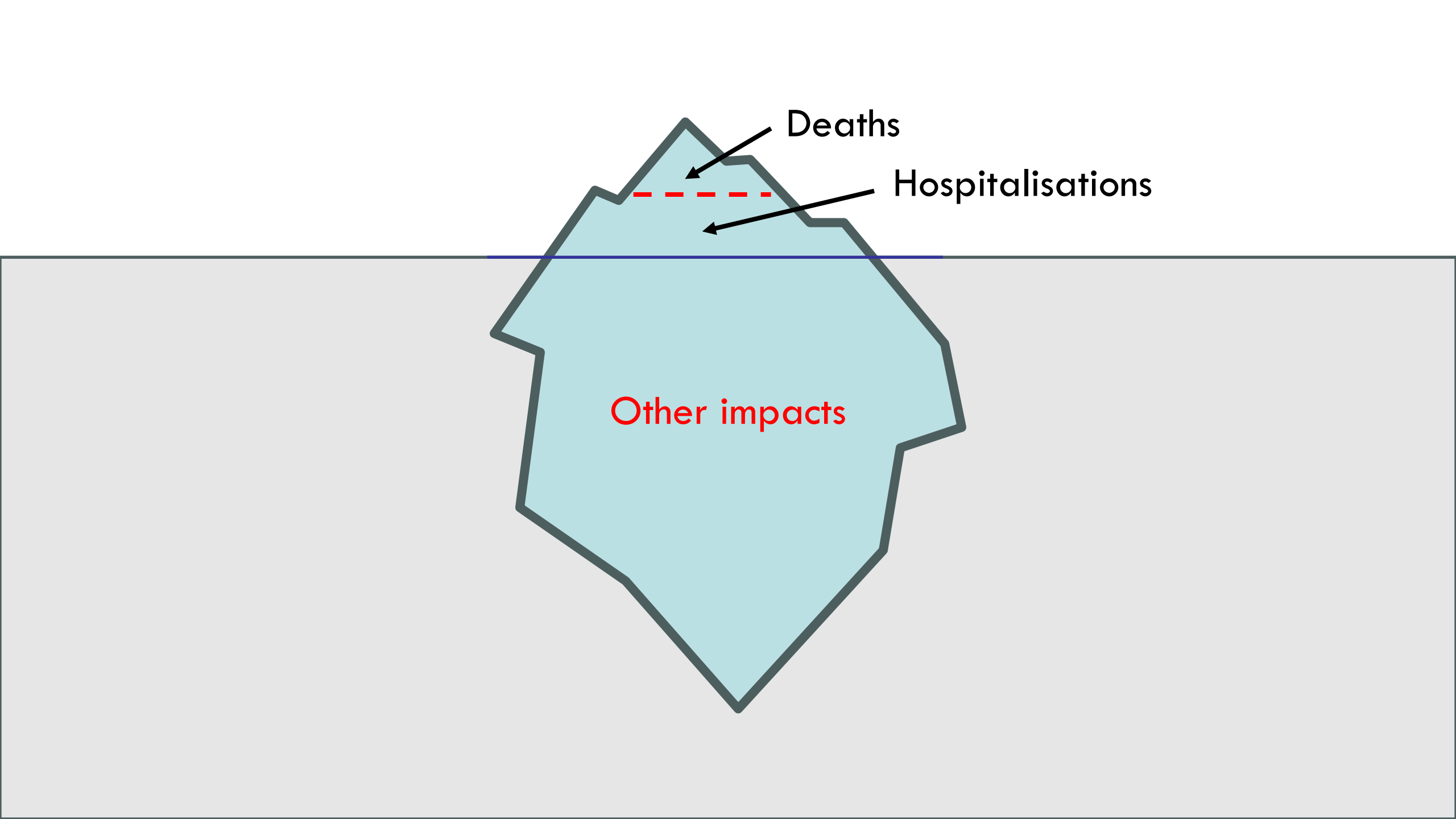
Annual deaths: >500,000
(>60% increase since 1990's)

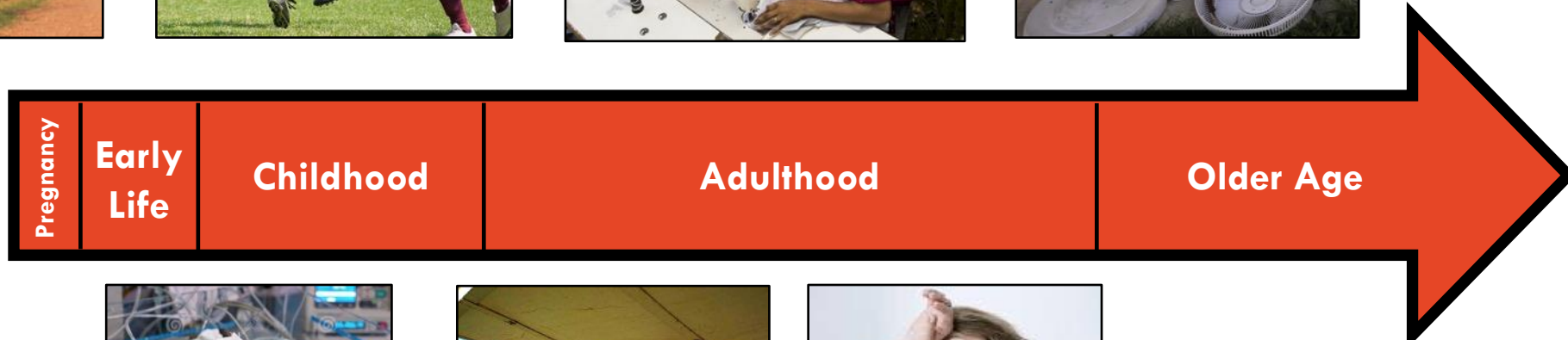
Classic Heat Stroke

Renal Collapse



Cardiovascular Collapse





Heat and Health Research Centre

Priority research themes



Maternal & Child Health

- Negative heat-related pregnancy outcomes
- Infant thermal management methods
- Heat in schools
- Playground safety



Physical Activity, Sport & Occupational Health

- Sport extreme heat policy development
- Equitable cooling in RMG industry
- Occupational heat stress risk management
- Active commuting



Ageing & Chronic Diseases

- Heat action plans
- Personal heat resilience
- Medications
- Cardiovascular health
- Mental health
- Aged-care homes



Landscapes & the Built Environment

- White/green roofing
- Urban greening
- Shading initiatives
- “Fan-first” cooling
- Modifications to built environment
- Low-income housing



Humanitarian Settings

- Future survivability limits
- Refugee camps
- Slums
- Prisons
- Heat & mosquito-borne diseases
- Heat & water-borne diseases

Hazard



Temperature



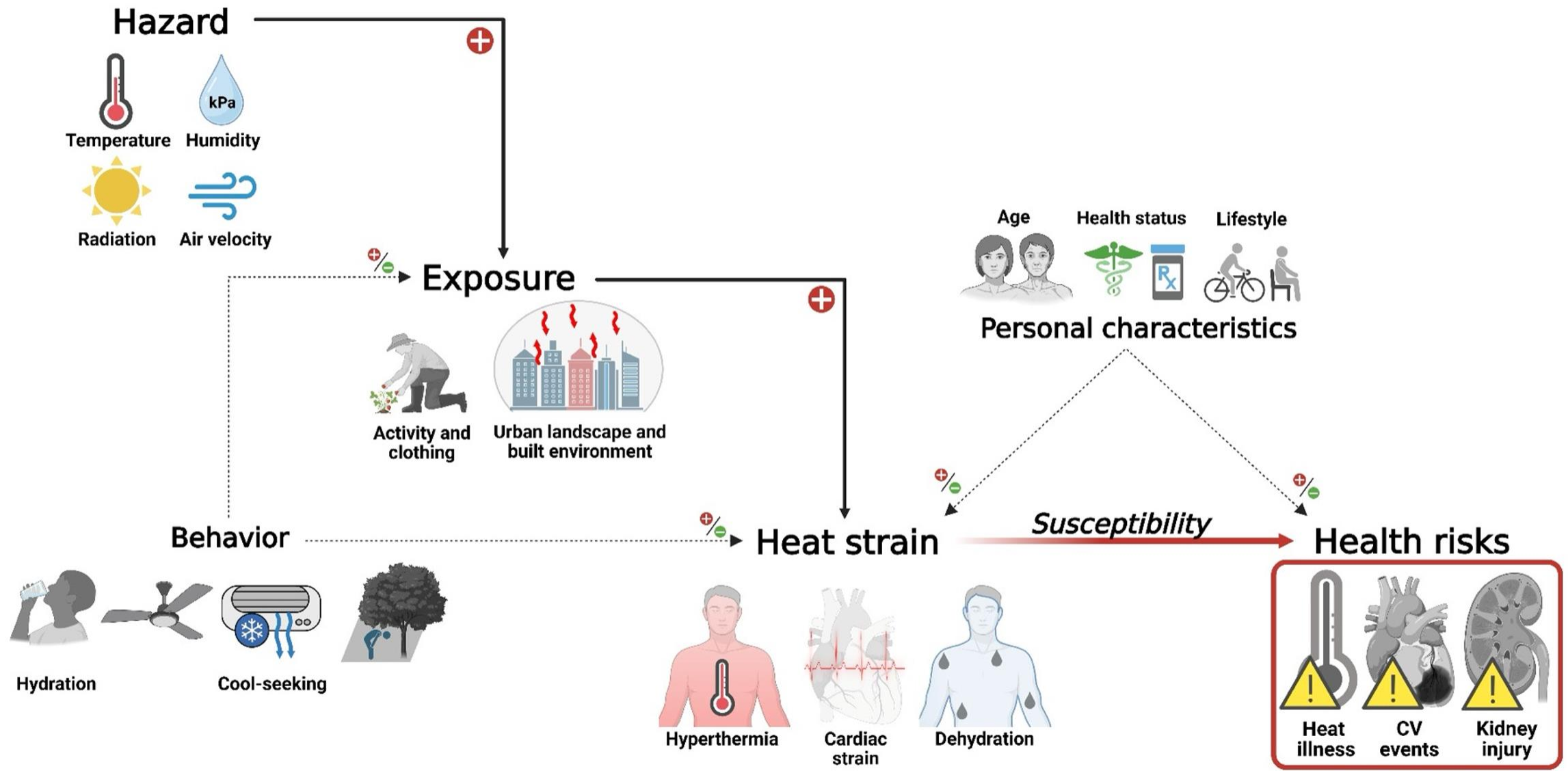
Humidity



Radiation



Air velocity



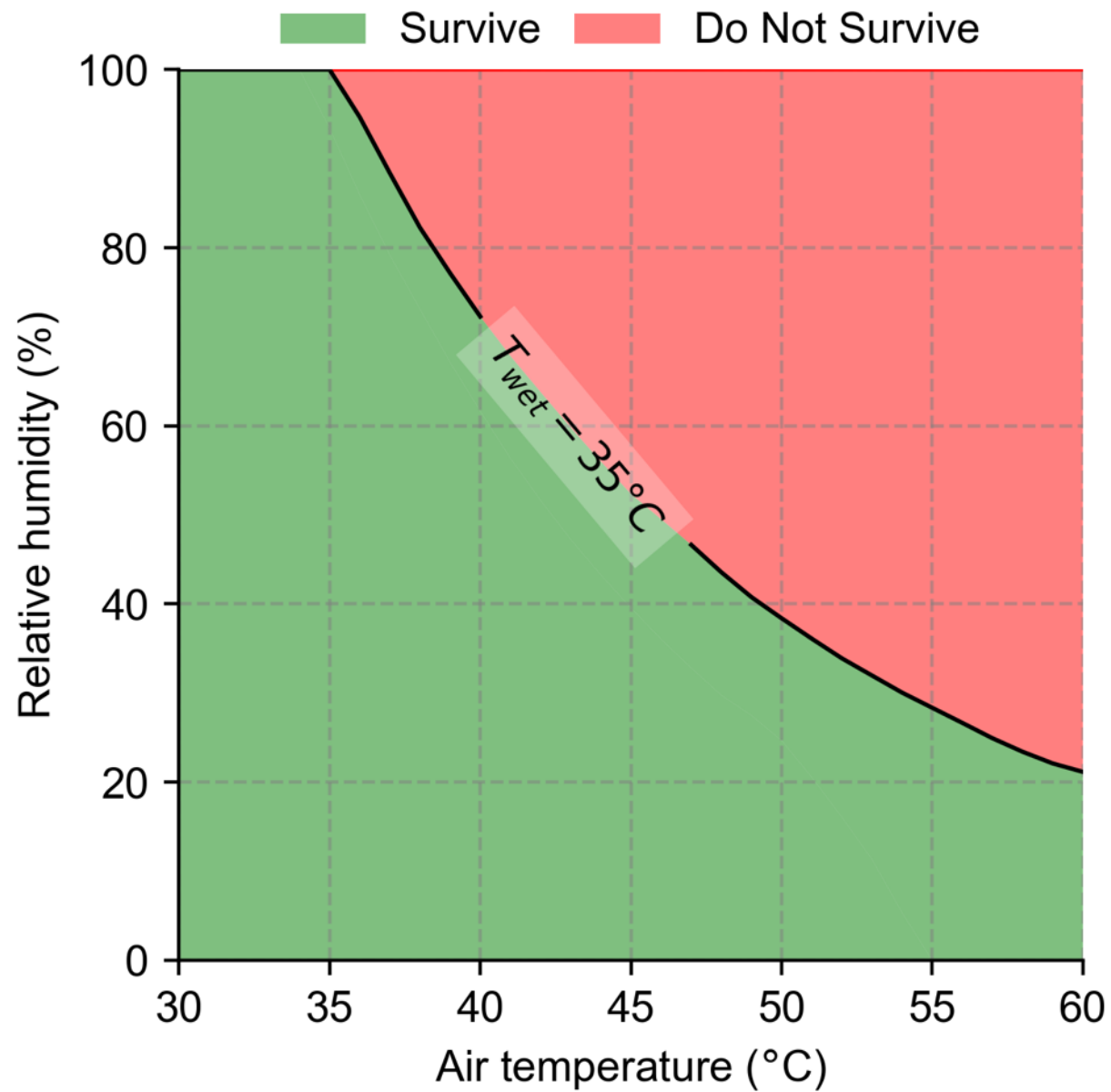
[nature](#) > [news](#) > article

NEWS | 14 August 2024

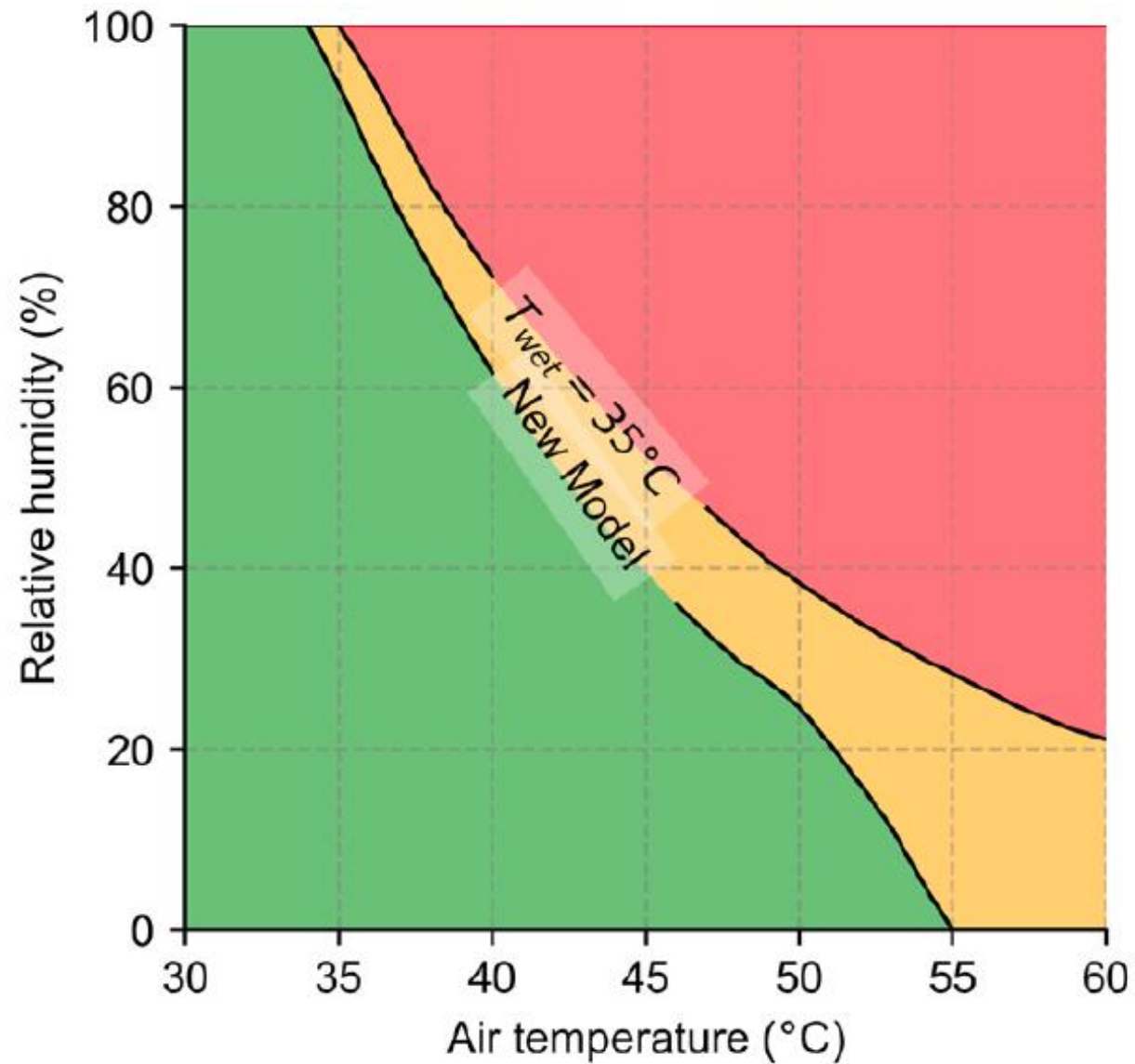
What is the hottest temperature humans can survive? These labs are redefining the limit

The threshold for survival in heat is lower than thought – researchers are using state-of-the-art climate chambers to explore when blistering conditions threaten life.

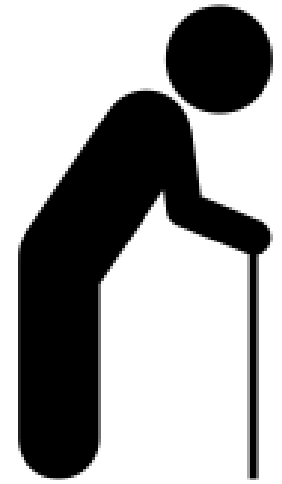
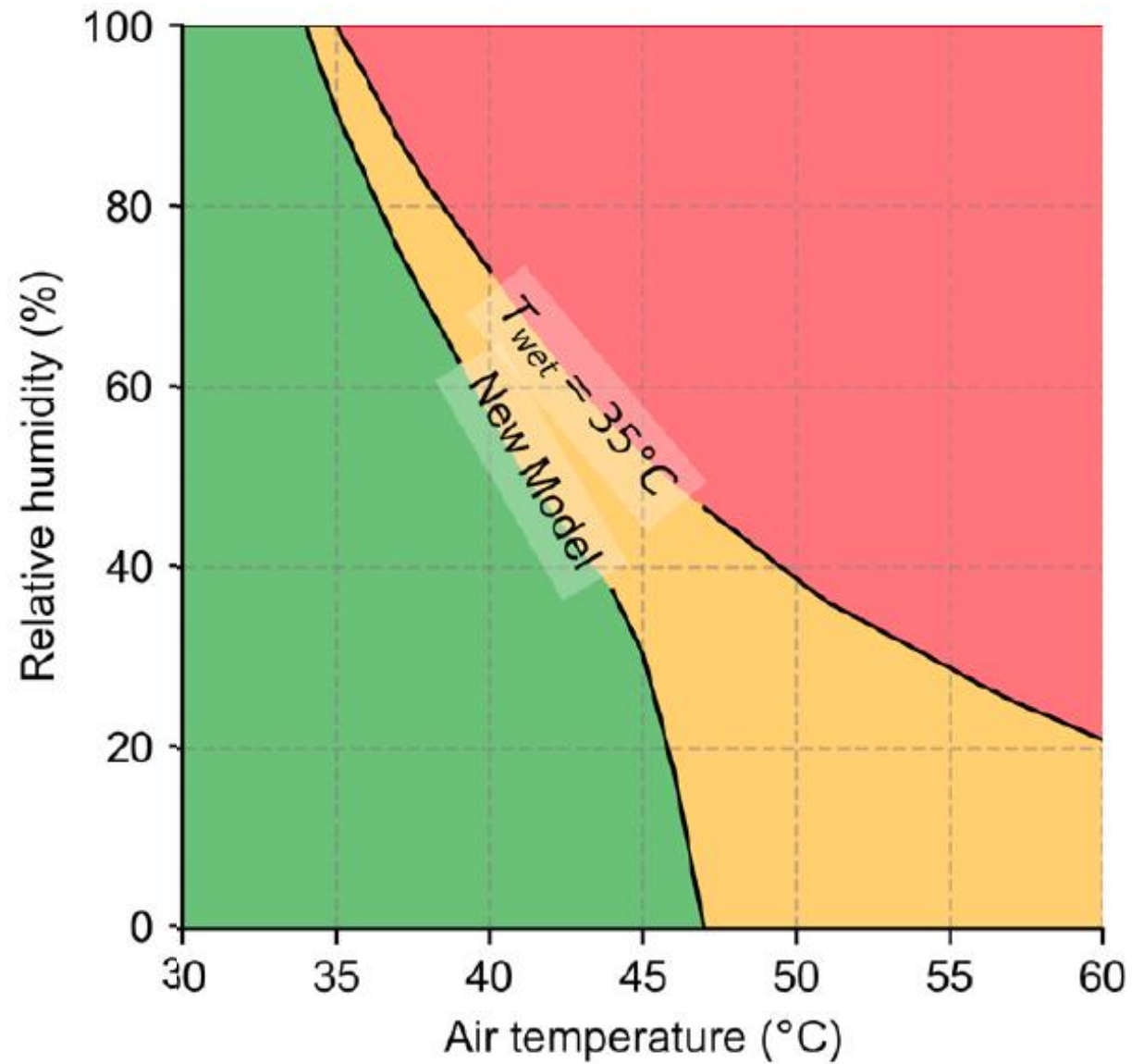
By [Carissa Wong](#)

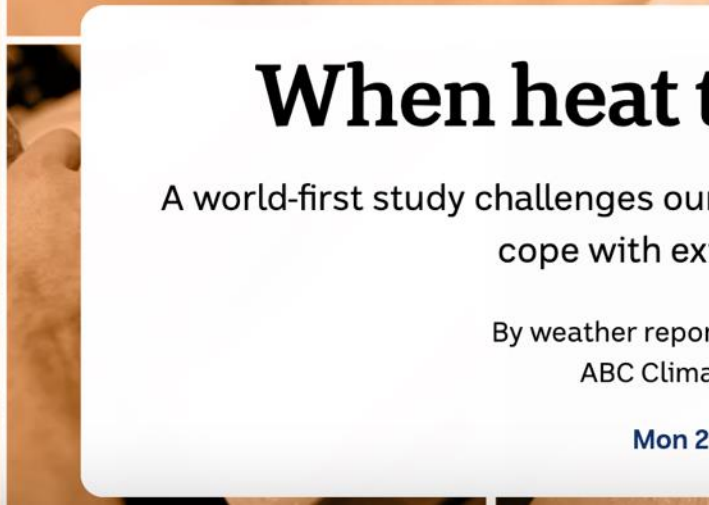


Survive with Both Models Do Not Survive with New Model Only Do Not Survive with Both Models



Survive with Both Models Do Not Survive with New Model Only Do Not Survive with Both Models





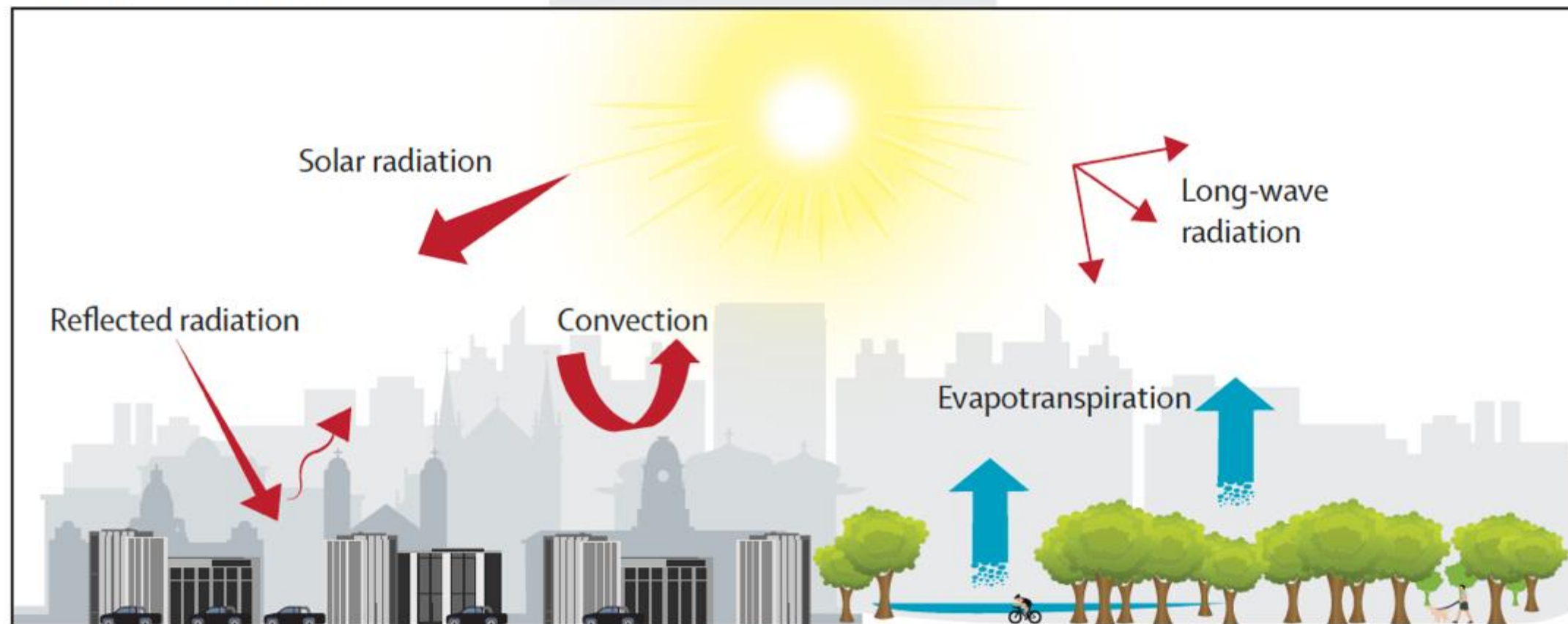
When heat turns deadly

A world-first study challenges our understanding of how humans cope with extreme heat.

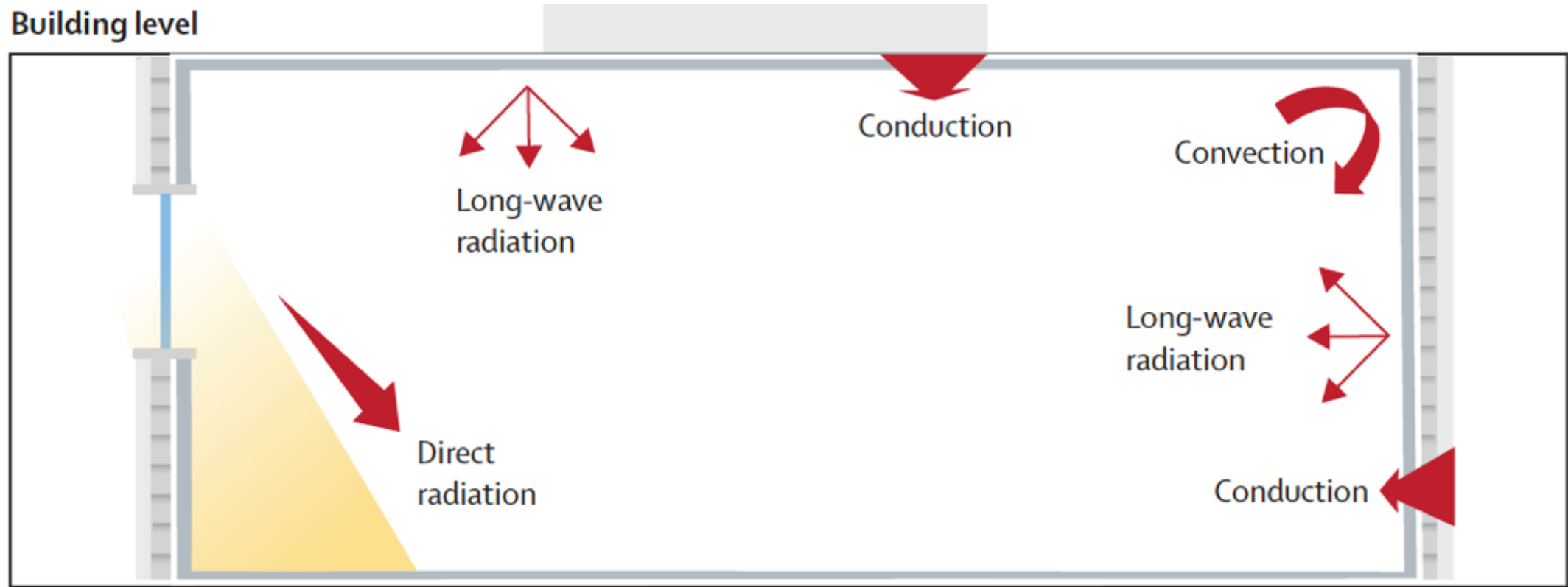
By weather reporter [Tyne Logan](#)
ABC Climate Team

Mon 2 Sep

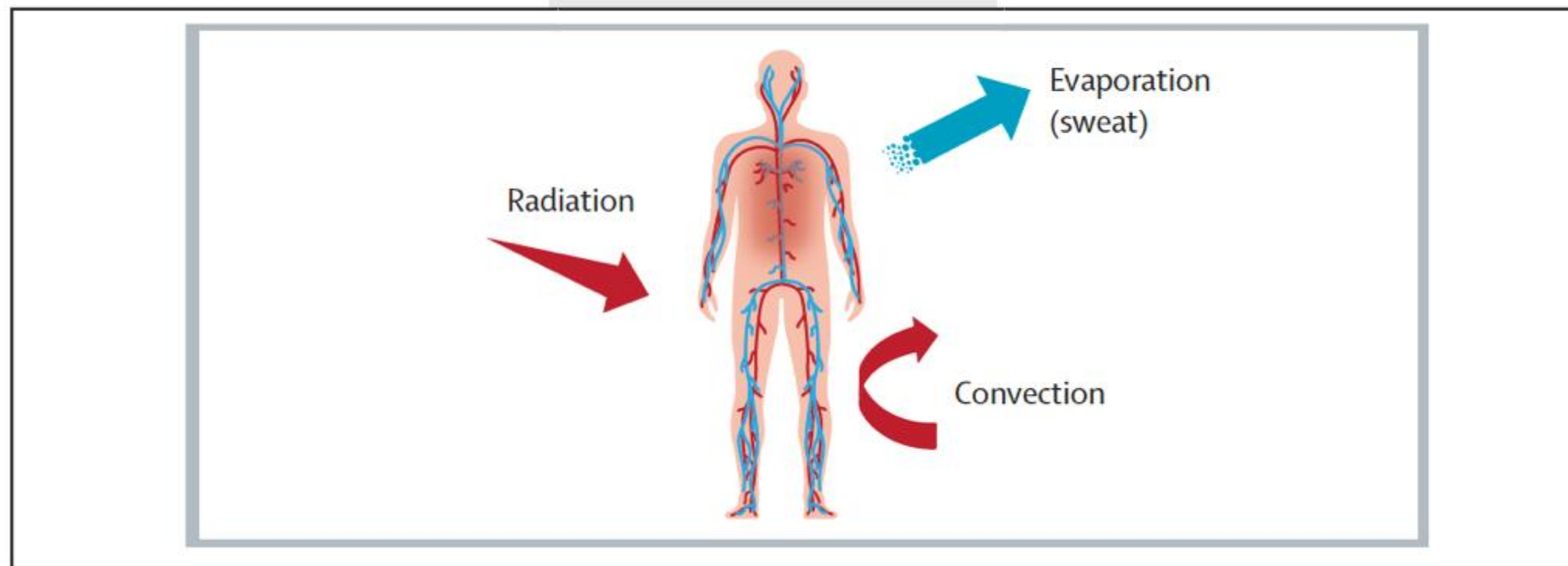
Landscape or urban level



Building level



Individual level



Individual heat strain



Thermal strain



Dehydration



Cardiovascular strain

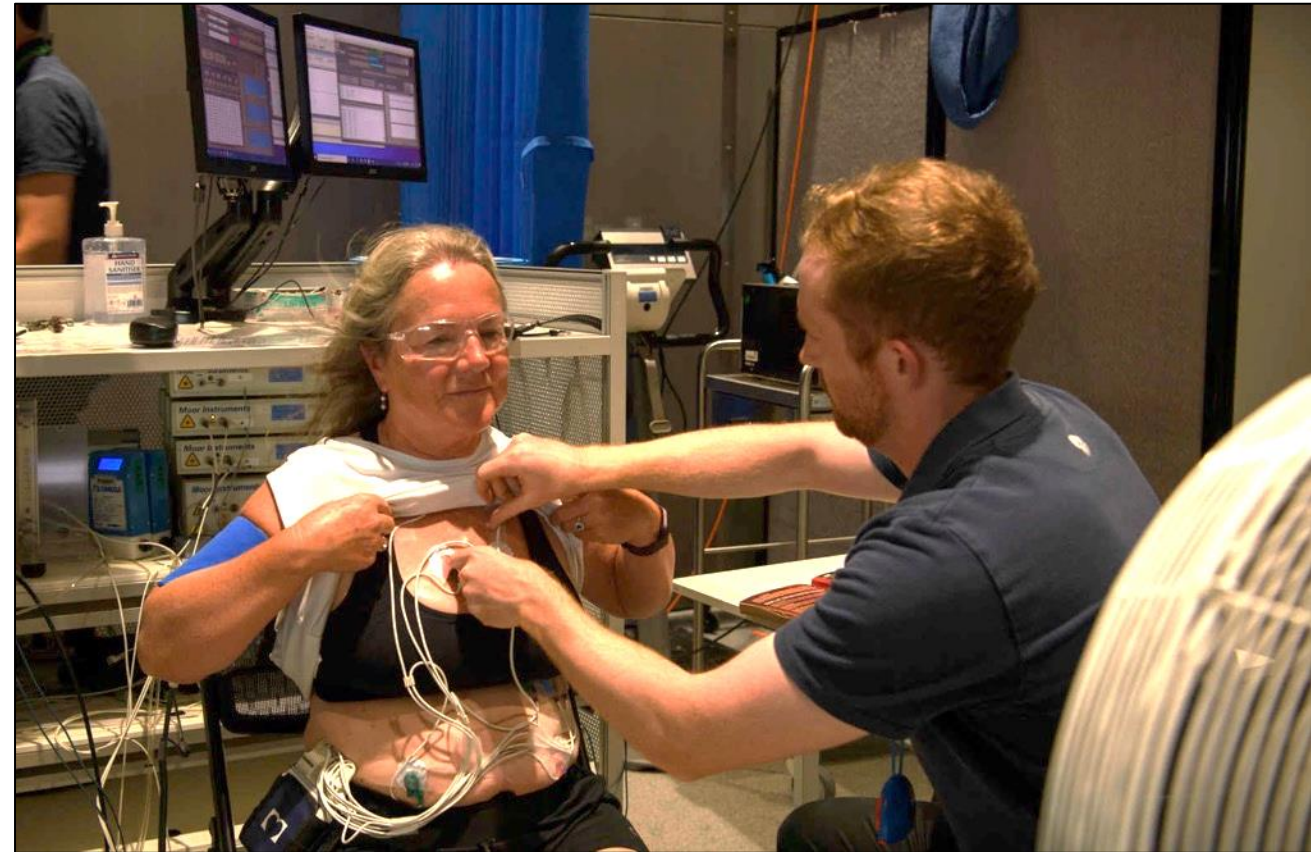


Renal strain

Thermal Ergonomics Laboratory



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Sustainable and accessible ways to keep cool

Mitigating climate change is vital, but inevitable rising temperatures means that identifying sustainable cooling strategies is also important. Strategies at the individual scale that focus on cooling the person instead of the surrounding air can be effectively adopted, even in low-resource settings.



- Can provide effective cooling for young healthy adults up to 42°C in 50% humidity
- Effectiveness is reduced with low humidity, and in older adults (>65 years), unless accompanied by self-dousing
- Increases dehydration, but can be offset by drinking an extra glass of water per h



- Can reduce heat strain and dehydration up to 47°C if dousing is sufficient to keep the skin wet
- Can be used during power outages
- Low compatibility with high clothing coverage



- Can reduce dehydration and thermal discomfort in hot and humid conditions
- Can be used during power outages
- Risk of slips and falls

* Feet immersed above the ankles in 20°C water



- Provides high evaporative heat loss without needing to sweat
- Can be used during power outages
- Clothing must be re-soaked roughly every 60 min



Electric fans can be used below these temperatures irrespective of humidity:

39°C

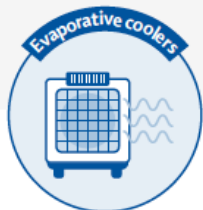
Healthy young adults (aged 18 to 40 years)

38°C

Healthy adults (aged over 65)

37°C

Over 65s taking anti-cholinergic medication



- Can cool air temperatures in dry conditions
- Minimal effect in high humidity
- Risks creating mosquito breeding sites without proper maintenance



- Lowers air temperatures in hot and dry conditions
- Must be used in well ventilated or outdoor areas otherwise humidity increases offset any benefit
- Risk of slips and falls



- Can reduce core temperature and cardiovascular strain in conditions up to 45°C
- Requires access to ice
- Labour-intensive to prepare

* Crushed ice wrapped in a damp towel applied to the neck and chest



- Can provide internal cooling
- Water should be ingested at a temperature that is most palatable (~10°C) to ensure optimal hydration
- If person has already started sweating, not effective at lowering core temperature

Read the full paper: Jay O, Capon A, Berry P, et al. Reducing the health effects of hot weather and heat extremes: from personal cooling strategies to green cities. *The Lancet* 2021. Published online August 19

THE LANCET

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"Given the inevitable rises in global and local temperatures over the coming decades, identifying effective prevention and response measures that can be implemented, particularly in low-resource settings, has never been more important."

See Series page 710

Perspectives

Climate disasters and global social medicine
(see page 710)

Articles

Tuberculosis in displaced or refractory multiple myeloma
(see page 711)

Articles

Vaccination of children against typhoid fever
(see page 712)

Articles

Non-optimal temperatures and daily mortality
(see page 713)

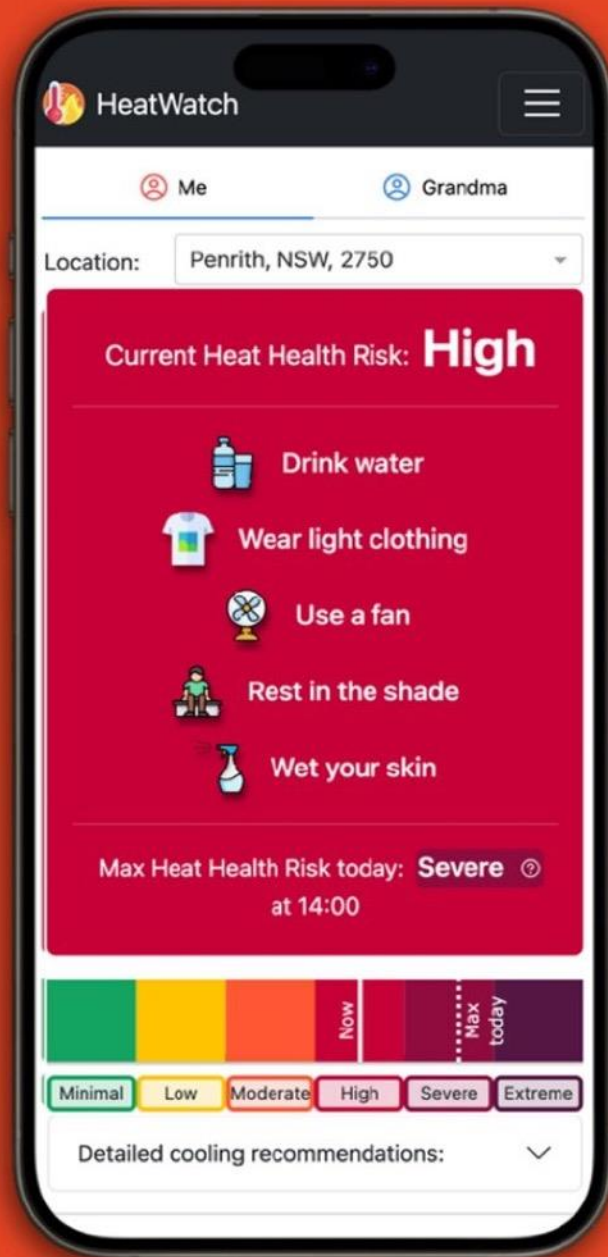
Series

Heat and health:
(see page 714 and 715)

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Translating to policy and action





THE UNIVERSITY OF
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HeatWatch

Stay safe in the heat

- Free & Easy-to-use
- Personal Heat Rating
- Multiple Profiles
- 7 Day Forecast





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