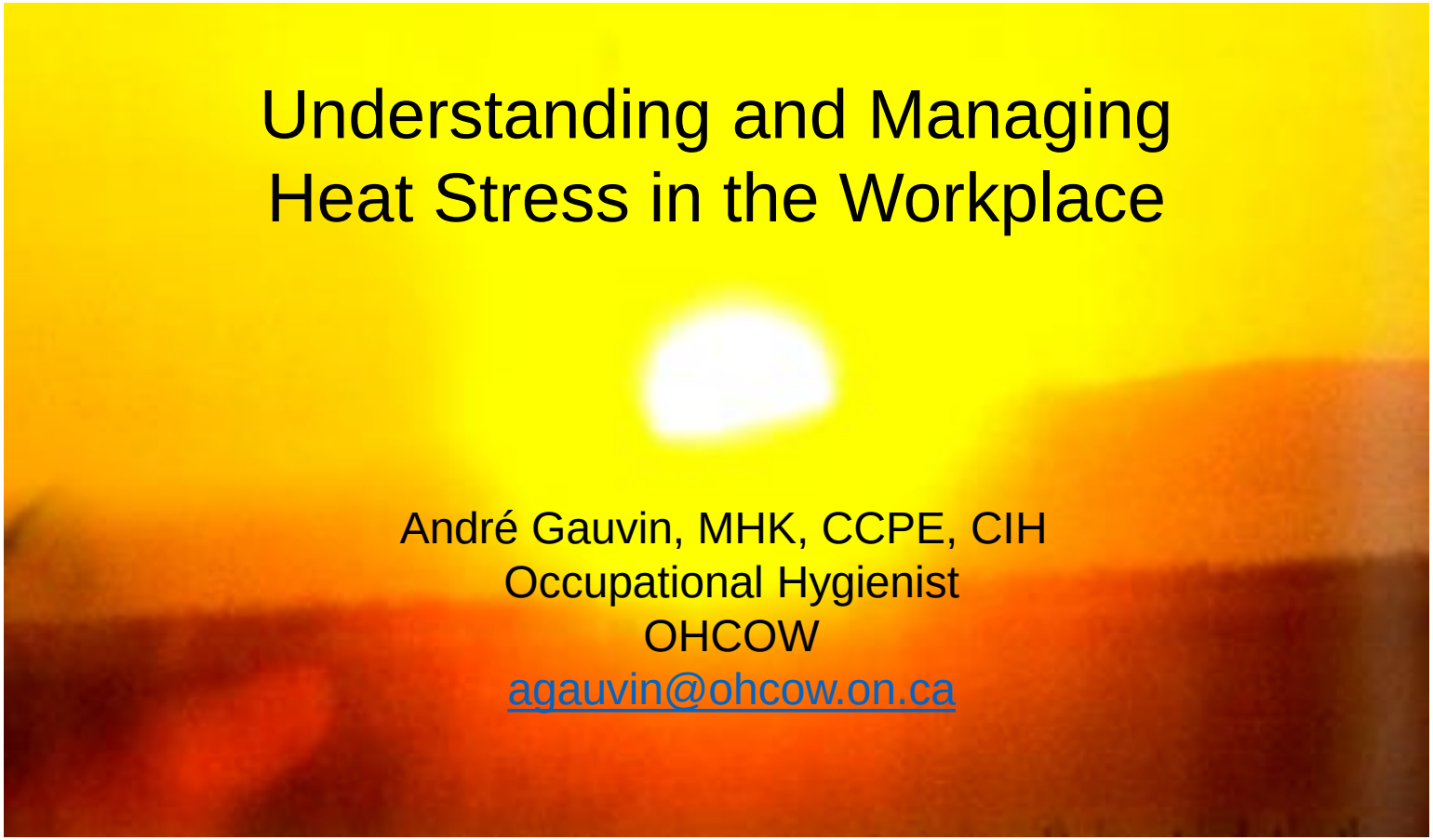
HEAT STRESS Toolkit

Understanding and Managing Heat Stress in the Workplace



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OUTLINE

1. Heat statistics
2. How your body responds to changes in Temperature
3. Working in the Heat
4. Complications from Heat Stress
5. Heat stress management levels
6. Heat stress evaluation
7. Humidex heat stress response plan
8. Prevention guidelines and controls

Heat statistics

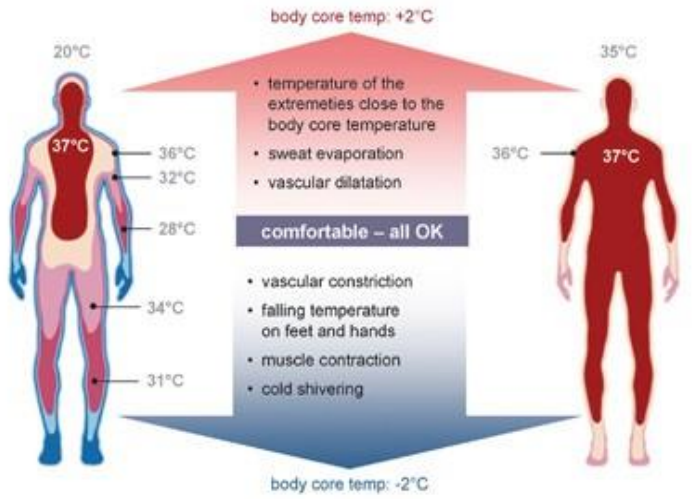
- Many places in Canada face extreme heat events, often called "heat waves." These events involve high temperatures and high humidity. A changing climate can mean longer and more intense heat events that can be dangerous for your health.
- Heat waves claim more lives each year than all other weather-related exposures combined (hurricanes, tornadoes, floods, and earthquakes). Heat wave tragedies have killed more than:
  - 280 people in Quebec (2010)
  - 700 people in Chicago (1995)
  - 70,000 people in Europe (2003)
  - 595 people in British Columbia (2021)
  - 156 people in British Columbia (2009)
- According to the CDC, **1,220 people** in the United States are killed by extreme heat every year.

Thermal Balance

- Divisions of the Body
  - Shell (Periphery) Temperature
  - Core Temperature

- Thermoregulation

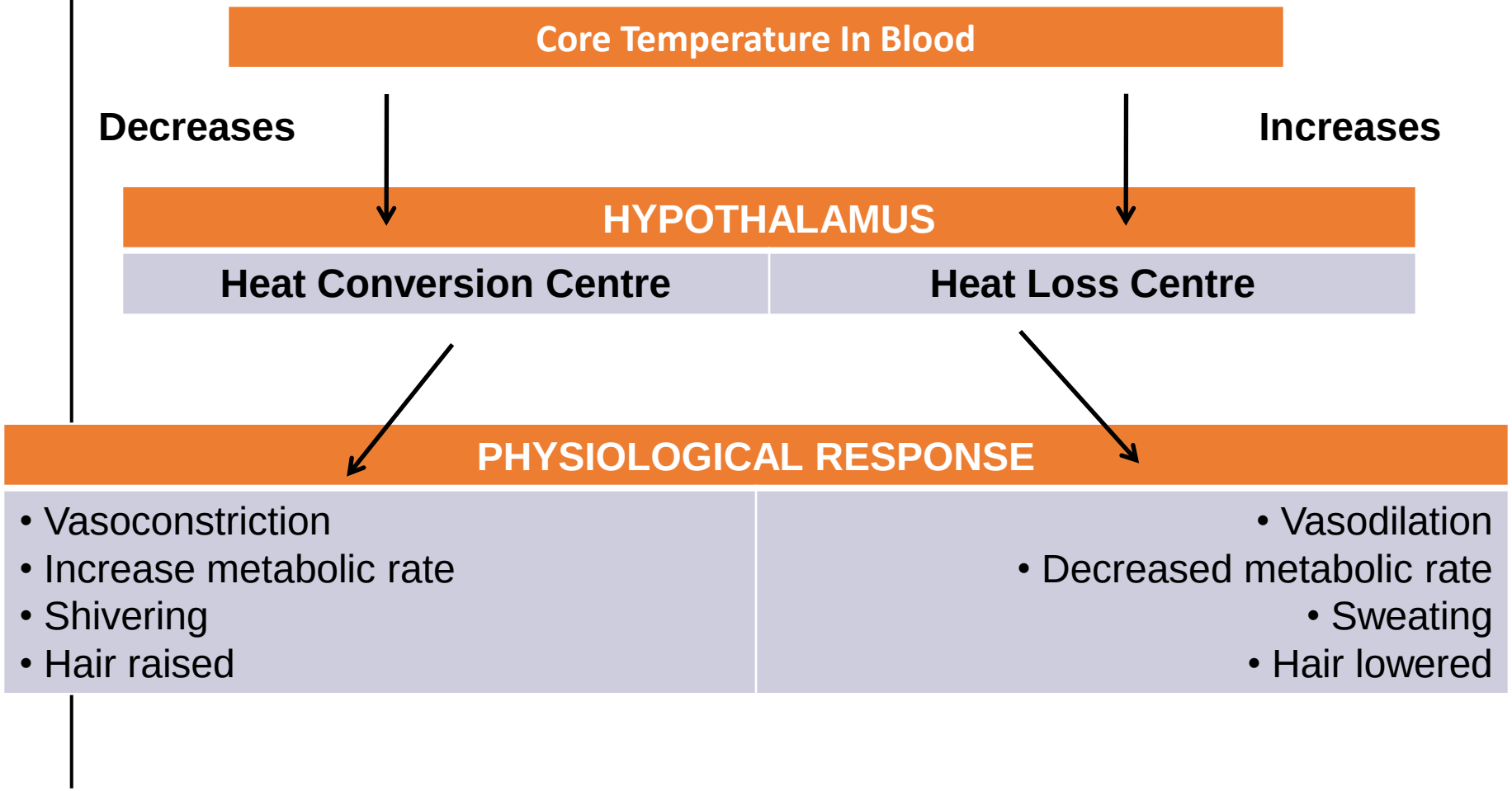
  Despite variations in temperatures, humans can maintain a constant body temperature by balancing heat gain with heat loss.



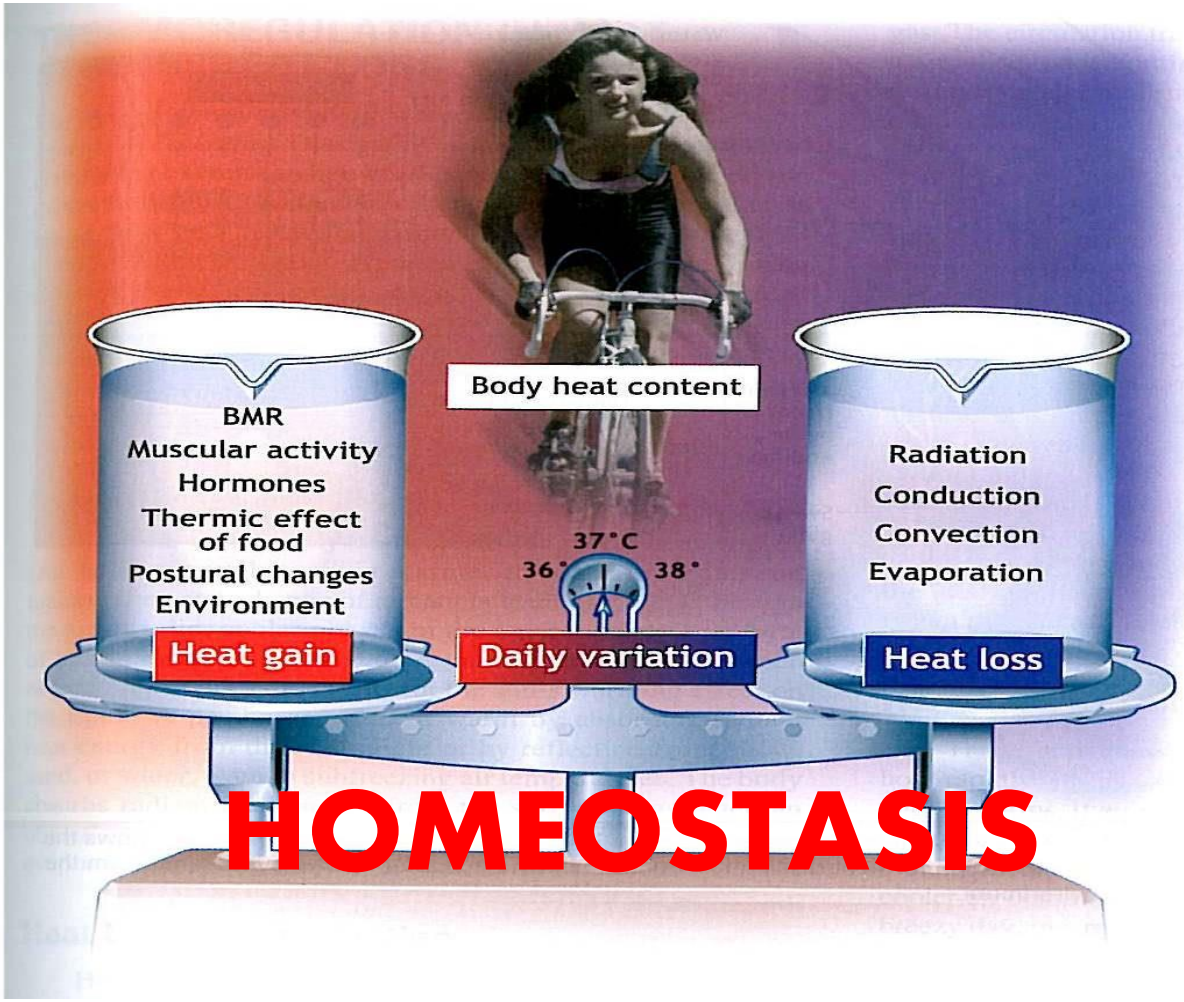
Casa DJ1, McDermott BP, Lee EC, Yeargin SW, Armstrong LE, Maresh CM. Cold water immersion: the gold standard for exertional heatstroke treatment. Exerc Sport Sci Rev. 2007 Jul;35(3):141-9.

Heat Gain versus Heat Loss	Core Temperature
Heat Gain = Heat Loss	Stays the **same**
Heat Gain > Heat Loss	Core temperature **rises**
Heat Gain < Heat Loss	Core temperature **falls**

What happens when you get HOT?

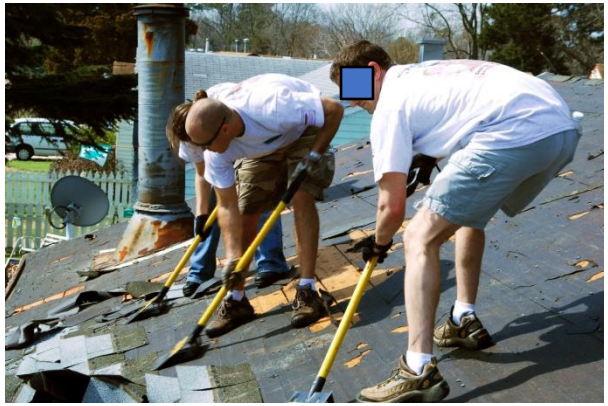


Body Heat Content



Heat Gain

- Resting Metabolism
- *Muscular Activity*
- Thermal Effect of Food (digestion)
- *Environment*
- Hormones

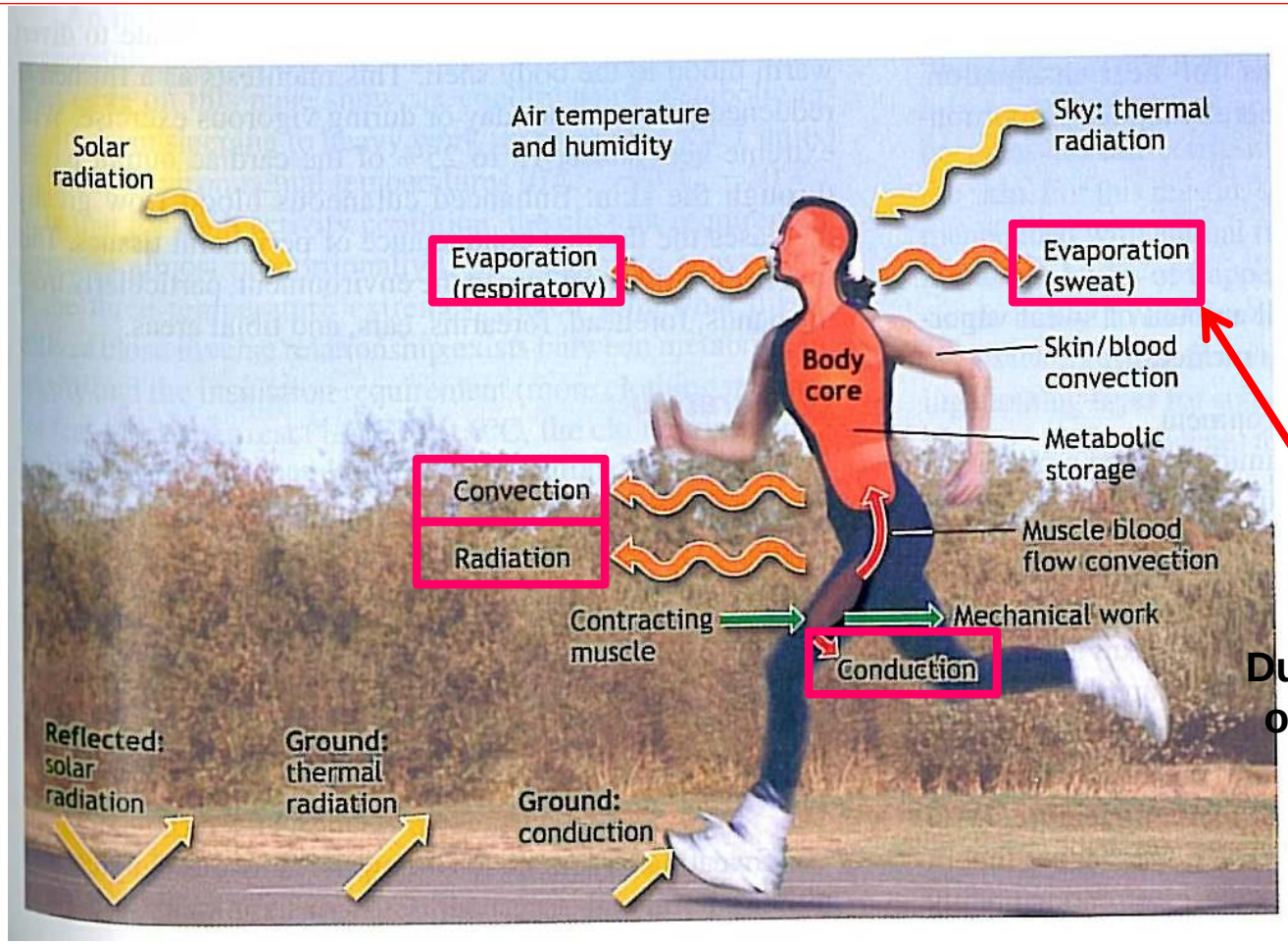


Heat Loss
Thermoregulation In Heat Stress

- The body has thermoregulatory mechanisms that primarily protect against overheating.

- Four Physical Processes Contribute to Heat Loss:
  - Radiation **60%**
  - Conduction **3%**
  - Convection **12%**
  - Evaporation **25%**

Other Heat Loss Processes



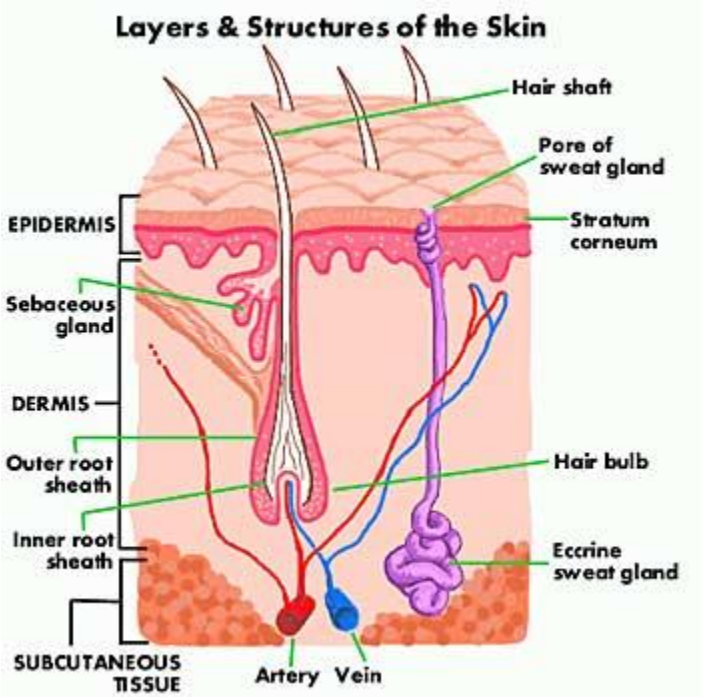
Essentials of Exercise Physiology 3rd (third) Edition by McArdle BS M.Ed PhD, William D., Katch, Frank I., Katch, V (2005)

80%

During Exercise or heavy work load

Heat Loss By Evaporation

- *Evaporation* provides the major defence against over-heating.
  - ❖ The body's surface contains approximately 2 to 4 million sweat glands.
  - ❖ During heat stress, glands secrete sweat.
  - ❖ Evaporation of sweat from the skin exerts a cooling effect (takes it heat from the body).
  - ❖ The cooled skin, in turn, cools the blood diverted from interior tissues.



Essentials of Exercise Physiology 3rd (third) Edition by McArdle BS M.Ed PhD, William D., Katch, Frank I., Katch, V (2005)

Evaporation at High Ambient Temperatures

- As temperature increases, conduction, convection, and radiation decrease in their effectiveness to cool the body.
- In fact, when Ambient Temp > Body Temp:
  - Three processes mentioned above cause the body to gain heat!
- Sweating is the only defense!
  - Skin
  - Respiratory Tract

Heat Loss in High Humidity

- Evaporation of Sweat is Key!
- Three factors affect evaporative cooling
    1. Surface Exposure;
    2. Temperature and Relative Humidity of Air;
    3. Convective air currents around the Body.

Relative Humidity ratio of water in ambient air at a particular temperature to the total quantity of moisture that air could contain (%)

Important

- Sweat does not cool the skin; evaporation cools the skin!!!

the greater the humidity, the greater the risk of overheating!

Factors Determining Physiological Strain

- Environment (Air temperature and relative humidity, radiant heat, convective air currents);
- Individual differences in body size and fatness;
- State of Training;
- Degree of Acclimatization;
- Intensity of Activity;
- Amount, type, and color of clothing.

Blood Flow in the Heat

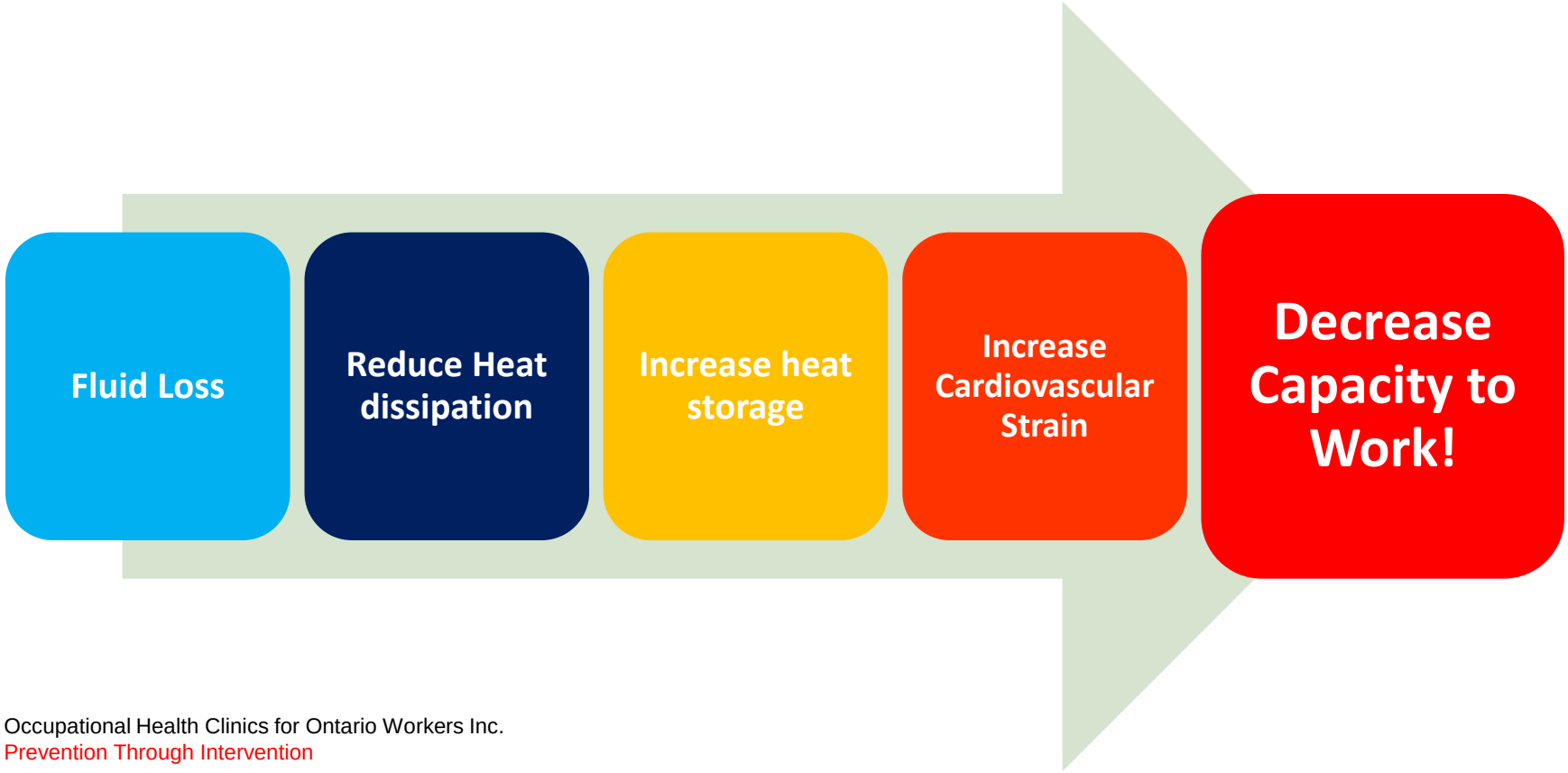
- Circulatory Dilemma
  - The body faces two demands when working in the heat:
    1. Muscles require delivery of oxygen through the blood
    2. Blood is diverted to the periphery to transport heat for cooling at the skin surface (oxygen is not delivered)
- <u>DANGER</u>
  - When it comes to exercise/work the body will favour oxygen delivery to the working muscles over cooling mechanisms

Working In the HEAT

- Physiological Effects
  - Blood Flow
    - Other tissues compromise blood flow
  - Fluid Loss
    - Evaporative cooling
    - Decreased blood volume
  - Core temperature rise
    - Hot environment + Working muscles
    - Core temperature rise causes impaired functioning of brain and fatigue.

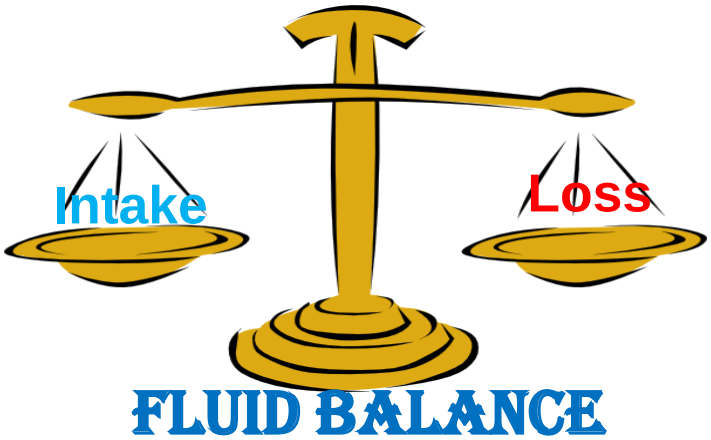
Fluid Loss in the Heat

- Dehydration = body water loss
- 1 hour moderate activity produces a sweat loss of 0.5 to 1 L (or more)



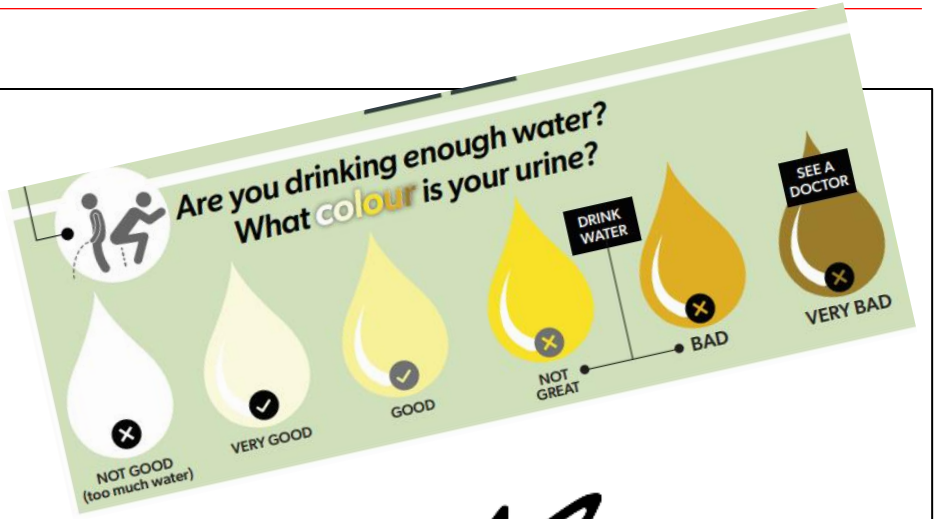
Hydration Strategies

- Hyperhydration – ingesting ‘extra’ water before work in the heat offers thermoregulatory protection.
- Strategy:
    1. 500 mL night before working in heat
    2. Another 500 mL upon awakening
    3. An additional 400 to 600 mL 20 minutes prior to activity.
    4. Consistent fluid intake throughout the day.



Signs of Hydration

- Inadequate Hydration
  - Infrequent urination
  - Excessive weight loss
  - Strong odour of urine
  - Urine Colour
- Adequate Hydration
  - Frequent urination
  - Urine Colour
  - Odourless

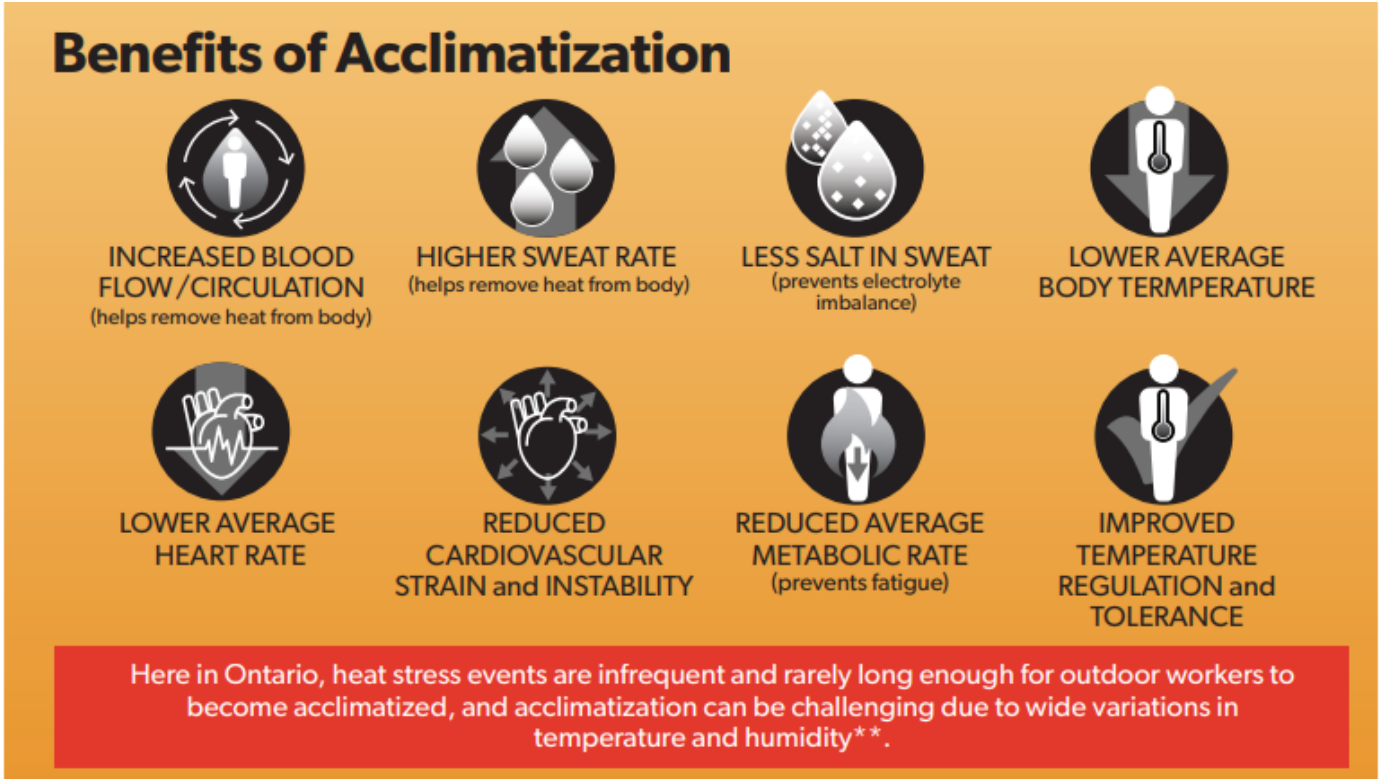


Electrolytes

- Electrolytes
  - Electrolyte solutions promote a more complete recovery during rehydration.
    - Decreases urinary output
    - Stimulate thirst mechanism
    - Restores plasma volume more rapidly

Heat Acclimatization

Body will adapt to hot environments over time in several ways including:



Heat Acclimatization (2)

- Can take up to 4-7 days to fully acclimatize. ACGIH 2023 TLV suggests: exposed at least 2 hours of heat stress exposure for **5 of last 7 days** or 10 of last 14 days

- Noticeable decline after 3 days, and can be completely lost with removal from heat for 3-4 weeks (need to re-acclimatize following lengthy vacations. ie. shift workers).

Those at Higher Risk

- Lack of physical activity
- Poor physical condition
- Overweight
- Age
- Very small body size
- Dehydration
- Excessive clothing
- High alcohol, caffeine, nicotine intake

Occupations at risk

- Involving high air temperatures, radiant heat sources, high humidity, or strenuous physical activities:
  - Construction workers or outdoor workers
  - Iron and steel foundries
  - Underground workers
  - Brick firing and ceramic plants
  - Firefighters
  - Bakeries
  - Smelter workers

The Law

- Under the current legislation, employers have a duty under Section 25(2)(h) of the Occupational Health and Safety Act to take every precaution reasonable in the circumstances for the protection of a worker.
  - This includes developing policies and procedures to protect workers in hot environments due to hot processes or hot weather.

- Training on heat stress should be provided to both workers **and** supervisors to manage heat stress.

- MLITSD current recommendations
  - ACGIH TLV heat stress and strain
  - TLV based approach (Humidex plan)

  - These values are based on **preventing unacclimatized workers' core temperatures from rising above 38° C.**

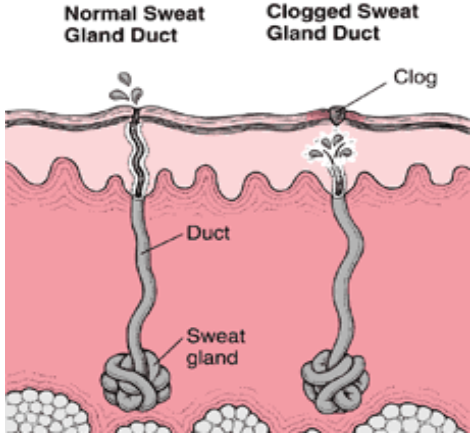
Heat Illness

Disabling complications relating to the body's inability to cope with heat. Knowing the signs and symptoms is an important step to managing heat stress (supported self-management):

- Heat Rash
- Heat Cramps
- Heat Exhaustion / Stress / Fainting
- Heat Stroke

Heat Rash

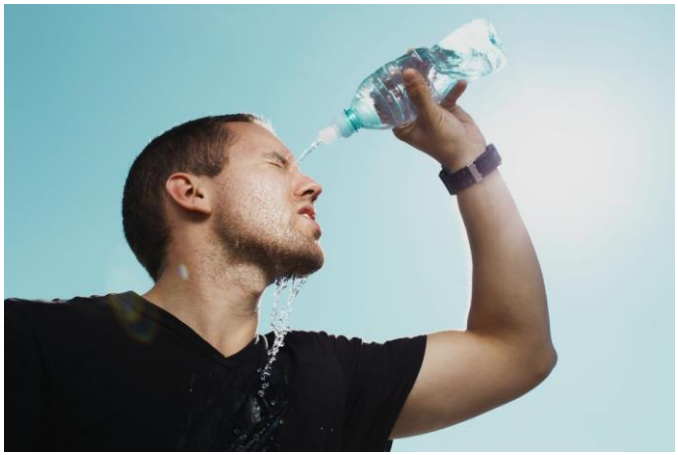
- Heat Rash is an irritation of the skin caused by excessive heat and sweating
- Rash develops as a result of plugged sweat glands (enhanced by hot, humid environment)
- Red, bumpy rash with severe itching.



https://www.merckmanuals.com/home/skin-disorders/sweating-disorders/prickly-heat

Heat Rash - Treatment

- Change into dry clothes and avoid hot environments
- Rinse skin with cool water



Heat Cramps

- Heat Cramps occur during or after physical activity in a hot environment, usually in the specifically exercising muscles.
  - Core temperature often remains normal
  - Heavy perspiration
  - Muscle Cramps (legs, arms, abdomen)
  - Weak/Lightheaded
- Typically caused by an imbalance in the body's fluid level and electrolyte concentrations.
- Heat cramps may also be a symptom of heat exhaustion.

Heat Cramps Prevention

- Rest briefly
- Drink electrolyte-containing drinks (e.g. sports drink) instead of plain water (to prevent water intoxication, or low blood Na level)
- Seek medical help if cramps persist.

Heat Exhaustion

- Heat Exhaustion usually develops in unacclimatized workers during the first heat wave.
- Caused by loss of a large amount of fluids & electrolytes and ineffective circulatory adjustments .
- Warning signs of heat exhaustion:
  - Heavy sweating
  - Paleness
  - Muscle cramps
  - Tiredness / Weakness
  - Dizziness
  - Headache
  - Very Thirsty
  - Nausea or vomiting
  - Fainting

Heat Exhaustion - Treatment

- Move to cool area, loosen clothing; make person lie down; offer sips of cool water.
- It takes at least 30 minutes to cool the body down after overheating
- Get medical attention
- CPR (in cases of cardiac arrest)

Heat Stroke

- Heat stroke is the most serious and complex of the heat stress illnesses.
- Reflects failure of heat-regulating mechanisms from an excessively high core temperature.
- Classic form:
  - Core temp. > 105 F / 40 C
  - Absence of sweating
  - Altered mental status

Heat Stroke

Exertional heat stroke

- Usually occurs in individuals (workers) who engage in:
  - strenuous physical activity for a prolonged period of time in a hot and humid environment.
  - and often have impeded heat dissipation.

Non-exertional heatstroke (NEHS)

- more commonly affects sedentary elderly individuals, persons who are chronically ill, and very young persons.
- NEHS usually occurs during environmental heat waves and is more common in areas that have not experienced a heat wave in many years.

Heat Stroke Progression

- Body no longer able to cool itself
- Basic heat loss mechanisms no longer functioning:
  - High body temperature (may be > 40°C)
  - Starting with excessive sweating → No sweating
  - Hot, dry skin
  - Headache, dizziness, nausea
  - Rapid heart beat, rapid and shallow breathing
  - Confusion, irritability
  - Loss of consciousness
  - Seizures
  - Can lead to death

Heat Stroke - treatment

- Immediate medical attention.
  - Call 911
- Immediate & aggressive cooling (by fanning, removing clothes, spraying with cool water,etc).
- Do not encourage eating
- Give fluid (in small amounts)
- Have the victim lie down with feet elevated, apply cool compresses

Proposed conceptual framework:

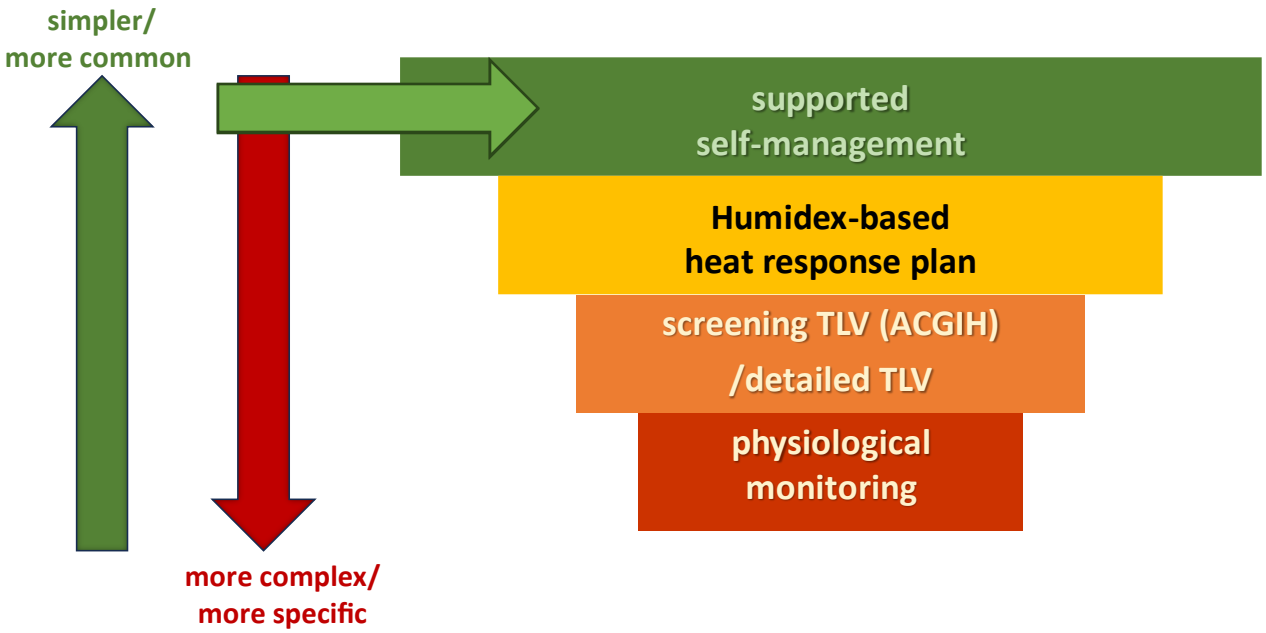
A. **Supported Self-management** – knowledgeable workers who have demonstrated they are able to recognize early signs & symptoms and, supported by their supervisors, are provided the latitude to manage their work rate and their fluid intake.

B. **Simplified TLV/Humidex-based heat response plan** – a simplified version of the ACGIH TLV guidelines based on direct measurements of temperature and relative humidity. The measurements are converted to Humidex (or WBGT estimates) prescribing preventive actions. This approach is designed for workplaces without process heat/humidity sources and regular work clothing – this approach can evolve into **supported self-management** over time under good management practices with supported self-calibration (being able to predict when preventive actions need to be taken by "listening to their body").

C. **ACGIH Screening/Detailed TLV** – using the "official" screening WBGT measurements and appropriate application of work-rest regimens to prevent heat stress (often to settle disputes) – may evolve into **simplified TLV/Humidex** approach over time. For complex and unusual exposures there is also the option to follow the technically challenging "TLV Analysis" method outlined in the TLV documentation.

D. **Physiological monitoring** may be required to manage exposures above the TLV criteria (for tough to manage exposures) – such measures can be correlated with ambient measurements over time and with correlational analysis (pattern detection) evolve into the establishment of "home-made" **screening levels**, or even a **simplified TLV/Humidex** approach. **Physiological self-monitoring** using smart watches or apps is another "unofficial" approach which should be viewed with caution (accuracy & validity problems). The data from these tools can evolve into **self-calibration** as workers consciously (or sub-consciously) recognize the correlation between measurements and body responses.

Levels of Heat Stress Management



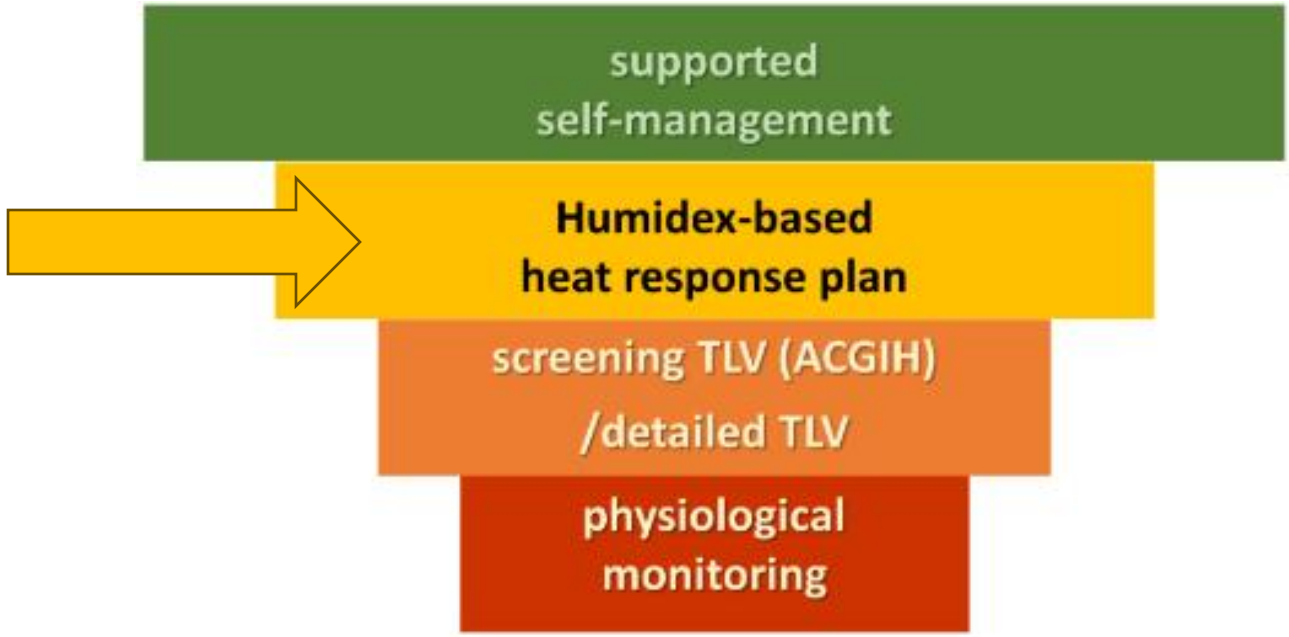
Knowledgeable workers who have demonstrated they are able to recognize early signs & symptoms and, supported by their supervisors, are provided the latitude to manage their work rate and their fluid intake.

Supported self management

- Train workers and supervisors to recognize early signs and symptoms of heat stress.
- Ensure workers can show demonstration of knowledge.
- Supported by supervisors.
- Give workers access to a cool or shaded rest area
- Take breaks as needed
- Manage your own work rate and fluid intake
- Co-worker observation (buddy system) with verbal cues.
- Have a hot-weather plan

(such as the Humidex).

Heat Stress Management



This approach is designed for workplaces without process heat/humidity sources and regular work clothing – this approach can evolve into **supported self-management** over time under good management practices with supported self-calibration

Humidex Heat Stress Response Plan

- Based on the ACGIH TLV.
- WBGT were translated into Humidex.
- Humidex 1: Based on “moderate” workload, un-acclimatized.
- Humidex 2: Based on “moderate” workload, acclimatized. **(Removed in new tool kit)**

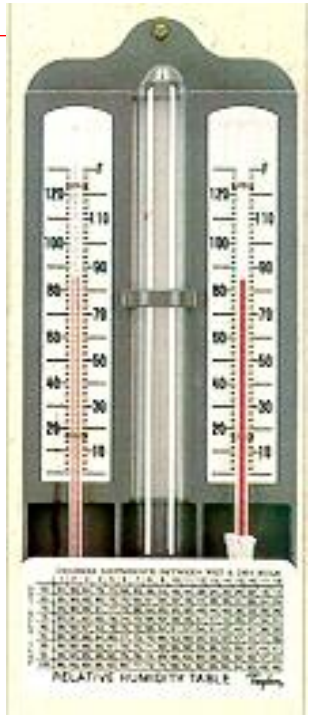
What is Humidex?

Humidex is a Canadian invention to combine temperature and relative humidity into a single number so people can tell how hot it “feels”, for example:

26°C	@ 40% RH	=>	28°C Humidex
	@ 60% RH	=>	32°C Humidex
	@ 80% RH	=>	36°C Humidex
	@ 100% RH	=>	39°C Humidex

How to Measure Humidex:

- Natural wet-bulb and dry bulb thermometers are the most accurate (±2-3%):
  - convert readings to %RH (Relative Humidity)
  - convert %RH and temperature to Humidex
  - (see OHCOW Humidex calculator at www.ohcow.on.ca)
  - Natural wet-bulb temperature: It is measured when the wetted wick covering the sensor is exposed only to naturally occurring air movements.
  - You can also buy hygrometers (RH meters ± 5%)



Occupational Health Clinics for Ontario Workers Inc.

June 2017

Limitations: this table is based on work with **little or no radiant heat**, assuming wearing **regular summer clothing**; if your specific working conditions vary from these assumptions, see the steps 1-5 listed below to make adjustments

Humidex Heat Stress Response Plan

	Relative Humidity (in %)																	
Temp (in °C)	100%	95%	90%	85%	80%	75%	70%	65%	60%	55%	50%	45%	40%	35%	30%	25%	20%	15%	10%
49																			50
48	NEVER IGNORE ANYONE'S SYMPTOMS DESPITE YOUR MEASUREMENTS!!!																		49
47	Moderate Unacclimatized & Heavy Acclimatized							Moderate Acclimatized & Light Unacclimatized										50	47
46																		49	46
45																	50	47	45
44		Action															49	46	43
43	45+	only medically supervised work						50+*								49	47	45	42
42	42-44	work with 45 min/hr relief						47-49*							50	48	46	43	41
41	40-41	work with 30 min/hr relief						45-46*							48	46	44	42	40
40	38-39	work with 15 min/hr relief						43-44						49	47	45	43	41	39
39	34-37	warn for symptoms & extra water						40-42					49	47	45	43	41	39	37
38	30-33	alert for symptoms & extra water						36-39				49	47	45	43	42	40	38	36
37	25-29	water as needed						32-35			49	47	45	44	42	40	38	37	35
36	*for Humidex 45+, heat stress should be managed as per the ACGIH TLV®								50	49	47	45	44	42	40	39	37	35	34
35								50	48	47	45	43	42	40	39	37	36	34	33
34							49	48	46	45	43	42	40	39	37	36	34	33	31
33					50	48	47	46	44	43	41	40	39	37	36	34	33	32	30
32			50	49	48	46	45	44	42	41	40	38	37	36	34	33	32	30	29
31	50	49	48	47	45	44	43	42	40	39	38	37	35	34	33	32	30	29	28
30	48	47	46	44	43	42	41	40	39	37	36	35	34	33	31	30	29	28	27
29	46	45	43	42	41	40	39	38	37	36	35	33	32	31	30	29	28	27	26
28	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25
27	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25		
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25	37	36	35	34	33	33	32	31	30	29	28	27	26	26	25				
24	35	34	33	33	32	31	30	29	28	28	27	26	25						
23	33	32	31	31	30	29	28	28	27	26	25								
22	31	30	30	29	28	27	27	26	25	25									
									60%	55%	50%	45%	40%	35%	30%	25%	20%	15%	10%

Ex: Temperature – 29°C

Relative Humidity – 65%

Humidex Heat Stress Plan:

Humidex	Response
25 – 29	supply water to workers on an “as needed” basis
30 – 33	post Heat Stress Alert notice; encourage workers to drink extra water; start recording hourly temperature and relative humidity
34 – 37	post Heat Stress Warning notice; notify workers that they need to drink extra water; ensure workers are trained to recognize symptoms
38 – 39	work with 15 minutes relief per hour can continue; provide adequate cool (10-15°C) water; at least 1 cup (240 mL) of water every 20 minutes worker with symptoms should seek medical attention
40 – 41	work with 30 minutes relief per hour can continue in addition to the provisions listed previously
42 – 44	if feasible, work with 45 minutes relief per hour can continue in addition to the provisions listed above
45 or over	only medically supervised work can continue

NEVER IGNORE ANYONE'S SYMPTOMS NO MATTER WHAT THE HUMIDEX!

Adjustment for Clothing

- Clothing can limit sweat evaporation which causes the body to heat up.
- Results from less air flow between the clothing and skin making sweat evaporation difficult
- TLV (WBGT) is based on wearing long-sleeve cotton shirt and pants.
- When clothing hinders evaporation, value needs to be added to measured temperature, which is based on WBGT.

Clothing Adjustment Values

	Current CAV 2023	
Clothing Type	**Addition to WBGT ^{0}C**	**Changes to Humidex ^{0}C**
Short Sleeves and Pants of Woven Material	-1.0	-1.0
Work clothes (long sleeve shirt and pants)	0	0
Cloth (woven material) coveralls	0	0
Double-layer woven clothing	3	6
SMS polypropylene coveralls	0.5	1
Polyolefin coveralls	1	2
Limited-use vapor barrier coveralls	11	22*
Limited-use vapor barrier coveralls with hood (Full Head and Neck Covering; not face)	+1	+2
Negative Pressure Respirator (Full Face or Less)	+0	+0

* use ACGIH TLV

Protective face masks and Thermoregulation

Protective Face Masks (N95, Air purifying respirators, Surgical masks)

- Negatively impacts respiratory and dermal mechanisms of human thermoregulation (relatively minor increases)
  - impairment of
  - convection,
  - evaporation
  - radiation processes.

  Raymond et al. (2011)., Protective Facemask Impact on Human Thermoregulation: An Overview.

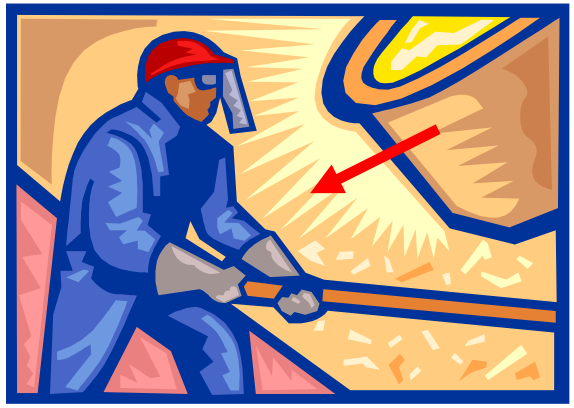
We get frequent enquiries about clothing adjustment factors for clothing items and PPE that aren't on the list

OHCOW is currently working on a CAV for other clothing derived from literature articles which compared the cooling rates of the different parts of the body.

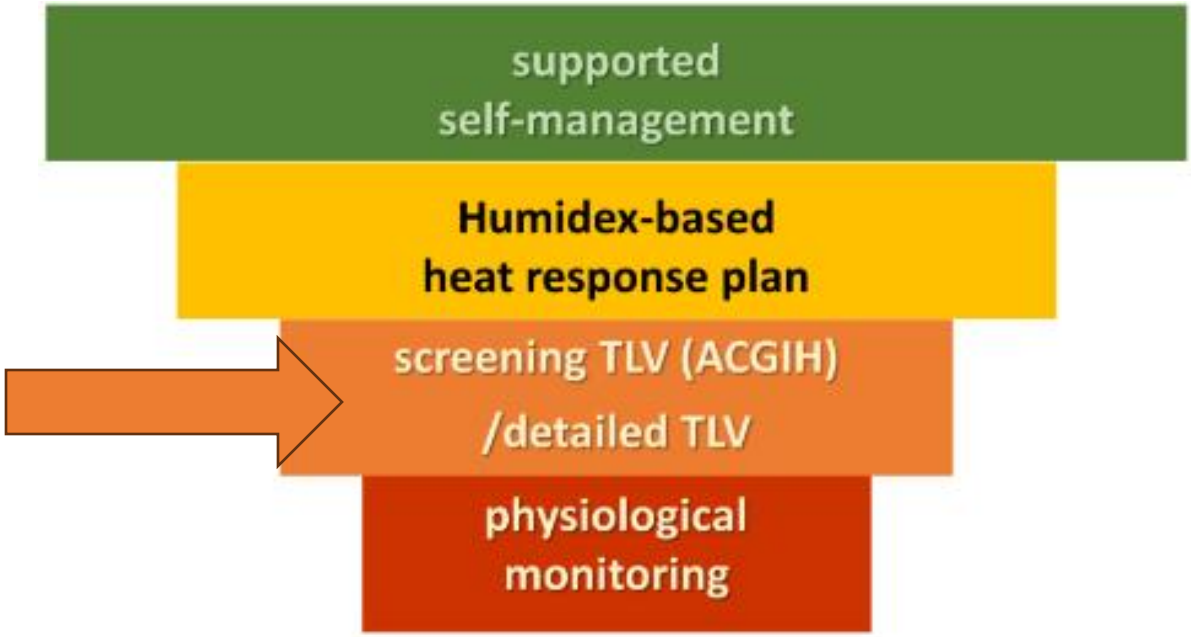
Adjustment for Radiant Heat (add to Humidex):

- If working outdoors in direct sunlight between 10 am-4pm, add 3-4ºC to Humidex.

- If working indoors with radiant heat sources, use common sense to add 3-4ºC (compare it to amount received from sun).



Heat Stress Management

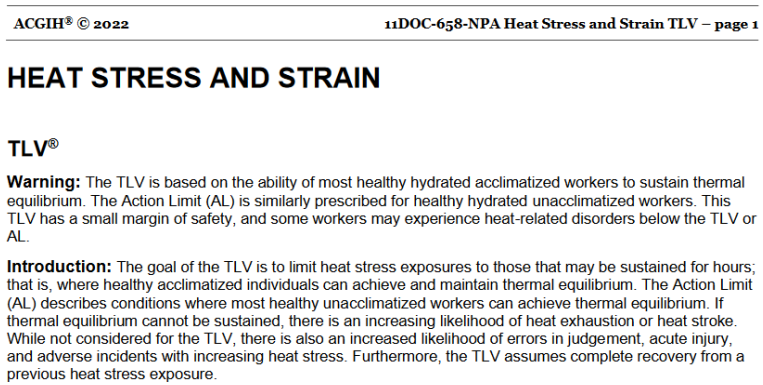


Using the “official” screening WBGT measurements and appropriate application of work-rest regimens to prevent heat stress (often to settle disputes) – may evolve into **simplified TLV/Humidex** approach over time.

ACGIH Heat Stress and Heat Strain TLV®:

- **Threshold limit value (TLV)** applies to “nearly all heat acclimatized, adequately hydrated, unmedicated, healthy workers who are repeatedly exposed without adverse health effects.”
- Based on preventing workers' core temperatures from rising above 38°C.
- A method for assessing heat stress based on a wet-bulb globe temperature (WBGT) threshold.

“Gold Standard”



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HEAT STRESS AND STRAIN

TLV®

Warning: The TLV is based on the ability of most healthy hydrated acclimatized workers to sustain thermal equilibrium. The Action Limit (AL) is similarly prescribed for healthy hydrated unacclimatized workers. This TLV has a small margin of safety, and some workers may experience heat-related disorders below the TLV or AL.

Introduction: The goal of the TLV is to limit heat stress exposures to those that may be sustained for hours; that is, where healthy acclimatized individuals can achieve and maintain thermal equilibrium. The Action Limit (AL) describes conditions where most healthy unacclimatized workers can achieve thermal equilibrium. If thermal equilibrium cannot be sustained, there is an increasing likelihood of heat exhaustion or heat stroke. While not considered for the TLV, there is also an increased likelihood of errors in judgement, acute injury, and adverse incidents with increasing heat stress. Furthermore, the TLV assumes complete recovery from a previous heat stress exposure.

What is a WBGT?

- WBGT (ºC) measures the environmental contribution to heat stress including
  - ➢air temperature (Normal temperature)
  - ➢radiant heat (Globe temperature)
  - ➢Humidity (Natural wet bulb and normal temperature)

2 Ways to calculate

With solar load

WBGT= 0.7NWB + 0.2GT + 0.1DB

Without solar load

WBGT= 0.7NWB + 0.3GT

Clothing Adjustment Values

	Current CAV 2023	
Clothing Type	**Addition to WBGT ^{0}C**	**Changes to Humidex ^{0}C**
Short Sleeves and Pants of Woven Material	-1.0	-1.0
Work clothes (long sleeve shirt and pants)	0	0
Cloth (woven material) coveralls	0	0
Double-layer woven clothing	3	6
SMS polypropylene coveralls	0.5	1
Polyolefin coveralls	1	2
Limited-use vapor barrier coveralls	11	22*
Limited-use vapor barrier coveralls with hood (Full Head and Neck Covering; not face)	+1	+2
Negative Pressure Respirator (Full Face or Less)	+0	+0

* use ACGIH TLV

ACGIH TLV 2023

- **Note: the 2023 version of the TLV does specify "acclimatized" and "unacclimatized" rather than TLV and AL**

Table 3. Screening Criteria using $WBGT_{eff}$ (°C) for Acclimatized and Unacclimatized Workers

	Metabolic Rate for Acclimatized Workers				Metabolic Rate for Unacclimatized Workers			
Allocation of Work in a Cycle of Work and Recovery	Light	Moderate	Heavy	Very Heavy	Light	Moderate	Heavy	Very Heavy
75 to 100%	31.0	28.0	–	–	28.0	25.0	–	–
50 to75%	31.0	29.0	27.5	–	28.5	26.0	24.0	–
25 to 50%	32.0	30.0	29.0	28.0	29.5	27.0	25.5	24.5
0 to 25%	32.5	31.5	30.5	30.0	30.0	29.0	28.0	27.0

Notes:

ACGIH TLV 2022 – Work load

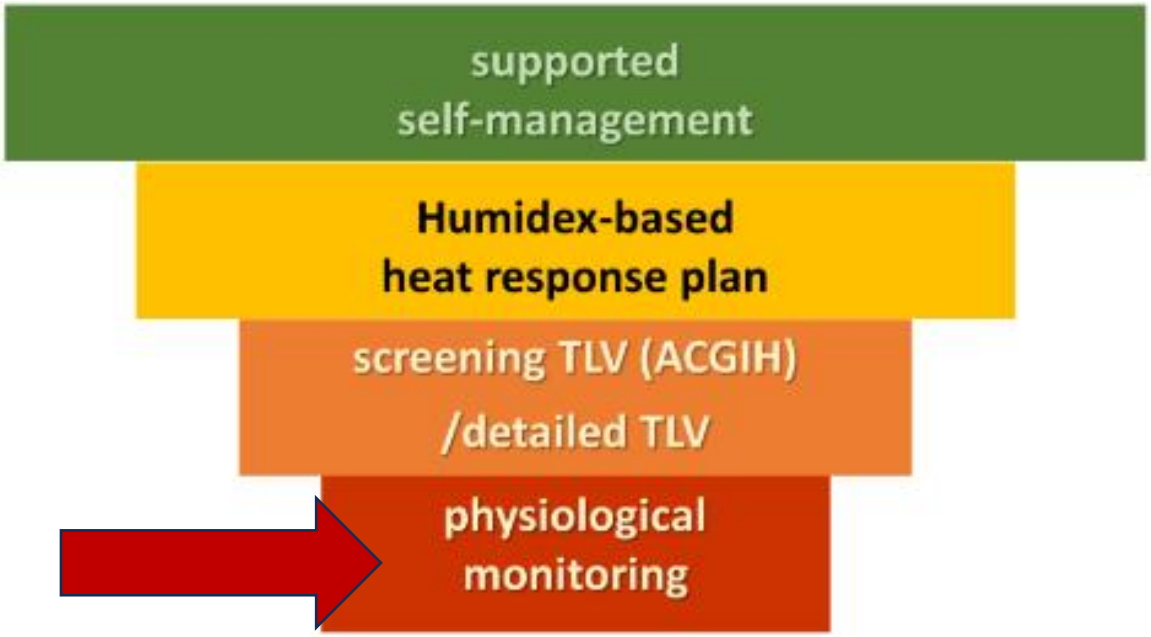
The 2022 TLV also specifies adjusting the metabolic rate for body weight

Moderate 235 to 360 W	300	Sustained moderate hand and arm work, moderate arm and leg work, moderate arm and truck work, or light pushing and pulling. Normal walking.
Heavy 360 to 470 W	415	Intense arm and trunk work, carrying, shoveling, manual sawing; pushing and pulling heavy loads; and walking at a fast pace.
Very heavy > 470 W	520	Very intense activity at fast to maximum pace.

Note: The effect of body weight on the estimated metabolic rate can be accounted for by multiplying the estimated rate by the ratio of actual body weight divided by 70 kg (154 lb).

Source: (International Organization for Standardization (ISO) 2017).

Heat stress management



Physiological monitoring for heat stress may be required to manage exposures above the TLV criteria. It can be a useful tool to protect the health and safety of individuals working in hot environments especially if engaging in strenuous physical activities, or the need for specific PPE (vapour barrier suit).

Heat Strain Self Evaluation

- Heart beat measurement (sustained 180bpm – age)
- Body temperature (38°C)
- Recovery heart rate @ 1 min. more than 120 bpm
- Symptoms of sudden and sever fatigue, nausea, dizziness, or lightheadedness

Worker may be at risk If

✓Profuse sweating sustained over hrs

✓Weight loss in a shift more than 1.5 %

✓Noticing less frequent urination

Physiological Monitoring Program

- any measurement of body functions or states should be treated as medical monitoring and the data collected subject to all the **confidentiality protections** afforded to individual medical information
- physiological monitoring should only be **reserved for complex exposures** that can't be managed using simpler methods
- **informed consent** needs to be fundamental to any physiological monitoring program
- Exposure should stop with **signs or symptoms** of heat exhaustion or heat stroke or with **a request to stop** regardless of what physiological monitoring may indicate.

Heat Stress Prevention Guidelines

Based on the heat stress evaluation you can implement **Job Specific Controls**

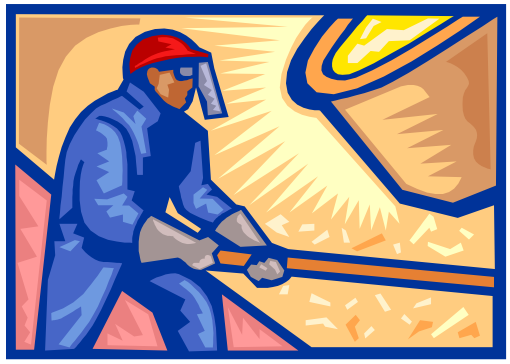
1. Engineering Controls
   - Controlling at the source
   - Ventilation/Air conditioning
2. Administrative Controls
   - Work/rest schedule
   - Job rotation
3. Personal Protective Equipment
   - Cooling vests
   - Reflective clothing

Engineering Controls

– *reducing heat at source*

- Controlling heat at source (e.g. insulation, blinds on windows, exhaust hot air or steam, radiant shielding).
- Ventilation
- General and local air conditioning.
- Provide air conditioned rest areas for breaks.
- Utilize cooling fans if temperature is <35°C.
- Actively cool body with misters.
- Use less labour intensive tools

Particularly, when cooling work environment is difficult



Administrative Controls

Minimize worker exposure & Increase time for recovery

- Have an established and enforced heat stress policy.
- Controlling internal heat generation:
  - reduce workload
  - increase the frequency rest breaks (or have workers perform lighter duties in cool areas)
  - assign extra workers
  - schedule strenuous jobs to cooler times of day
  - ensure good nutrition and rest (fruits and vegetables)

Personal Protective Equipment

- If appropriate, light summer or breathable clothing should be worn.
- In case of high radiant heat, reflective clothing may help.
- Cooling vests
- For very hot environments, air, water or ice-cooled insulated clothing should be considered.

Protective Clothing and Heat Stress

- Protective clothing can inhibit the sweat evaporation due to lack of permeation. This could increase the body internal temperature and thus cause heat strain.
- Vapor barrier clothing can also increase heat stress on the body.
- Extra caution should be taken in Heat Stress evaluation.
- removed protective clothing during breaks to improve sweat evaporation and reduce body temperature.
- Passive or active cooling during rest.
- Replenish fluids in the body.

What to do for Heat-Related Illness

Never ignore anyone's signs or symptoms, no matter what the temperature or Humidex!

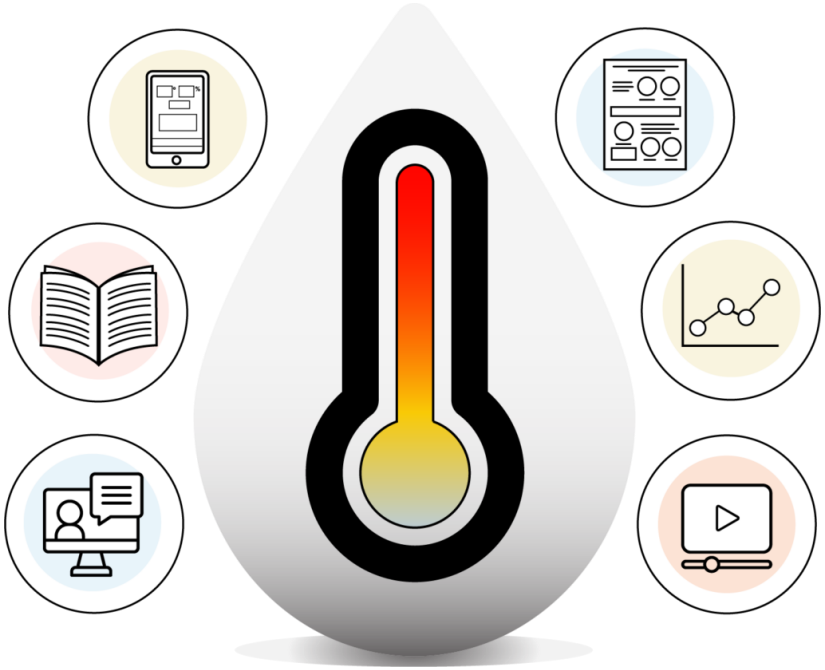
Call 911 (if indicated)

While waiting for help to arrive you should do the following:

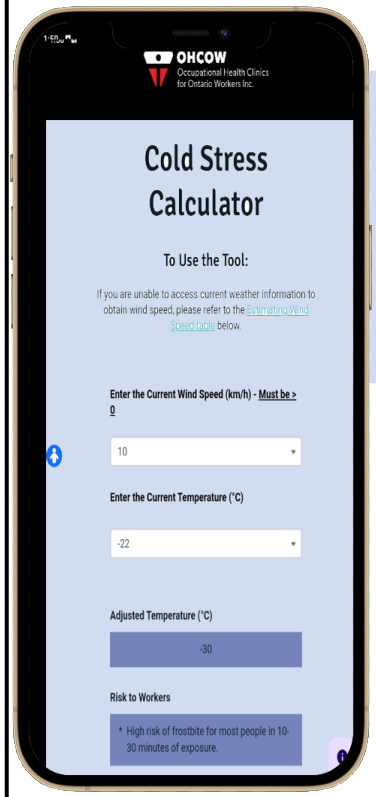
- Move worker to a cool shaded place
- Loosen or remove heavy clothing
- Provide cool water / sports drink to worker
- Fan and mist worker with water

COMING SOON! – Spring 2024

- Heat Stress Toolkit – OHCOW



Other new tools



Available at App Store (Apple), Google Play Store or OHCOW's website

For more information about the cold stress app contact:

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Thank you for your attention

If you have any questions about Occupational Hygiene, Ergonomics or any other occupational health concern contact OHCOW at:

Phone: **1-877-817-0336**

E-mail: ask@ohcow.on.ca

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