

# Importance of the Micro Climate At The Seating Interface

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- Coined in the 1950's to describe any climatic condition in a relatively small area
- In the complex rehab space, to describe the mini-atmosphere at the area of contact between the seat cushion and client
- Encompasses temperature, moisture and humidity
- An adverse microclimate increases the risk of tissue deformation

**Micro climate is an indirect risk factor  
(Gefan, 2014; Kottner et al 2018)**

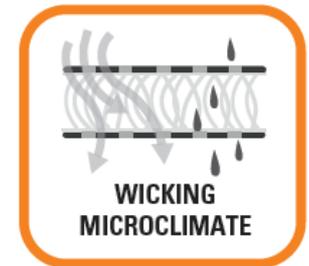
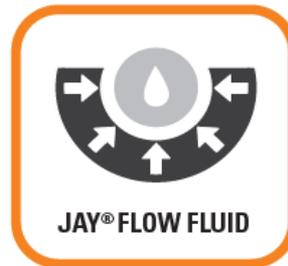
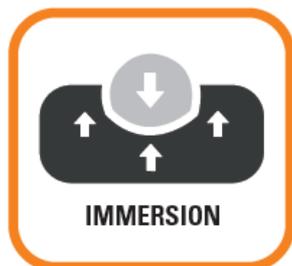
## BACKGROUND

- Incidence of pressure injuries within wheelchair users is high
  - Limited mobility
  - Sensation abnormalities
  - Among the SCI population – annual incidence is estimated at 23-40% and a lifetime incidence of **95%! <sup>1</sup>**
- Well established risk from pressure and shear forces
- Recent considerations of the micro-climate
  - Moisture, Humidity

**Managing of the microclimate is essential  
in healthy skin promotion**

- Increased heat worsens symptoms for clients with demyelinating diseases <sup>2,8,9</sup>
  - MS - (Multiple Sclerosis) chronic immune-mediated disorder of the central nervous system
- Clients with Cerebral Palsy with high tone/spasticity suffer from heat related issues and subsequent skin integrity issues <sup>3</sup>

## Preventative Strategies



- ✓ Majority of studies demonstrated a lower skin temperature response to gel when compared to foam or air.
- ✓ Foam cushions produce a lower relative humidity compared to gel
- ✓ Foam may be superior in moisture management

Why is this important?

**Material matters**

Increased interface  
**pressure** while sitting  
reduces blood flow to 'high  
risk' areas: IT's, Sacrum

Higher skin temperature  
increases tissue metabolism  
and demand for oxygen &  
nutrients (about **10% higher**  
**for 1°C** raised) <sup>4</sup>

**Goal: Reduce incidence of  
pressure injuries amongst  
wheelchair users**



- ✓ Lowering skin temperature by up to **5°C** can produce the same tissue protection effects as the pressure reduction provided by the most expensive support surfaces. <sup>5</sup>
- ✓ Reducing skin temperature at the sacrum by **3°C** is estimated to be equivalent to a **14% reduction in interface pressure** <sup>6</sup>
- ✓ Cooling skin from 36 °C to 28°C is estimated to be equivalent to reducing **interface pressure by 29%** <sup>6</sup>

Why is this important?

**Reducing both pressure and temperature can have a protective effect in the development of Pressure Injuries**

Increasing skin temperature seems to be associated with **general decline of skin resistance to damage**

Temperature and humidity affect the structure and function of the skin, **lowering damage thresholds** for the skin and underlying soft tissues. <sup>7</sup>



## Repositioning and weight shifts

- Pressure relief and re-distribution
- Improving air flow and moisture dissipation

## Maximise pressure distribution

- Decrease peak and mean pressure
- Pressure itself may also lead to increases in skin temperature

# Change the Microclimate

Increase the heat dissipation away from the seated surface

**Reducing both pressure and temperature can have a protective effect in the development of Pressure Injuries**

## Multiple Sclerosis

### Problem

- The majority of MS patients experience transient and **temporary worsening of symptoms** in response to a number of factors, the most prominent of which are increased ambient or core **body temperature and exercise**.<sup>2,9</sup>
- **Fatigue** is a frequent and sometimes debilitating symptom in MS, present in nearly 70% of MS patients<sup>2,8</sup> and **worsens during thermal stress**<sup>10</sup>
- Clients with MS potentially have impaired sweat glands - reducing the body's ability to control body temperature<sup>12</sup>

## Spinal Cord Injuries (SCI)

### Problem

- SCI clients have **difficulty regulating body temperatures** - thermal regulation is impaired below the level of injury
- **Impaired sensation decreases/slows body's responses** to changes in body temperature
- Higher risk for **overheating during exercise**

During exercise in 35°/95°F, increase in body temperature for client with SCI was larger than in Able bodies (AB).<sup>14</sup>

- SCI are at a greater risk for a disturbed heat balance during exercise in the cold and in the heat than AB. Both in the cold and in the heat, precautions should be taken even earlier and be more intensive for SCI than for AB.<sup>14</sup>

## Bariatric

### Problem

High risk population for skin integrity issues

- Poor blood supply to fatty tissues and **inadequate oxygenation** to these tissues.
- Potential for **poor nutrition**
- **Increased sweating** leads to moist skin
  - Higher likelihood of skin integrity issues
  - Bacteria and fungi issues
- **Difficulty in keeping the skin clean.** Skin folds, in particular, may be difficult for the bariatric patient to clean thoroughly; the abdominal folds and groins may be ignored or inaccessible, leading to an increased risk of skin breakdown in these areas
- Immobility or significant reduction in ability to perform pressure reliefs

## Cerebral Palsy

### Problem

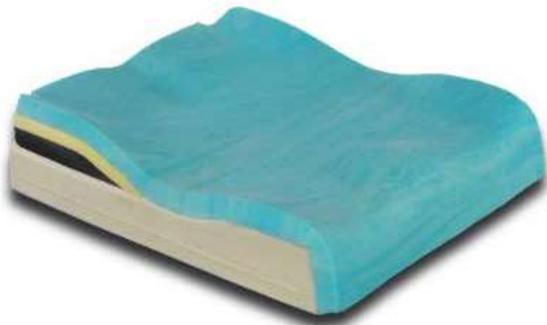
High risk population for skin integrity issues and need high degree of postural support

- Inability to change position
- Shear forces due to **higher tone/spasticity**
- Increased sweating due to **highly supportive (contoured) seating systems** that reduces airflow and increase body temperature
- Clients with CP tend to **cope poorly in hot temperatures** – body has diminished response to heat stresses

**During the seating assessment, consideration of both the cushion design and materials needs to occur in order for the clients to effectively use these strategies.**

- **Consider the cushion materials:**

- Is the cushion full contact, form fitting and immersive? This type of cushion might reduce air flow - if so, more heat reduction strategies may be required.
- Is the cushion able to dissipate heat appropriate to the client and climate?
- Consider “active cooling strategies” provided by cushion material with the more “at risk clients”.



Cushion covers play an Influence the micro climate

(Mendes et all, 2019)

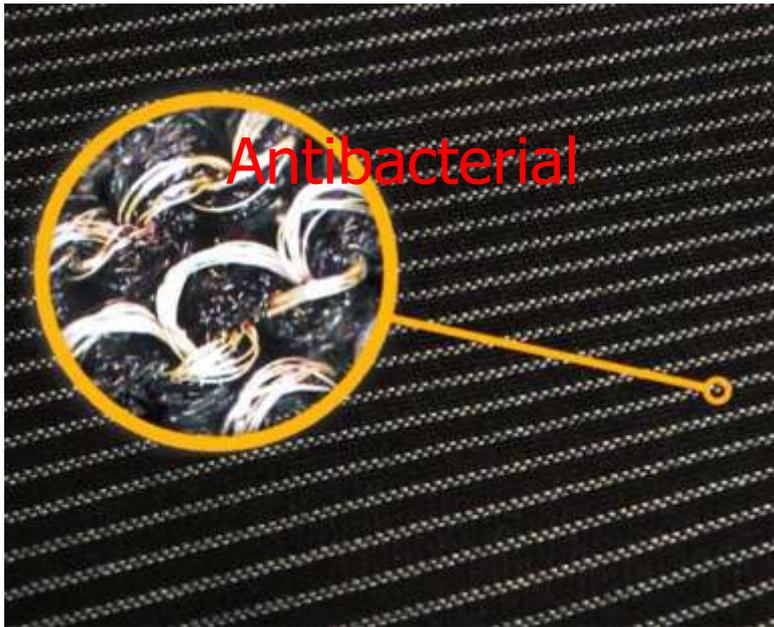
( Stockton, Gebhardt and Clark, 2009)

1. Influences moisture
2. Heat creation
3. Protects the cushion

- **Consider cushion cover materials that optimize airflow with the more “at risk” clients:**
  - Is it able to passively dissipate heat appropriate to the client and climate?
  - Does it have the necessary wicking capability?
  - What is the permeability of the cover material?



# Covers



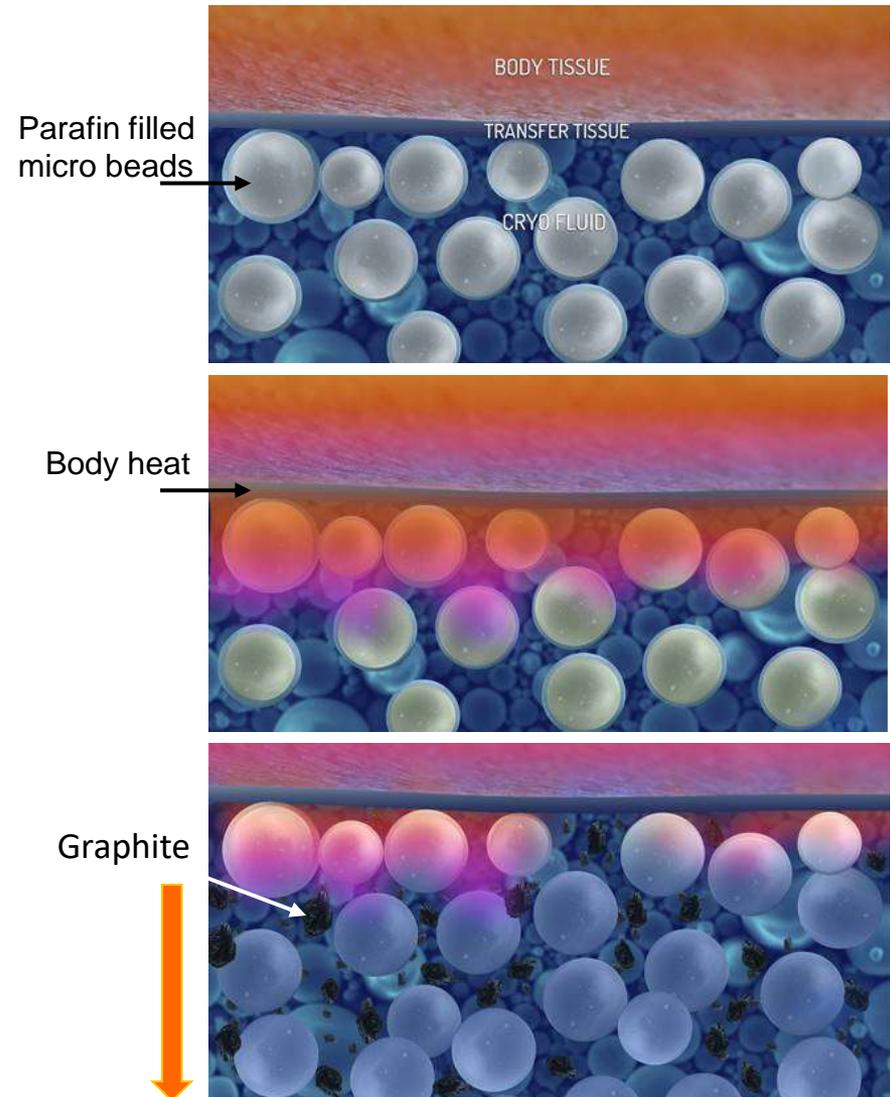
## Key Points

- Decreasing the skin temperature may reduce severity of ischemia (reduced blood flow) and lower the risk of developing a pressure injury
- Decreasing the temperature by up to 5°C at the skin-support surface interface can have a significant protective effect <sup>5</sup>
- The skin microclimate (temperature, humidity and airflow next to the skin surface) is an indirect pressure ulcer risk factor and risk can be reduced by changing the microclimate <sup>7</sup>
- Reducing skin temperature and interface pressure together produces the most beneficial effect



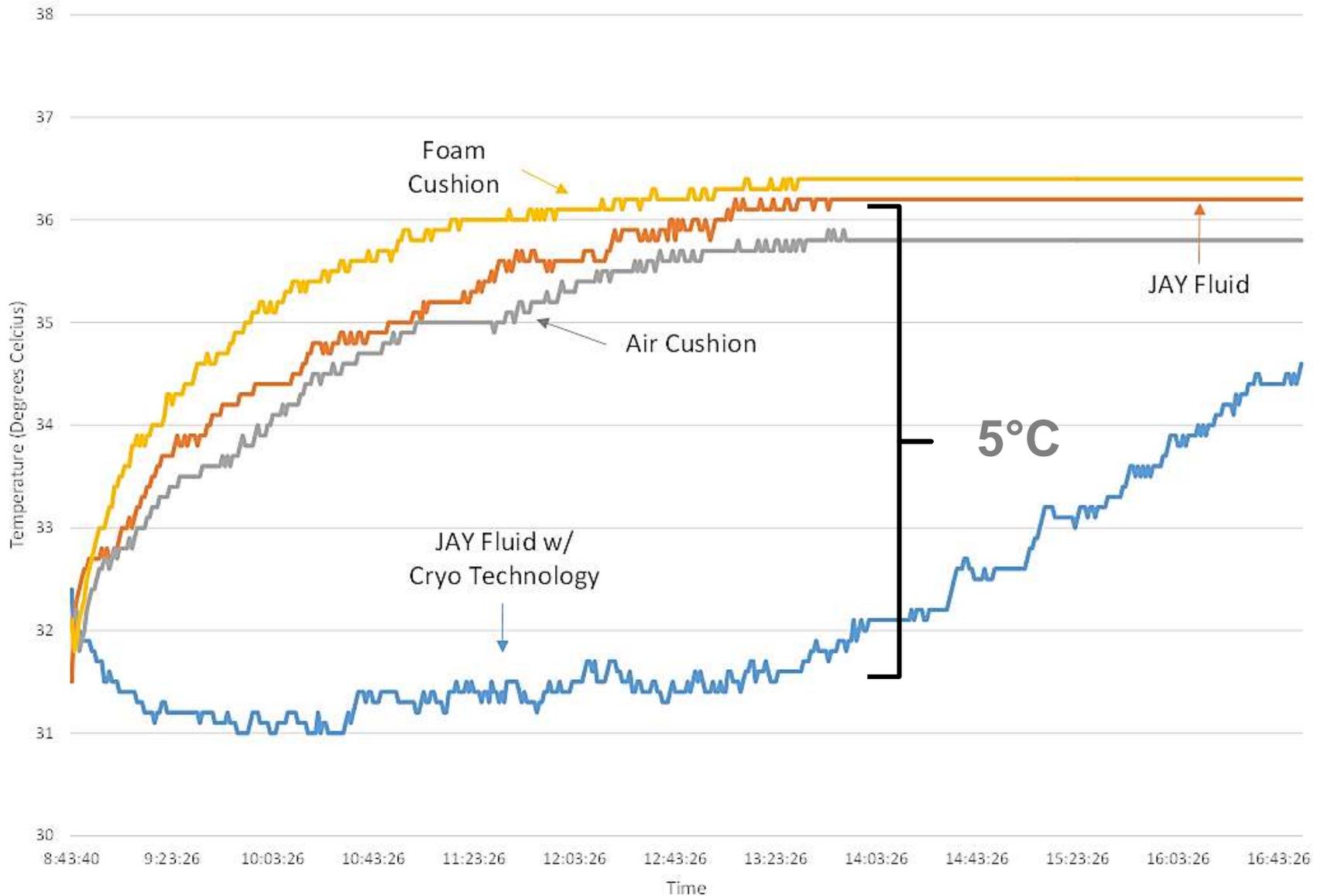
It occurs using **Phase Change Material** technology

1. Heat is pulled away from user's skin into JAY Fluid with Cryo® technology because fluid is cooler (High to Low temperature gradient)
2. Increased heat causes the paraffin inside millions of microbeads to turn from solid to liquid (process called 'Phase Change')
3. Heat is passed through all of the beads in the bladder via graphite filaments and away from the skin
4. Process is continually repeated until all beads become liquefied (~8 hours)



# How effective is it?

IT Skin Temperature - JAY Fluid w/ Cryo vs Existing Seating Technology



# Thanks For Attending

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