BEAT THE HEAT

WAKAYAMA MEDICAL UNIVERSITY
WORLD PARA ATHLETICS
JAPAN PARA ATHLETICS

TATSURU IBUSUKI
## Competition Schedule of Athletics

<table>
<thead>
<tr>
<th>Event</th>
<th>AUG</th>
<th>SEP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opening and Closing Ceremonies</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>Athletics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Track &amp; Field</td>
<td>● ● ● ●</td>
<td>● ● ● ●</td>
</tr>
<tr>
<td>Marathon</td>
<td></td>
<td>●</td>
</tr>
</tbody>
</table>
Agenda

• Summer heat environment in TOKYO

• Physiological characteristic of Para Athletics Athletes

• Cooling strategy to Para Athletics Athletes

• The system of weather prediction “MiCATA”

• Marathon Race on 6th SEP
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The measurement point of data

- National stadium
- Meteorological station
- PV

Distances:
- 3.7km
- 5.2km

Google Map
Change of Temperature and the Relative humidity

2018 TOKYO

1999-2018 TOKYO

Competition Environment: Temperature 30°C, Relative humidity 80%
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Physiological characteristic of Para Athletes

Body temperature response

1. Behavioral temperature response
   Clothing (take off, or change) or Air conditioner (turn on, or turn up)

2. Autonomous temperature response
   Sweaty (heat dissipation)

For example

CSCI
Leg amputation
Visual impairment and Guide
Assistant

Competition Environment: Temperature 30°C, Relative humidity 80%
### Physiological characteristic of Para Athletes

<table>
<thead>
<tr>
<th>Health Condition</th>
<th>Problems in the heat environment</th>
</tr>
</thead>
</table>
| Spinal Cord Injury     | • Autonomic nervous system disorders  
                          • Inhibition of Sweating 
                          • Heat retention |
| Cerebral Palsy         | • Hypertorus 
                          • Sweat rate increase 
                          • Dehydration |
| Amputee                | • Body surface decrease 
                          • Sweat rate increase 
                          • Dehydration |
| Visual Impairment      | • The sunshine and the shade are hard to find |
| Intellectual Impairment| • Difficulty with declaration of intention 
                          • Dehydration |

Which does athlete choose?
- Crash ice
- Cold water
- Fan
- Ice vest
- Hand cooling
- Ice slurry
- Ice pack
- Ice bath
Research in Road Race
2018 Japan Ekiden Race

MAR/11/2018 @kyoto
Start at 11:30; Ta 12.5°C; RH47%
6.4 km : time 12’04”

\[
\begin{align*}
\text{Core temperature} & \quad \text{(°C)} \\
\text{kcal/10s} & \quad \text{(kcal)} \\
\text{Time, sec} & \\
\end{align*}
\]

-300 0 300 600 900

Race

78.3 kcal

+0.5°C
Review Indonesia 2018 Asian Para Games

Oct/2018: Average temperature 29.8°C
High temperature 33.3°C  Low temperature 27.0°C
Relative humidity 68%

Heat stroke 7 athletes (In morning session) /64 JPA athletes

Track event
- T52 Short Splint
- T53 Middle Distance

Field event (1 hours-2 hours)
- T64 Highs Jump
- T64 Long Jump
- T63 Long Jump
- F46 Javelin Throw
- F55 Sitting Throw

SCI and Limb deficiency
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How do we control body temperature of wheelchair athlete with SCI in heat environment?
The experiment in the chamber

Competition Environment: Temperature 30°C, Relative humidity 80%

Warming up with Ice best

Cooling down by Ice bus

How does the core temperature change in heat environment?
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MiCATA is, weather information of only their own that meet the schedule of the team. MiCATA is a service that specializes in sports for.

2 week forecast for my schedule

72h forecast

Alert that forecast has changed

Alerts with a range of uncertainty

Range of uncertainty

Today’s MiCATA

Lightning alert
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Sensible temperature is different
Ambulant athlete and Wheelchair athlete

Heat stroke environment health manual
Ministry of the Environment 2018

Marathon Finish time
T12 Men 2:32:17  T54 Men 1:26:16
Women 3:01:43  Women 1:38:44
T46 Men 2:33:35
Marathon Race: 6th SEP

Tokyo 2020 Paralympic Marathon Course

Paralympic Marathon Course: T12 (Men/Women), T46 (Men), T54 (Men/Women)

Average Relative Humidity (%)
Average Temperature (℃)

Tokyo 2020 Paralympic Marathon Course

Start/Finish Olympic Stadium

Thank you for your attention!

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