



DSE 5\*\*

BIOLOGY (E1)

STARSHOOTER

## HKDSE Biology Elective 1 - Human Physiology: Regulation and Control

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# 1. Regulation of Body Temperature (Thermoregulation)

1.1 Importance of thermoregulation	
	<ul style="list-style-type: none"> <li>- metabolism catalysed by <b>Enzymes</b></li> <li>- enzymes require <b>optimum temperature</b> to work efficiently</li> <li>- steady temperature = steady metabolic rate</li> </ul>
<b>Thermoregulation</b>	<ul style="list-style-type: none"> <li>- <b>balance heat gain + heat loss</b></li> <li>- way of heat gain and loss               <ol style="list-style-type: none"> <li>1. internal                   <ul style="list-style-type: none"> <li>- metabolic reactions (e.g. cellular respiration in liver &amp; skeletal muscles)</li> </ul> </li> <li>2. external                   <ul style="list-style-type: none"> <li>- gain → conduction, convection, radiation</li> <li>- loss → evaporation of sweat, exhalation, urination</li> </ul> </li> </ol> </li> </ul>
<b>advantage of human being a homoiotherm</b> 恆溫動物	<ol style="list-style-type: none"> <li>1. appropriate temperature for metabolism at all time → high level of activity maintained at all time</li> <li>2. body activity not affected by daily/seasonal/regional changes in environmental temp → can live in <b>wide range of habitat</b></li> </ol>
<b>disadvantage</b>	<ol style="list-style-type: none"> <li>1. need to <b>consume food</b> all the time to maintain the regulation</li> </ol>
1.2 Skin structure & function	
<b>function of skin</b>	largest organ <ol style="list-style-type: none"> <li>1. regulate body temp</li> <li>2. body defense</li> <li>3. sensation</li> <li>4. excretion</li> <li>5. waterproof → prevent water loss</li> </ol>
<b>structure</b>	<ol style="list-style-type: none"> <li>1. <b>epidermis</b> (outer + thinner)</li> <li>2. <b>dermis</b> (inner + thicker)</li> <li>3. <b>subcutaneous fat</b></li> </ol>
<b>Epidermis</b>	<ol style="list-style-type: none"> <li>1. <b>Malpighian layer</b> (innermost)           <ul style="list-style-type: none"> <li>- active <b>mitotic cell division</b> → make new cells</li> <li>- produce <b>melanin</b> (pigment)               <ul style="list-style-type: none"> <li>- give skin color</li> <li>- <b>absorbs UV light</b> → protect skin &amp; tissue under</li> </ul> </li> <li>- produce <b>vitamin D</b> in sunlight</li> </ul> </li> <li>2. <b>living cells produced by Malpighian layer (middle)</b> <ul style="list-style-type: none"> <li>- cell pushed towards skin surface → content of the cell gradually replaced by <b>Keratin</b> (fibrous protein) → <b>nuclei disappear</b> when cell die</li> </ul> </li> </ol>