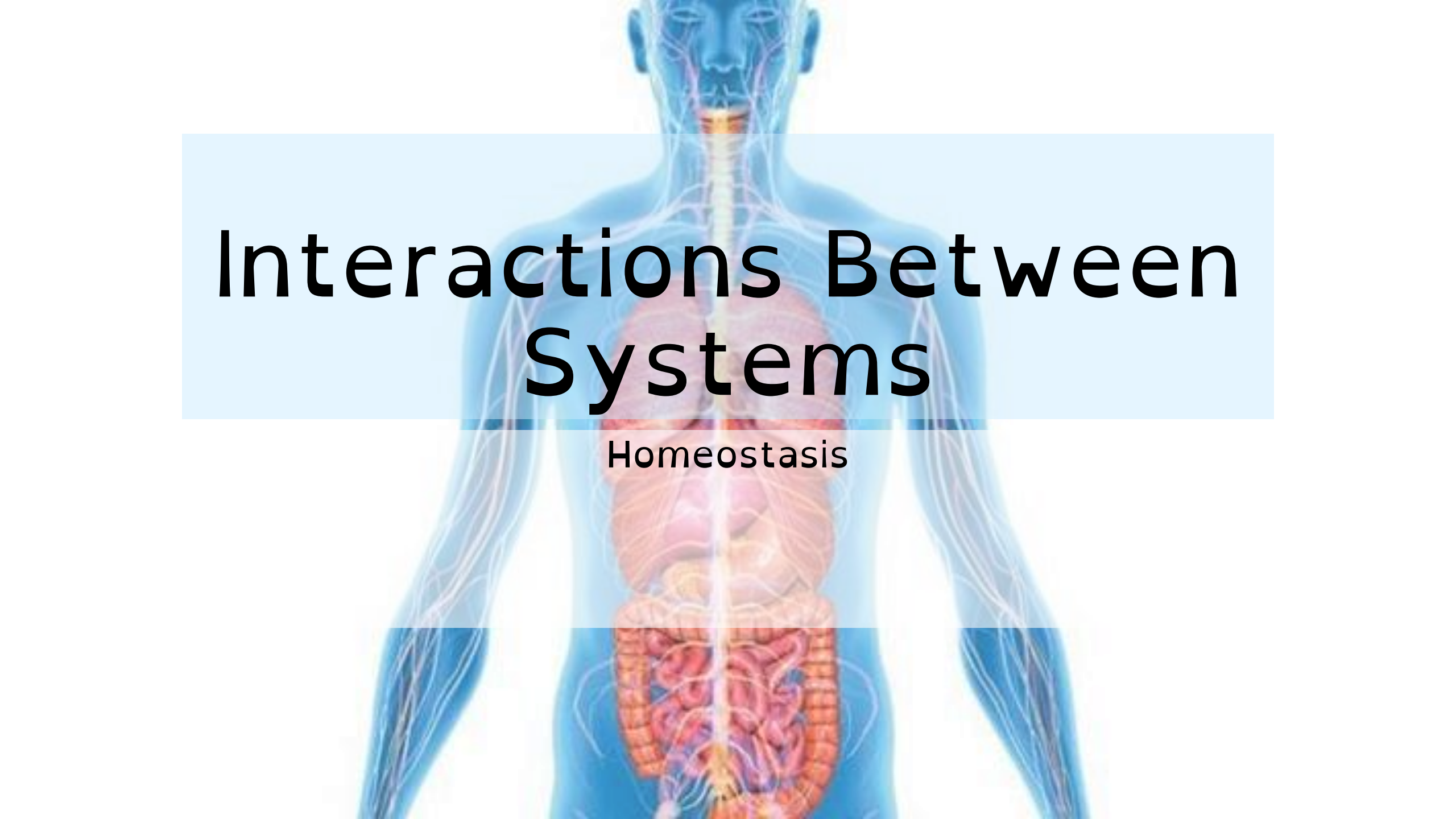


Interactions Between Systems

Homeostasis

What is homeostasis?

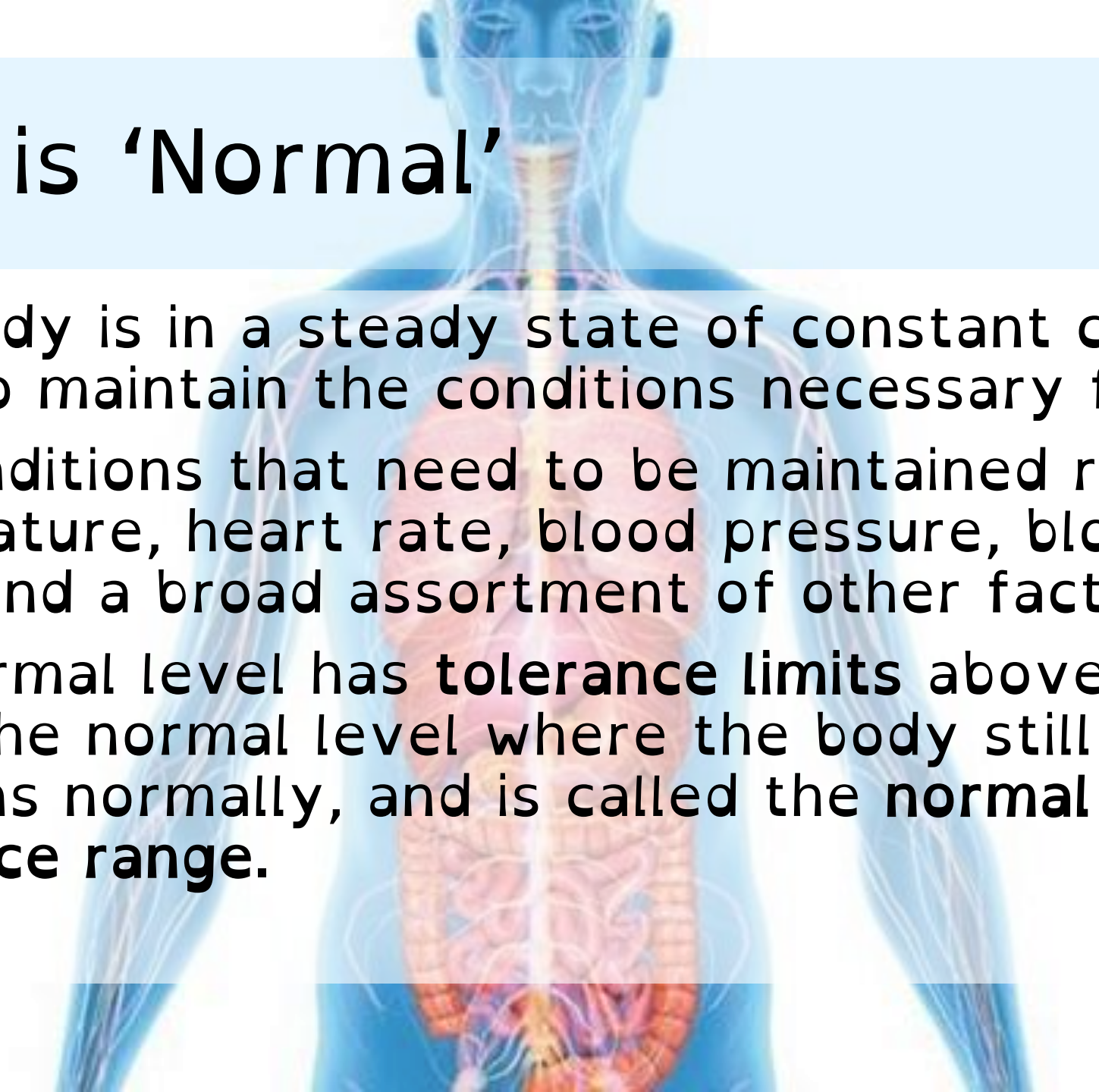
- Humans have a normal temperature that the body functions at.
- If your body temperature goes above that normal temperature it is a clue that you are suffering from an infection and that the body has raised its temperature to fight off the infection.
- After a few days, you will know you are better when your body temperature returns to normal.

Wee Tanit sick with Fever...

What is ‘Normal’?

- Your body works best when a number of internal conditions are kept at a **normal or reference level.**
- Above or below these values your body does not function properly and if left untreated it could lead to cell damage and possibly even death.
- The condition called **homeostasis** is the mechanism by which the body maintains these normal levels. The word homeostasis is a combination of two Greek words, *homoios* meaning “same” and *stasis* meaning “standing still”.

What is ‘Normal’



- Your body is in a steady state of constant change in order to maintain the conditions necessary for life.
- The conditions that need to be maintained relate to temperature, heart rate, blood pressure, blood sugar, and a broad assortment of other factors.
- This normal level has **tolerance limits** above and below the normal level where the body still functions normally, and is called the **normal or reference range.**

What is ‘Normal’

- It is also important to note that the normal level can be different for different people.
- Age, gender, genetics, fitness, and lifestyle all have an impact on what is considered normal.
- If you are a marathon runner you might find that your resting heart rate is below the normal 72 beats per minute. This can be attributed to your fitness level and lifestyle choices.
- A person who lives a sedentary lifestyle and has poor fitness might find that even the slightest bit of exertion will cause his heart rate to skyrocket out of the normal range.

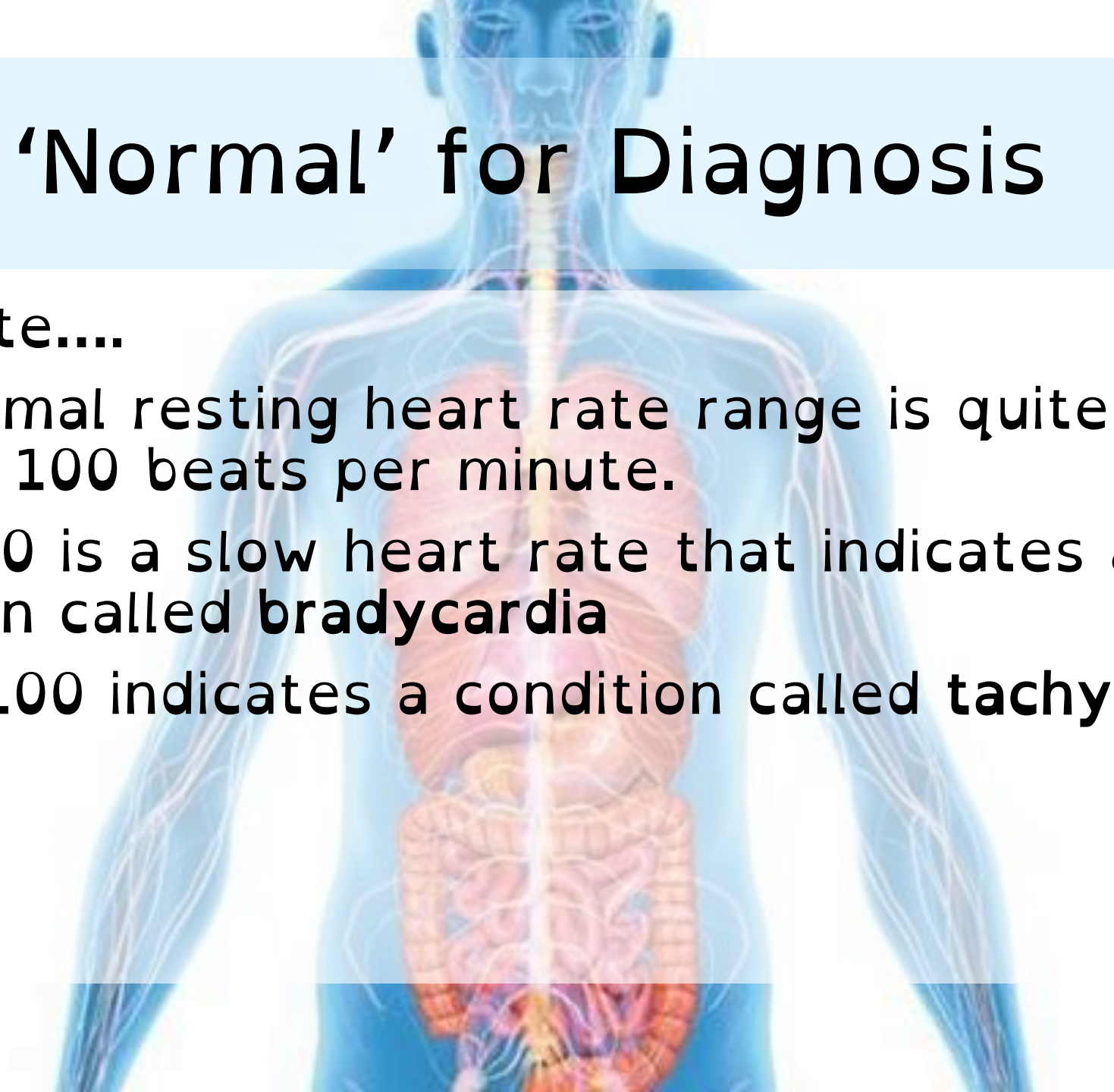
Using ‘Normal’ for Diagnosis

- Doctors use these 'normal ranges' to help diagnose potential illnesses since they often affect one or more of the normal levels.

Temperature…

- The normal range for body temperature is 36.2°C to 37.2°C; a temperature above this indicates fever and a temperature below this indicates **hypothermia.**

Using ‘Normal’ for Diagnosis



Heart Rate….

- The normal resting heart rate range is quite wide; it is 60 to 100 beats per minute.
- Below 50 is a slow heart rate that indicates a condition called **bradycardia**
- Above 100 indicates a condition called **tachycardia.**

Using ‘Normal’ for Diagnosis

Breathing Rate…

- Doctors can also be quite sneaky when checking your resting breathing rate.
- Since you can control the rate at which you breathe, they will pretend to take your pulse but are instead counting your breaths.
- The normal breathing rate range is from 16 to 20 breaths per minute.
- Above this rate is called **hyperventilation** and below the rate is called **hypoventilation**.

Using ‘Normal’ for Diagnosis

Resting Blood Pressure

- The blood pressure considered ‘normal’ is 120 / 80 mmHg, but this value can be affected by sex, age, and other factors.
- It is this pressure that is exerted on the walls of the blood vessels that we refer to when we talk about blood pressure.
- Obviously a certain level of pressure is needed to be able to force the blood through all those tiny capillaries in your tissues, but too much pressure can be dangerous.

Blood Pressure

- The greatest pressure is exerted on the arteries when the ventricles contract.
- This is called the systolic pressure.
- The pressure is at its lowest when the ventricular muscles relax. This is called the diastolic pressure.
- Together, these two pressures make up the blood pressure reading.

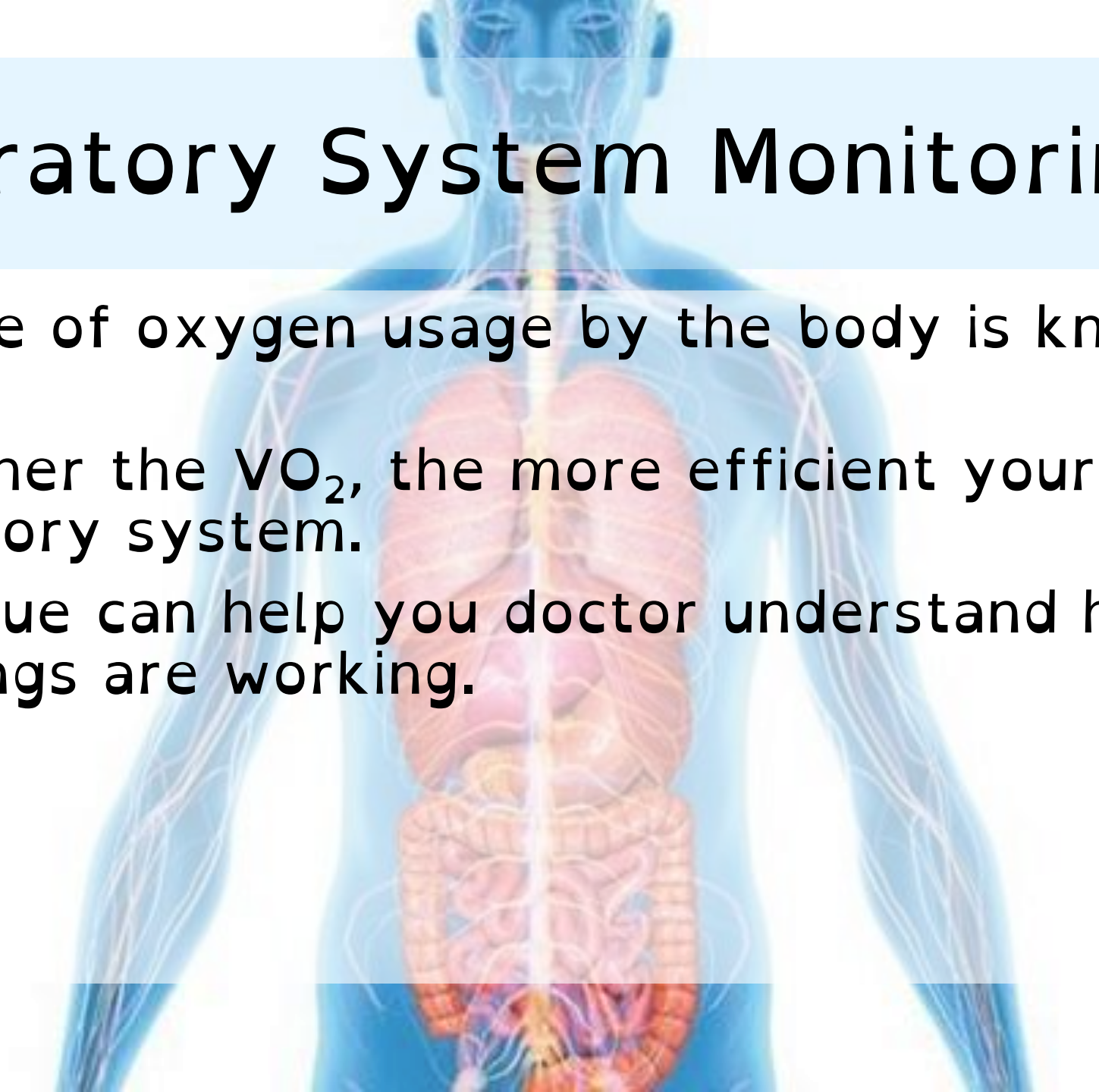
Blood Pressure

- As previously mentioned, the ideal systolic pressure for most people is 120 mmHg, and the ideal diastolic pressure is 80 mmHg, to give a blood pressure of 120/80 (read as 120 over 80).
- These values are based on the pressures in the brachial artery located in your arm.
- Since pressure decreases as the blood flows away from the heart, other locations may produce different readings.

Measuring Blood Pressure

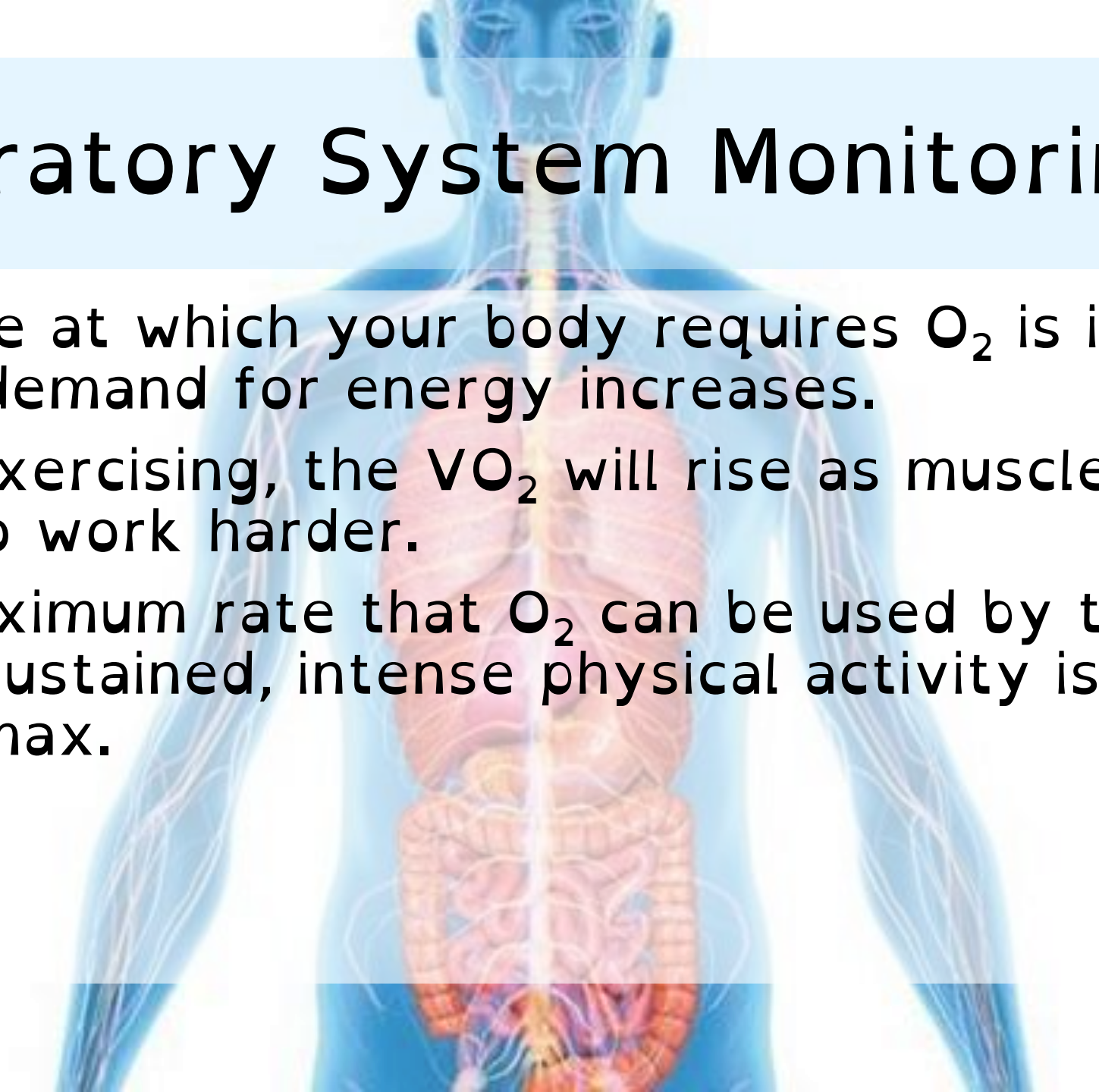
- The equipment needed to measure blood pressure is a stethoscope and a device called a sphygmomanometer (of course, it couldn't be 'blood pressure measuring thingy').
- It is an inflatable pressure cuff connected to a pressure meter.
- Basically, the first heart sound you hear when checking the pressure is the systolic pressure, and the last sound you hear is the diastolic pressure.

Respiratory System Monitoring



- The rate of oxygen usage by the body is known as VO_2.
- The higher the VO_2, the more efficient your respiratory system.
- This value can help you doctor understand how well your lungs are working.

Respiratory System Monitoring



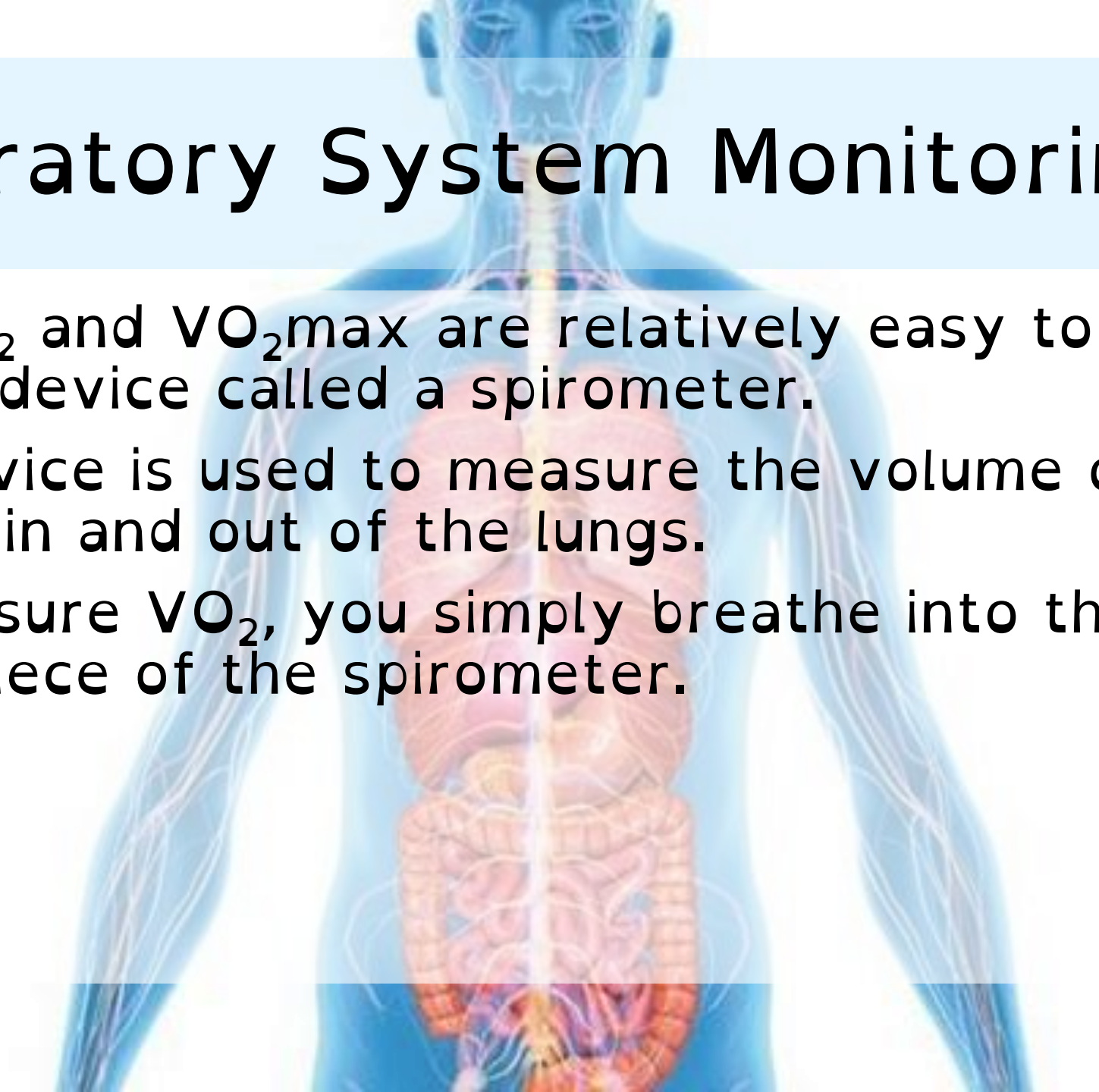
- The rate at which your body requires O_2 is increased as the demand for energy increases.
- When exercising, the VO_2 will rise as muscles are made to work harder.
- The maximum rate that O_2 can be used by the body during sustained, intense physical activity is known as VO_2max.

Respiratory System Monitoring

- VO_2 and VO_2max both depend on a number of factors.
- Your age, weight, and sex all have an impact.
- Both values are measured in millilitres of oxygen used per kilogram of body mass per minute, or mL/kg/min.

Age and Sex	Very Poor	Poor	Fair	Good	Excellent	Superior
13-19 M	< 35.0	35.0 - 38.3	38.4 - 45.1	45.2 - 50.9	51.0 - 55.9	> 55.9
13-19 F	< 25.0	25.0 - 30.9	31.0 - 34.9	35.0 - 38.9	39.0 - 41.9	> 41.9

Respiratory System Monitoring



- The VO_2 and VO_2max are relatively easy to measure using a device called a spirometer.
- This device is used to measure the volume of air moving in and out of the lungs.
- To measure VO_2, you simply breathe into the mouthpiece of the spirometer.