8 How our bodies keep warm

We need to keep at just the right level of warmth. To achieve this, our bodies have ways of controlling how warm we are.

People, and all other living things, spend much of their time keeping warm. This is because the bodies of all living things need to be within a narrow temperature range in order to work well. For humans, the normal body temperature is 37°C. Just a degree or so above this and you feel too hot, a degree or so below and you feel too cold. When we are healthy, our bodies have ways of keeping our temperature from getting too hot or too cold.

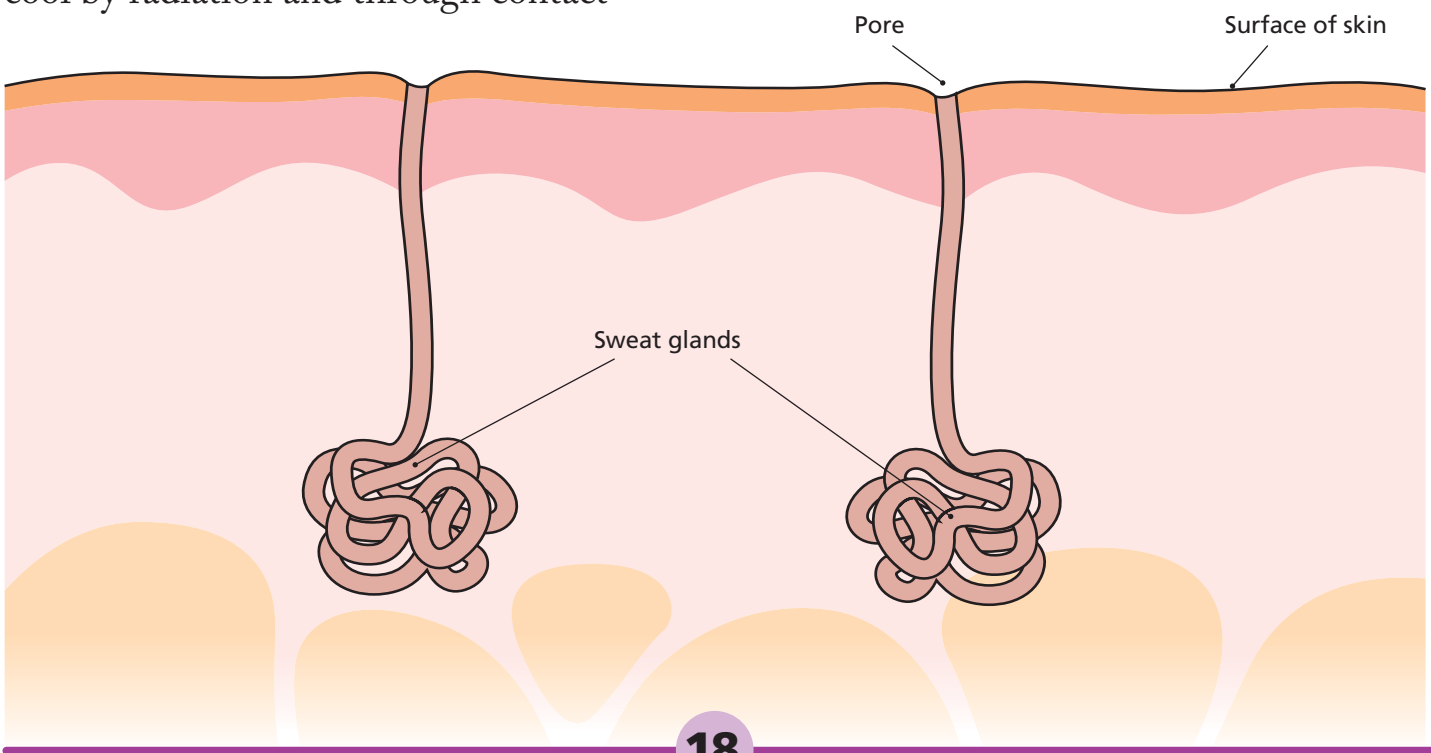
How the blood controls warmth

Our blood flows all around our bodies, taking heat from hot muscles and sending it close to the skin, where it can cool by radiation and through contact with the air (conduction and convection). If we get too hot, more blood flows close to the skin. If we get cold, less blood flows near the skin.

Sweating

When water **EVAPORATES**, it takes heat from its surroundings. This works like a natural refrigerator, and is used when the body gets very hot. People, and some other animals, lose water to keep cool – in this case it is called **SWEATING** (Picture 1).

▼ (Picture 1) Sweat is made in special coiled tubes inside the skin. Sweat contains water and other substances that the body wants to remove. The sweat comes to the surface through an opening called a pore. The water evaporates, leaving the other substances on the surface of the skin.



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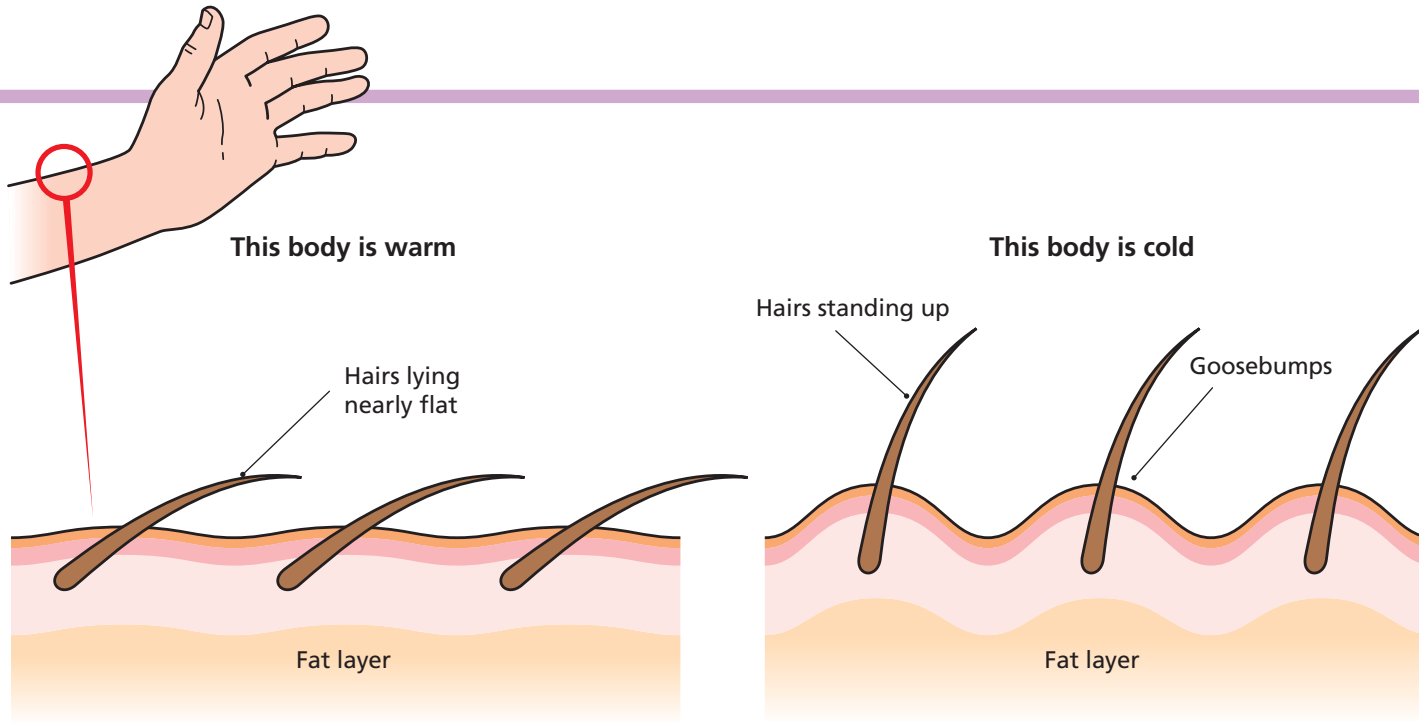

▲ **(Picture 2) Goosebumps, or goose pimples, are produced when the skin becomes cold. The muscles in the skin raise the hairs to trap more air. This also has the effect of producing goosebumps. As we have fewer hairs than most furry animals, this is not an especially effective way of keeping warm. The fat layer below the skin does a much better job of insulating against the cold.**

Shivering

We have a layer of fat below the skin. This acts like a natural insulator, keeping most of the body heat inside. When we get too cold, however, the body spots the danger signs and the muscles in the skin start to raise the hairs, causing **GOOSEBUMPS** (Picture 2). At the same time, we start to shake violently. We call this uncontrollable shaking **SHIVERING**. Shivering makes the muscles work, and in doing so they release heat.

We have no control over shivering. We continue shivering until the body has warmed up above the danger level.

Hypothermia

If we cannot warm ourselves up enough by shivering, the body uses more extreme measures. The muscles stop shaking and the body now tries to save what little heat it still has for as long as possible.

It shuts down all of the circulation to the skin and keeps warm blood flowing only to essential parts like the heart and brain. This is why people become very still when they are dangerously cold. But by shutting down like this, the body cannot continue for long and, without help, a person in this state would die. Life-threatening coldness is called **HYPOTHERMIA**.

Summary

- **Our bodies only work well in a narrow temperature range.**
- **The body can help to keep its temperature steady by changing where blood flows.**
- **If the body gets too cold, there is a risk of death.**