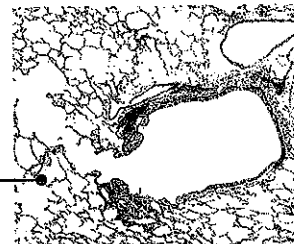
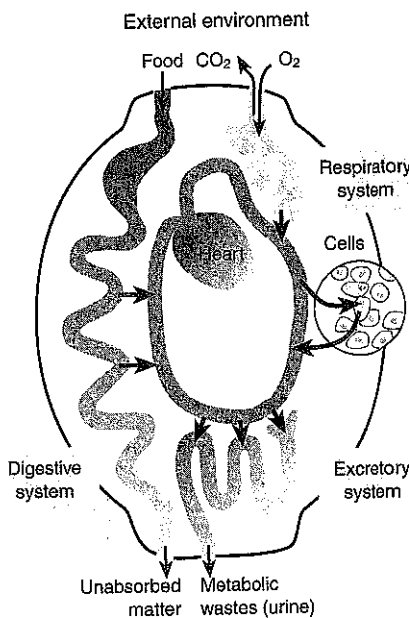


Principles of Homeostasis

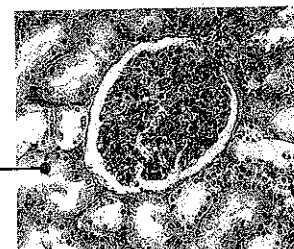
Homeostasis the relative physiological constancy of the body, despite external fluctuations. Homeostasis of the internal environment is an essential feature of complex animals and it is the job of the body's **organ systems** to maintain it, even as they make necessary exchanges with the environment. Homeostatic control systems have three functional components: a receptor to detect change, a control centre, and an effector to direct an

appropriate response. In **negative feedback** systems, movement away from a steady state triggers a mechanism to counteract further change in that direction. Using negative feedback systems, the body counteracts disturbances and restores the steady state. **Positive feedback** is also used in physiological systems, but to a lesser extent since positive feedback leads to the response escalating in the same direction.

Organ systems maintain a constant internal environment that provides for the needs of all the body's cells, making it possible for animals to move through different and often highly variable external environments. This representation of a mammal shows how organ systems permit exchanges with the environment. The exchange surfaces of organ systems are usually internal, but may be connected to the environment via openings on the body surface.



Lung tissue provides an expansive, moist surface for gas exchange.



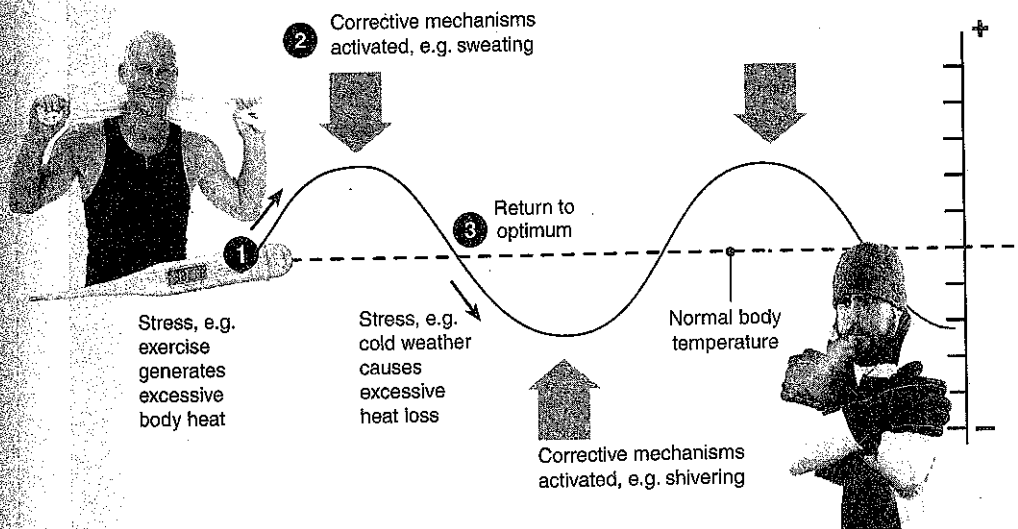
Kidney tubules exchange chemicals with the blood through capillaries.



The finger-like villi of the small intestine greatly expand the surface area for nutrient absorption.

All photos this page: Eil

Negative Feedback and Control Systems



- 1 A stress or disturbance, e.g. exercise, takes the internal environment away from optimum.
- 2 Stress is detected by receptors and corrective mechanisms (e.g. sweating) are activated.
- 3 The corrective mechanisms act to restore optimum.

Negative feedback acts to counteract any departures from a steady physiological state. The diagram shows how a stress (disturbance) is counteracted by corrective mechanisms in the case of body temperature.

In contrast to negative feedback, positive feedback will push physiological levels out of the normal range. While it is inherently unstable, it has a useful role at certain times, e.g. during childbirth.

The Integument & Homeostasis

1. Describe the three main components of a regulatory control system in the human body: _____

2. Explain how negative feedback mechanisms maintain homeostasis in a variable environment: _____

