Questionnaires were given to both presenters (n = 30) and the rest of the students (n = 300), and their responses are shown in Tables 1 and 2. Student feedback indicates that this activity is very effective, not only in breaking the monotony of lecture but also in generating interest in the topic as well as involving students in the discussion. Many students found it as a useful method of review because they were made to recall previously discussed topics during the activity.

**REFERENCES**


**Fig. 1. Homeostatic cycle.** The homeostatic functions of the body are built up from the functional unit, the cell, to the structures of higher level of organization, the systems, which work interdependently to give their functional contributions to the adequate maintenance of a stable condition of the extracellular fluid.
nance of extracellular fluid. This implies that the primordial function of all systems of the body is to maintain a tight control over the thermodynamic variables of the internal environment, granting living conditions for each cell to functionally contribute to the body economy as a whole. The maintenance of a stable condition of the internal environment is known as homeostasis. An intense change in the external environment that overcomes the capacity of the control systems or the hypofunctionality of a control system breaks homeostasis and may result in illness or even in death. In this context, the primordial task of physiology is to understand the processes by which organisms maintain homeostasis.

To make clear the concept of homeostasis for students starting in physiology, let’s make an analogy between a cell tissue of the body (Fig. 2A) and a cell culture in the laboratory (Fig. 2B). The analogy shows that what the researcher has to do for keeping the cell alive is to make the growth medium similar to the extracellular fluid and to mimic the actions of homeostatic control systems. Whereas in the in vivo system the nutrients are delivered to and metabolites are withdrawn from the surroundings, respectively, by the arterial and venous circulations, in the in vitro system the researcher does the same by periodically changing the growth medium. In other words, the researcher has to maintain the homeostasis of the growth medium, which is exactly what organic systems do for the internal environment. A classical example is as follows: to control the extracellular fluid temperature, there is a system composed for temperature sensors responding to hot and cold scattered throughout the body, an integrative control center, i.e. the hypothalamic thermostat, and by effectors that can produce more heat (increasing metabolic rate, shivering) and change heat loss (blood vessel dilatation or constriction, sweating). This system is able to set the temperature to \( \sim 37^\circ C \) and keep it constant by making the difference between production and loss of heat equal to zero. For achieving the same temperature control over the growth medium, the researcher keeps the petri dish in a temperature chamber, which is equipped with a controlled heat source, a thermostat, and a knob for setting the temperature at \( 37^\circ C \). In this way, the researcher makes, in relation to the temperature, the in vitro universe (growth medium-cell) similar to the in vivo universe (extracellular fluid-cell). This analogy can be used for any other physical chemical variable of the internal environment comparing control systems of the body and the researcher’s actions.

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