

## Can the Immune System Be Classically Conditioned?

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(1) Ever since the turn of the twentieth century, psychologists have known that reflexes and emotional reactions can be classically conditioned. But what about the human immune system - can it too be trained to respond to neutral stimuli? Thanks to recent research developments, we now know that it is also possible to train the body's immune system - and, as a result, certain aspects of our physical health and well-being (Ader & Cohen, 1993). Indeed, the pages of medical history are filled with stories that seem to indicate the effects of classical conditioning - as in the case of a hay fever patient whose allergy was so severe that just looking at a hay field would trigger an attack (Martin, 1998).

(2) Consisting of more than a trillion white blood cells, the immune system guards our health by warding off bacteria, viruses, and other foreign substances that invade the body. When this system fails, as it does when the AIDS virus ravages it, disease and death are the certain outcome. With that in mind you can appreciate the following striking discovery. Psychologist Robert Ader had been using classical-conditioning procedures with rats in which he paired sweetened water with a drug that causes nausea-cyclophosphamide. Water, drug. Water, drug. As expected, the rats developed a taste aversion to the sweetened water. Unexpectedly, however, many of the animals died because the drug Ader used weakened the immune system by destroying certain types of white blood cells. To further explore this phenomenon, Ader joined with immunologist Nicholas Cohen (1985) in a series of experiments. They repeatedly fed the rats sweetened water, which is harmless, followed by the cyclophosphamide (US), which weakens the immune system (UR). The result: After several pairings,, the sweetened water on its own (CS) caused a weakening of the immune response, followed by sickness and sometimes death (CR).

(3) In the light of this result, Dana Bovjberg and others (1990) wondered about cancer patients who take chemotherapy drugs. These drugs are designed to inhibit the growth of new cancer cells, but they also inhibit the growth of immune cells. With chemotherapy drugs always being given in the same room in the same hospital, is it possible, over time, that a patient's immune system is conditioned to react in advanced to cues in the surrounding environment? Yes. In a study of women who had undergone several chemotherapy treatments for ovarian cancer, these researchers found that their immune systems were weakened as soon as they entered the hospital - before they were treated. As with Pavlov's bell, the hospital triggering maladaptive change in cellular activity.

(4) These discoveries raise an exciting question: If the immune system can be weakened by conditioning, can it similarly be strengthened, and activity levels increased? Research on this question is still in its early stages, but positive results in animals have shown that it can be done (MacQueen et al., 1989; Ramirez-Amaya & Bermudez-Rattoni, 1999). In human studies, too, researchers have found that after repeatedly pairing sweet sherbet or other neutral stimuli with shots of adrenaline (which has the unconditioned effect of increasing activity in certain types of

immune cells), the sherbet flavor alone later triggered an increase in the immune response (Buske-Kirschbaum et al., 1992, 1994). Might it one day be possible for medical doctors to use classical conditioning to help people fight AIDS and other immune-related diseases? Stay tuned. Pavlov's simple discovery may well prove useful in this battle.

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[www.saveourevironment.org](http://www.saveourevironment.org)

This is a comprehensive site representing a collaborative effort of the most influential environmental advocacy organization to increase public awareness and activism on environmental issues.

[www.fs.fed.us/land/emterms.html](http://www.fs.fed.us/land/emterms.html)

This is a people's glossary of ecosystem management terms.