

Cancer Cells Suppress the Body's Own Defense Mechanisms

Cancer cells use tricks to evade the immune system. Thus, for example, they attract specific blood cells which suppress the body's own defense mechanisms. Scientists of the German Cancer Research Center (Deutsches Krebsforschungszentrum, DKFZ), collaborating with colleagues of the University Surgical Hospital in Heidelberg and an international research team, have investigated these processes in bowel cancer. The results of their research have now been published online in the *Journal of Clinical Investigation*.

An intact immune system is of utmost importance for our health. The immune system is at work around the clock fighting against pathogenic influences. Yet, although our immune system is able to recognize cancer cells as foreign, the body only rarely rejects tumors. Scientists assume that a class of immune cells known as regulatory T cells (Tregs) is responsible for this. These special immune cells are normally responsible for protecting our body from self-destruction by suppressing other, destructive immune cells. Tregs also play a role in cancer. They might be the reason why our immune system behaves surprisingly calm towards tumor cells.

Dr. Philipp Beckhove and his team at DKFZ, collaborating with the working group of Professor Jürgen Weitz at the Surgical Department of Heidelberg University Hospitals, have investigated which tumor antigens activate the Tregs. "So far, it has been largely unknown which structures on tumor cells are recognized by Tregs," says Beckhove. "This is a central question of tumor immunology." The scientists' approach was to isolate T cells from the blood of bowel cancer patients and of healthy control persons. The investigators sorted the T cells into killer cells and regulatory cells and tested their reaction to artificially produced tumor antigens. They discovered that the regulatory T cells recognized only some of the tumor antigens, while the killer T cells were activated by all tumor antigens that were tested. Furthermore, they found out that killer T cells directed against tumor cells were found only in the blood of cancer patients.

"We now want to use these findings to develop an improved cancer immune therapy," Philipp Beckhove explains. In what is called cancer vaccine therapy, patients are given proteins which are found on the surface of tumor cells. The immune system is supposed to recognize these as foreign and, consequently, destroy all tumor cells which carry these antigens. So far, trials have shown, however, that the antigens administered attracted not only aggressive killer T cells but also regulatory T cells. As a result, rejection of the tumor failed to come to pass properly. In future studies, researchers are planning to specifically use such vaccine antigens that activate killer T cells but do not activate Tregs. "We believe that this will make therapy for cancer patients more successful," says Beckhove.

The German Cancer Research Center (Deutsches Krebsforschungszentrum, DKFZ) is the largest biomedical research institute in Germany and is a member of the Helmholtz Association of National Research Centers. More than 2,000 staff members, including 850 scientists, are investigating the mechanisms of cancer and are working to identify cancer risk factors. They provide the foundations for developing novel approaches in the prevention, diagnosis, and treatment of cancer. In addition, the staff of the Cancer Information Service (KID) offers information about the widespread disease of cancer for patients, their families, and the general public. The Center is funded by the German Federal Ministry of Education and Research (90%) and the State of Baden-Württemberg (10%).

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