

A Success Story in the Fight Against Cervical Cancer

The world's first vaccine that was developed to prevent a specific type of cancer was launched on the US market in late June. Research results obtained by scientists of the German Cancer Research Center (Deutsches Krebsforschungszentrum, DKFZ) and the US National Institutes of Health (NIH) were the basis for developing the vaccine.

About three decades ago, **Professor Dr. Harald zur Hausen**, who was to become Scientific Director of the DKFZ and headed the Center for many years, postulated a connection between an infection with wart viruses (human papillomaviruses, HPV) and the development of cervical cancer. Several years later, researchers in his laboratory were able to prove that specific types of these viruses are indeed causally involved in the development of such tumors.

The finding that cervical cancer is caused by viruses soon gave scientists the idea to prevent the disease by vaccinating against the pathogen. The classical method of vaccine production, i.e. growing and subsequently inactivating the virus, was not an option with HPV: It is not possible to grow the virus in the lab. Therefore, the only way to produce a vaccine was gene technology.

In the early 1990s, researchers found out that a single protein, called L1, of the viral protein capsid can spontaneously cluster together to form "empty" virus particles called virus-like particles (VLP). These particles are ideal as a vaccine, since they are treated by the immune system like "real" viruses due to their almost identical structure. Yet they do not contain any genetic material and, thus, are not infectious. **Professor Dr. Lutz Gissmann** of the German Cancer Research Center and his colleagues, collaborating with the US National Institutes of Health, succeeded in producing large amounts of VLPs on the basis of an L1 gene isolated from HPV16. The DKFZ and the NIH jointly own the patents on this gene, which serves as a basis for the vaccine that has now become available.

The vaccine is directed against the chief cancer-causing types, HPV16 and HPV18, and also against types HPV6 and 11 that cause genital warts (*Condylomata acuminata*). It protects against about 70 percent of cervical cancers. The vaccine was tested in clinical trials including 25,000 women and was found to prevent precancerous lesions associated with HPV16 or HPV18 to one hundred percent. In Germany, the vaccine is expected to be approved early next year and will be marketed by Sanofi Pasteur MSD GmbH.

Cervical cancer is a major health problem in Third World countries, where cancer screening programs are often unavailable. In Germany, despite the introduction of an early detection program covered by the statutory health insurance in the 1970s, approximately 6,500 women get cervical cancer each year; 1,762 women succumbed to the disease in 2003.

The task of the Deutsches Krebsforschungszentrum in Heidelberg (German Cancer Research Center, DKFZ) is to systematically investigate the mechanisms of cancer development and to identify cancer risk factors. The results of this basic research are expected to lead to new approaches in the prevention, diagnosis and treatment of cancer. The Center is financed to 90 percent by the Federal Ministry of Education and Research and to 10 percent by the State of Baden-Wuerttemberg. It is a member of the Helmholtz Association of National Research Centers (Helmholtz-Gemeinschaft Deutscher Forschungszentren e.V., HGF).

This press release is available at www.dkfz.de/pressemitteilungen

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