Goodbye cold sores

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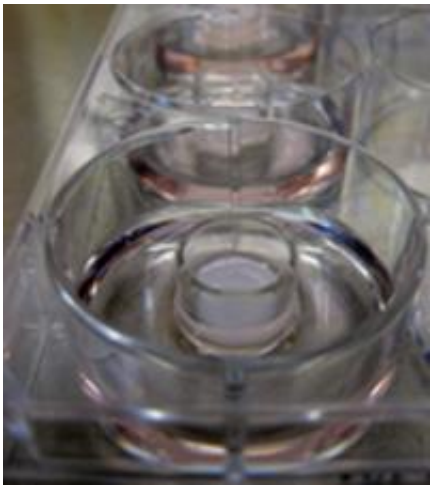

The 3-D infection model makes it possible to examine infection mechanisms such as a herpes infection. (© Fraunhofer IGB)

Herpes infections on the lips, in the eyes or on the nose are painful, long-lasting and unpleasant. A new 3D herpes infection model brings hope: active ingredients and new treatments can be reliably tested with this model. Animal tests could soon be a thing of the past.

It burns and itches on your upper lip: a herpes infection is on the advance. Caught early, the number and size blisters can be controlled with virus-controlling salves, but the herpes simplex virus can recur at any time. “About 90 percent of the world‘s population carry it in them all their lives, once infected, and become sick again in stress situations,“ explains Dr. Anke Burger-Kentischer of the Fraunhofer Institute for

Interfacial Engineering and Biotechnology IGB in Stuttgart. Coming down with a herpes virus is not always without its dangers. In the worst cases the nervous system and the brain become inflamed. The researcher, together with her team and the cell systems department, developed a 3D herpes infection model. This makes it possible for the first time to integrate the complicated dormant stage of the virus into a model of the skin. A patent application has been submitted for the new process.

The expert explains the particularity of the virus: “After the blisters subside, the herpes virus retreats to the nerve cells and rests there. At this stage, only the virus’ DNA can be proven.“ As soon as a human suffers too much stress or is even exposed to too much intense sun, the nerve cell may release the virus. It travels along the neural pathways to sites where it has occurred several times before, and the new infection becomes visible.

To date the skin models used for drug testing and to detect the virus have been very simple and unable to simulate the dormancy state of the virus. “We have integrated a neuronal cell line into the certified skin model of the IGB and are able to detect this latency stage for the first time. Just like in the human nerve cells, the particles of the virus itself cannot be seen; only the presence of its DNA can be proven by means of a PCR (polymerase chain reaction) analysis,“ explains the expert. The researcher and her team then exposed the skin model to ultraviolet radiation at wave lengths of 280 to 315 nanometers (UVB). This reactivated the herpes virus, and there was an infection on the skin model. Proof of this reactivation was also possible on a co-culture. For this, the researchers introduced the latently infected neuronal cell line to a carrier with pores. Subsequently the cells were also irradiated with UVB. The virus was reactivated and penetrated these pores, infecting the cutaneous keratinocytes – the keratinizing cells cultivated previously. To verify the infection, the scientists used a specific antibody that binds to a

specific protein on the outer layer of the virus. The coloration of this antibody made it possible to clearly show the infection of the skin cells with the reactivated virus from the nerve cells. “The 3-D herpes infection model therefore simulates an in-vivo situation exactly. Animal experiments will in the future become largely unnecessary,“ happily explain Burger-Kentischer and the doctoral candidate, Ina Hogk, who has worked on the development of the model from the beginning.

Research on active ingredients can profit from the 3D herpes infection model of the researchers from IGB, a model that also enables improved study of infection mechanisms. This procedure might also be used to test new medications for shingles, which is also caused by a variant strain of the herpes virus. At the BIO trade fair from June 27 - 30, 2011, in Washington, DC, the researchers will answer questions regarding their new development.

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