

# Combating cancer and infectious diseases with natural milk protein

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Researchers from the Institute for Hygiene and Applied Immunology of the Center for Pathophysiology, Infectology and Immunology at MedUni Vienna, led by Hannes Stockinger, have discovered a hitherto unknown function of the protein lactoferrin, which is primarily found in breast milk. The main finding of the study, which has now been published in the *Journal of Biological Chemistry* is that lactoferrin inhibits certain processes in the dissolution of blood clots and in cell migration. Says Stockinger: "This discovery could be useful in developing new therapeutic agents for cancer and also for treating certain bacterial infections."

Background: plasminogen is one of the most important enzymes in the human body, playing an important role in the breakdown of proteins. It is crucial for dissolving [blood clots](#) but also in a large number of other physiological processes, such as tissue and organ development, the immune response and the healing of wounds. In order to carry out its role, the inactive form of the plasminogen molecule has to be converted into the active form, "plasmin".

Disruption of this process can cause many pathological processes to occur in the body, says lead investigator Vladimir Leksa from MedUni Vienna. "Malignant tumour [cells](#) and some virulent types of bacteria, such as *Borrelia*, for example, bind and activate human plasminogen in order to penetrate tissue barriers. Consequently, the plasminogen system is a useful target for diagnostic and therapeutic strategies in cancer and inflammatory diseases."

## Milk protein inhibits plasminogen activation

The new study, which was published in collaboration with the Slovakian Academy of Sciences in Bratislava, now clearly shows that the human breast-milk [protein](#) lactoferrin inhibits plasminogen activation by binding directly to human plasminogen. This can block an invasion of tumour cells or even prevent the penetration of bacteria such as *Borrelia*. The main source of human lactoferrin is human breast-milk, although it is also present in serum, tears, saliva and urine.

"Our results not only add to our understanding of many antimicrobial, antitumour and immunomodulatory activities that are attributed to lactoferrin but also show that lactoferrin can be useful as a natural tool for therapeutic interventions, to prevent malignant cells from invading and virulent bacteria from penetrating hosts," says Stockinger, in summary.

**More information:** Alexander Zwirzitz et al. Lactoferrin is a natural inhibitor of plasminogen activation, *Journal of Biological Chemistry* (2018). [DOI: 10.1074/jbc.RA118.003145](https://doi.org/10.1074/jbc.RA118.003145)

Provided by Medical University of Vienna

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