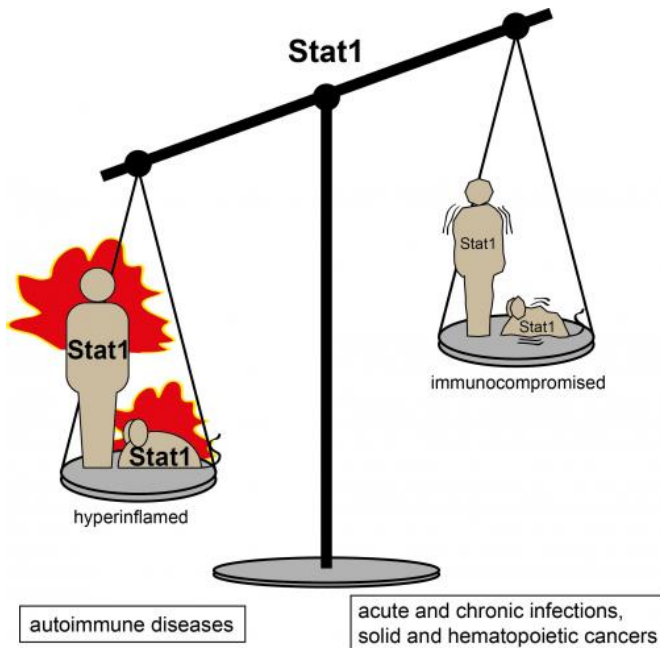


# A model for studying cancer and immune diseases

4 February 2014, by Dr. Susanna Kautschitsch



Too much STAT1 in the cell induces chronic inflammation and auto immune diseases in the body. In contrast, insufficient amounts of STAT1 can cause chronic infections and cancer. Credit: Nicole R. Leitner / Vetmeduni Vienna

The protein STAT1 is involved in defending the body against pathogens and for inhibiting tumour development. If the levels of the protein are out of balance, disease may result. Researchers at the University of Veterinary Medicine, Vienna have developed a mouse whose STAT1 levels can be modified at will, enabling the study of the involvement of STAT1 in various processes. The work has now been published in the online journal *PLOS ONE*.

STAT1 (signal transducer and activator of transcription 1) is a member of a family of transcription factors, cellular proteins that control whether and when particular genes are active.

STAT1 transmits signals from interferons to the immune system. Animals with too little STAT1 suffer from weak immune responses and are prone to develop tumours: human cancer patients frequently have mutations in their STAT1 gene. On the other hand, too much STAT1 causes the immune system to overreact and in humans often results in autoimmune diseases. It is thus vital to ensure the correct dose of STAT1 in the body.

## Dosing STAT1 in the mouse

Nicole R. Leitner from the Institute of Animal Breeding and Genetics and her colleagues now report the development of a genetically modified mouse where the level of STAT1 can be fine-tuned. The production of STAT1 is under the control of the drug doxycycline, which is added to the drinking water. If less doxycycline is given, STAT1 levels are correspondingly low; adding more doxycycline to the water results in higher STAT1 levels. The system enables the researchers to investigate the precise role of STAT1 in various disease conditions such as [breast cancer](#) or infectious diseases.

"Mice whose STAT1 can be completely switched off, so-called knock-out mice, have been around for some time. The special feature of our model is its ability to produce an exact dose of protein. This will make it possible for us to examine the origins and the course of many diseases and ultimately to test possible cures for them," says Leitner. Mathias Müller, the Director of the Institute, is excited by the model's potential. As he notes, "we are currently investigating the function of STAT1 in various forms of cancer, such as breast cancer and leukaemia. In the future it might be possible to use information on the amount of STAT1 in the cell to give an indication about the progression of diseases and thus to guide the choice of therapy."

**More information:** Leitner NR, Lassnig C, Rom R, Heider S, Bago-Horvath Z, et al. (2014) Inducible, Dose-Adjustable and Time-Restricted

Reconstitution of Stat1 Deficiency In Vivo. *PLoS*

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