

Study explains why diabetic retinopathy is difficult to treat

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Damage to the retina due to diabetes can be ameliorated only partially, despite treatment with the standard drug metformin. Scientists of Helmholtz Zentrum München have discovered that metformin treatment normalizes the alterations induced by diabetes in only about half of the altered retinal proteins. The results of the study were published in the journal *Diabetologia*.

Retinal damage is one of the most common complications of [diabetes](#), affecting about 90 percent of type 1 diabetics and 75 percent of type 2 diabetics. According to the World Health Organization (WHO), diabetic retinopathy is the leading cause of blindness in adults of working age, and its incidence is showing an upward trend.

The retina is the part of the eye that converts optical images into nerve signals, which are then transmitted to the brain where vision is interpreted. Numerous proteins and molecules are involved in the process of [signal transduction](#). Diabetic [retinal damage](#) leads to impaired function of these proteins. Within the framework of research projects of the German Center for Diabetes Research (DZD), scientists of the Research Unit Protein Science (PROT) and the Institute of Experimental Genetics (IEG) at Helmholtz Zentrum München (HMGU) have now investigated how drug treatment affects these signal carriers. They compared the concentrations of proteins in the retinas of non-diabetic mice, of mice with type 2 diabetes without treatment and of type 2 diabetic mice that were treated with the standard drug metformin, which lowers [blood glucose levels](#) and thus reduces diabetes complications. A

total of 98 proteins were differentially abundant in the diabetic animals. About half of the proteins were normalized by treatment with metformin. The other proteins were unchanged, however, despite treatment and improved blood glucose levels. Among these was the [protein](#) VGLUT1, which is essential for signal transduction in specific nerve cells.

"Our results show that normalized blood glucose levels alone are not sufficient to fully treat [diabetic retinopathy](#)," said Dr. Alice Ly (PROT), lead author of the study. "In further studies we want to examine how different combination therapies affect the retinal proteins, in order to achieve a better understanding of the causes and treatment of this diabetes complication," added Dr. Stefanie Hauck (PROT).

The most common diseases in the population, such as type 2 diabetes, are the focus of research at Helmholtz Zentrum München. The aim is to develop new approaches to diagnosis, [treatment](#) and prevention.

More information: Ly, A. et al. (2013), Retinal proteome alterations in a mouse model of type 2 diabetes, *Diabetologia*. [DOI: 10.1007/s00125-013-3070-2](#)

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