

Specific protein essential for healthy eyes, study finds

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Researchers at the Hebrew University of Jerusalem, in collaboration with researchers at the Salk Institute in California, have found for the first time that a specific protein is essential not only for maintaining a healthy retina in the eye, but also may have implications for understanding and possibly treating other conditions in the immune, reproductive, vascular and nervous systems, as well as in various cancers.

Their work, reported online in the journal *Neuron*, highlights the role of Protein S in the maintenance of a healthy retina through its involvement in the process of pruning photoreceptors, the light-[sensitive neurons](#) in the eye. (This process is also referred to as phagocytosis.) These photoreceptors keep growing and elongating from their inner end. In order to maintain a constant length, they must be pruned from their outer end by specialized cells called [retinal pigment](#) epithelial cells.

Without such pruning—which also clears away many [free radicals](#) and toxic by-products generated during visual [biochemical reactions](#)—photoreceptors would succumb to toxicity and degenerate, leading if unchecked to blindness. A [receptor molecule](#) called Mer is a key in photoreceptor pruning, and is therefore vital for retinal health. Mutations in the mouse, rat and human Mer genes cause [retinal degeneration](#), which finally leads to blindness.

The Hebrew University study published in *Neuron* focuses on the molecules activating Mer in this pruning mechanism. Although two such molecules – Gas6 and Protein S—were identified previously, it was yet

to be proven that they also play a role in a [living organism](#). To show this, Dr. Tal Burstyn-Cohen of the Hebrew University Institute of Dental Sciences and colleagues at the Salk Institute in California found in their experiments on laboratory animals that both Gas6 and Protein S are needed to activate phagocytosis, or pruning, of retinal photoreceptors, and thus keep a healthy retina.

These findings could have practical implications, since Protein S also functions as a potent blood anticoagulant. People with Protein S deficiency are at risk for life threatening thrombosis (blood clots) and thromboembolism (a clot that breaks loose and is carried by the blood stream to plug another vessel).

These results further open new avenues of research into the role of Protein S in activating the receptors in other tissues where their function was shown to be important, such as in the immune, reproductive, vascular and nervous systems, as well as in various cancers where activation of receptors has been observed. For example, since Protein S is important for blood vessel formation, neutralizing Protein S in the blood vessels supplying blood to cancer growths could interfere with the cancerous blood supply.

More information: Burstyn-Cohen, T. et al., Genetic Dissection of TAM Receptor-Ligand Interaction in Retinal Pigment Epithelial Cell Phagocytosis. *Neuron*. 20 December 2012, 76(6) pp. 1123 - 1132.

Provided by Hebrew University of Jerusalem

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