New type of cell communication regulates blood vessel formation and tumor growth

20 March 2014

When tumours grow, new blood vessels are formed that deliver oxygen and nutrients to the tumour cells. A research group at Uppsala University has discovered a new type of cell communication that results in suppressed blood vessel formation and delayed tumour growth. The results might explain why healthy individuals can have microscopic tumours for many years, which do not progress without formation of new blood vessels.

Communication between cells controls their behaviour, e.g. survival, growth and mobility. In tumours, communication between tumour cells and blood vessel cells regulates the formation of new blood vessels that is required for tumours to grow.

One of the most important components controlling blood vessel formation is the growth factor VEGF. By binding to a receptor on the surface of blood vessel cells VEGF can induce signals that in turn regulate if new blood vessels should be formed or not.

In the present study, published in *Developmental Cell*, the researchers have studied how an additional molecule participates in the cell communication in response to VEGF. If this molecule, called NRP1, is present on the same cell as the VEGF-receptor a positive signal is delivered into the cell, leading to blood vessel growth. On the other hand, if NRP1 is present on another adjacent cell, e.g. a tumour cell, binding of VEGF will lock the receptor to the cell surface and it will loose its ability to send a positive signal into the cell.

– We call this kind of inhibited signalling trans communication and it suppresses the formation of new blood vessels. This results in delayed tumour growth. If trans communication occurs very early in tumour development tumour growth can be inhibited completely, says Lena Claesson-Welsh, professor at the Department of Immunology, Genetics and Pathology, who is responsible for the study.

Trans communication can also occur between cells of the same type. Therefore, in order for blood vessels to grow and form new vessels, trans communication between blood vessel cells must be avoided. This can be achieved if NRP1 levels vary between the cells. I accordance with this, the research group also found that fluctuating NRP1 levels occur naturally in adjacent cells in blood vessels in the eye.

More information: Koch et al.(2014) Neuropilin-1 presented in trans to the endothelium arrests VEGFR2 endocytosis, preventing angiogenic signaling and tumor initiation, *Developmental Cell*, Volume: 28; Issue: 6

Provided by Uppsala University