Immune cells promote blood vessel formation in mouse endometriosis

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A discovery in mice of immune cells that promote the formation of new blood vessels could lead to new treatments for endometriosis, a painful condition associated with infertility that affects up to 15 percent of women of reproductive age.

The formation of new blood vessels, or angiogenesis, is known to encourage the growth of tumors and endometriosis lesions. A team led by Ofer Fainaru, MD, PhD, a research associate in the Vascular Biology Program at Children's Hospital Boston and Harvard Medical School, found that dendritic cells—highly specialized immune cells—help trigger angiogenesis in a mouse model of endometriosis. Their findings were published online last month in the FASEB journal. Judah Folkman, MD, director of Children's Vacular Biology Program, who helped found the field of angiogenesis, was the paper's senior author.

Endometriosis occurs when endometrium, a tissue normally found in the inner lining of the uterus, grows elsewhere in the body—most commonly in the abdominal cavity. The misplaced endometrial tissue begins as small lesions, or masses, but once blood vessels are recruited, the lesions grow larger and respond to female hormones, resulting in inflammation, cyclic pelvic pain, and infertility.

In the mouse model, the researchers observed that dendritic cells infiltrate endometriosis lesions, and near the sites where they invade, new blood vessels form. Injecting mice with excess dendritic cells caused their lesions to gain more blood vessels and to grow larger.

The researchers also found that dendritic cells have a strikingly similar effect on intra-abdominal tumors.

When the researchers grew dendritic cells together with endothelial cells—the cells that line blood vessel walls—the endothelial cells migrated towards the dendritic cells. The team hypothesizes that dendritic cells, after embedding in a new lesion or tumor, act like foremen on a building team: they call in, direct and support endothelial cells that build the new blood vessels.

"We believe that targeting dendritic cells may prove to be a promising strategy for treating conditions dependent on angiogenesis, such as endometriosis and cancer," says Fainaru. But first, the team must demonstrate that dendritic cells are essential—that without these cells in mice, new blood vessels do not form.

"Our next step would be to look for specific dendritic cell inhibitors that could have the potential to block angiogenesis in these conditions," says Fainaru.

The team hopes to develop cell-specific therapy for angiogenesis-dependent diseases that will be more effective and less toxic than current treatments. Currently, the most effective treatment for endometriosis is surgically removing the lesions, but this does not prevent them from growing back—as large and symptomatic as before. If dendritic cells are indeed ringmasters and not sideliners in new blood vessel growth, locally knocking them out just after an initial surgery, or altering them in some way, could render the lesions tiny and harmless.

Similarly, potential dendritic-cell inhibitors, when added to other agents that stop new blood vessels from forming, could enhance doctors' ability to choke off growing tumors, Fainaru adds.

Source: Children's Hospital Boston