Pentraxin 3's biological roles and therapeutic potential in inflammation-associated diseases

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Abstract

Unlike acute inflammation, chronic inflammation is also called persistent, low-grade inflammation because it produces a steady, low-level of inflammation throughout the body, as judged by a small rise in immune system markers found in blood or tissues. Meanwhile, increasing studies and evidence shows that chronic inflammation causes and advances many common diseases. In fact, even the links between inflammation and diseases have been accumulated largely, inflammation and its resolution is still under-studied in medicine despite being essential for understanding the development of chronic inflammatory diseases. In organ fibrosis, inflammation can trigger a series of cells and molecular level chain reactions, which lead to tissue fibrosis. Unfortunately, there is still no effective anti-fibrotic drugs that can significantly reduce the fibrosis process or even restore organ fibrosis. In addition, inflammation can increase the risk of normal cells becoming tumorigenic and enhances metastasis and invasion of cancer cells and cancer recurrence. However, cancer cells are genetically heterogeneous, leading to difficulties in elucidating the causes of cancer in different cancer patients and searching for an optimal and efficient therapeutic strategy. In contrast, noncancerous stromal cells in the tumor microenvironment are genetically stable therapeutic targets. We are also the first to prove that pentraxin 3 (PTX3) is a novel and potential therapeutic target for cancer treatment. Inhibition of PTX3 can attenuate cancer progression and disable the communication between the tumor and its microenvironment. Following elucidating the PTX3-mediated molecular mechanisms in fibroblast activation in lung injury and communication with cancer cells, we further successfully developed PTX3 inhibitors and demonstrated it can efficiently attenuate even reverse organ fibrosis and the risk of invasion, metastasis stemness of cancers and drug-resistant cancers.