Immunity in spleen

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Video Abstract

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Abstract

The spleen is known for its ability to recycle red blood cells, but it also has a critical role in the immune system: screening blood for potential pathogens, and mounting a targeted immune response if an invader is detected. The key players behind this filtering are antigen presenting cells, or APCs, which “present” pieces of these pathogens to T cells, which can’t on their own “see” any foreign material. Recently, scientists discovered a new type of APC in the spleen, but its specific abilities remained elusive. Now, a group of Australian immunologists has systematically tested a variety of splenic APCs in mice to discover their particular functions. Antigen presentation comes in several forms, depending on the origin of the antigen – inside or outside the cell – and the type of T cell “seeing” that antigen. Generally, outside antigen can only be gobbled up and presented to helper T cells, which coordinate attacks with other immune cells. Infected cells can present inside antigen to killer T cells, marking them for elimination. And in a special case known as cross-presentation, outside antigen is shown to killer T cells. Only so-called professional APCs, including dendritic cells, or DCs, can do all three. The research team isolated APC subsets from spleen then tested the capacity of each to do these three kinds of presentation. L-DCs, the newly discovered cell type, paled in comparison to monocytes in terms of gobbling up outside antigen for helper T cells, but were just as good when taking up outside antigen for killer T cells. L-DCs and conventional DCs could efficiently cross-present, or get killer T cells to actually kill. But L-DCs couldn’t activate helper T cells, unlike the fully professional dendritic cells. The findings demonstrate that although L-DCs resemble monocytes, they are unique APCs with the special ability to cross-present, and may be important for controlling infections and targeting cancerous cells. Additional work will reveal whether this is also true in humans, and why the spleen has evolved so many types of antigen presenters.