



Discovery of fibroblastic reticular cells that regulate body cavity-associated lymphoid tissues

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Abstract

While abdominal cavity, which accommodates internal organs such as the stomach, intestines, and pancreas, is normally sterile, infection can occur due to perforated appendicitis, liver cirrhosis, pancreatitis, abdominal surgery, or peritoneal dialysis. The peritoneal infection can develop life-threatening sepsis which is characterized by bacteria and toxins spreading throughout the body and it causes multi-organ failure.

Visceral adipose tissue, omentum, is important organ for the protection from the peritoneal infection. Omentum harbors unique lymphoid structures called “milky spots” which plays a central role in the peritoneal immune responses, whereas the mechanisms underlying the formation of these milky spots remain poorly understood. In this study, we identified novel stromal cells that are responsible for the formation of the milky spots.

Background & Results

In this study, we conducted an analysis of stromal cells within the omental milky spots and identified novel fibroblastic reticular cells (FRCs) characterized by the production of retinoic acid. We termed these cells as Aldh1a2⁺ FRCs. FRCs are special stromal cells that form functionally compartmentalized structures in lymphoid tissues,

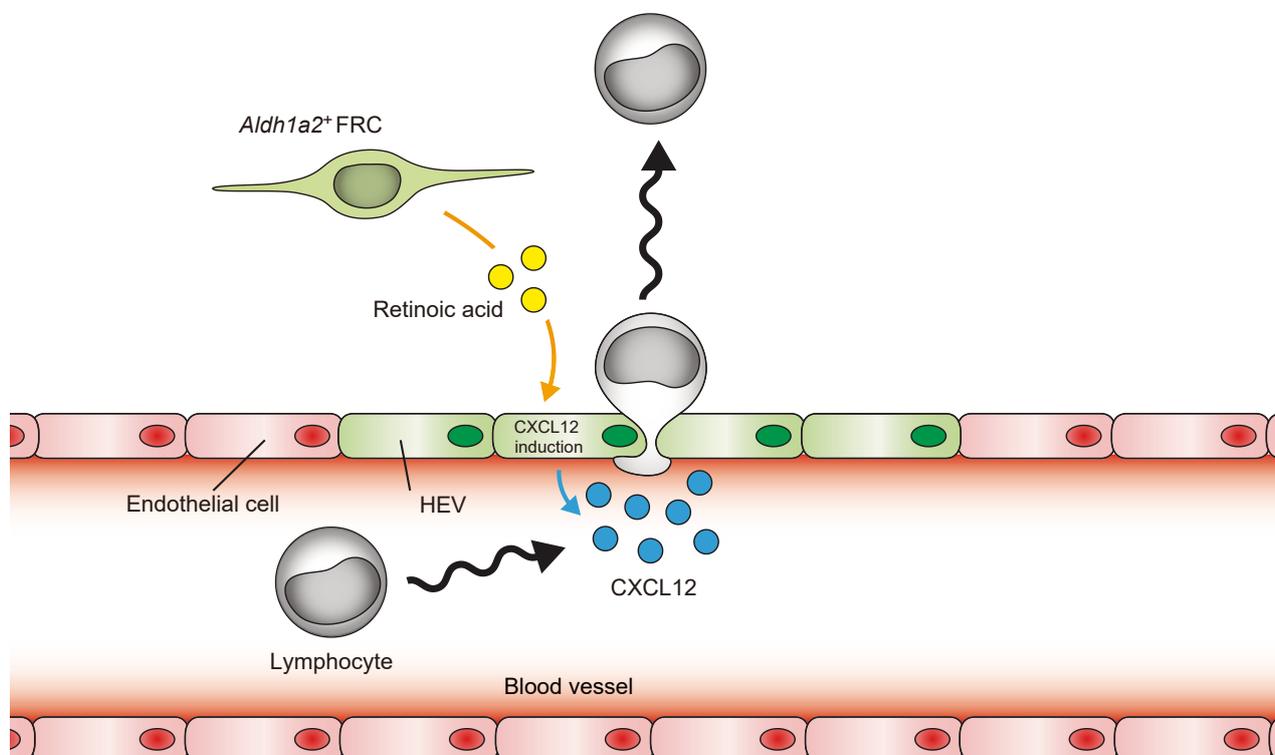
providing the “environment” for immune cell differentiation, activation, and maturation. Interestingly, Aldh1a2⁺ FRCs are specifically found in the omentum milky spots, whereas they were absent in other lymphoid tissues.

Furthermore, we revealed that Aldh1a2⁺ FRCs induce the expression of the chemokine CXCL12 in a specialized blood vessel called a high endothelial venule (HEV) through the production of retinoic acid. This discovery suggests that Aldh1a2⁺ FRCs play a role in controlling the recruitment of lymphocytes to the greater omentum milky spots.

Significance of the research and Future perspective

Sepsis is a life-threatening disease caused by infection and over 11 million deaths each year is estimated worldwide. Abdominal infections are reported as the second most common source of infection leading to sepsis, since bacteria and toxins in the peritoneal cavity can easily spread throughout the body.

The omentum plays a crucial role in preventing the spread of peritoneal infection, while its mechanism has not been fully understood. In this study, stromal cells essential for the formation of lymphoid tissues in the omentum have been identified. Further development of the research may lead to a better understanding of the mechanisms that prevent the spread of abdominal infections.



ALDH1A2⁺ FRCs regulate lymphocyte recruitment to the milky spot parenchyma via high endothelial venules (HEVs)

Patent

Treatise

URL

Keyword

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lymphoid organ, retinoic acid, stroma