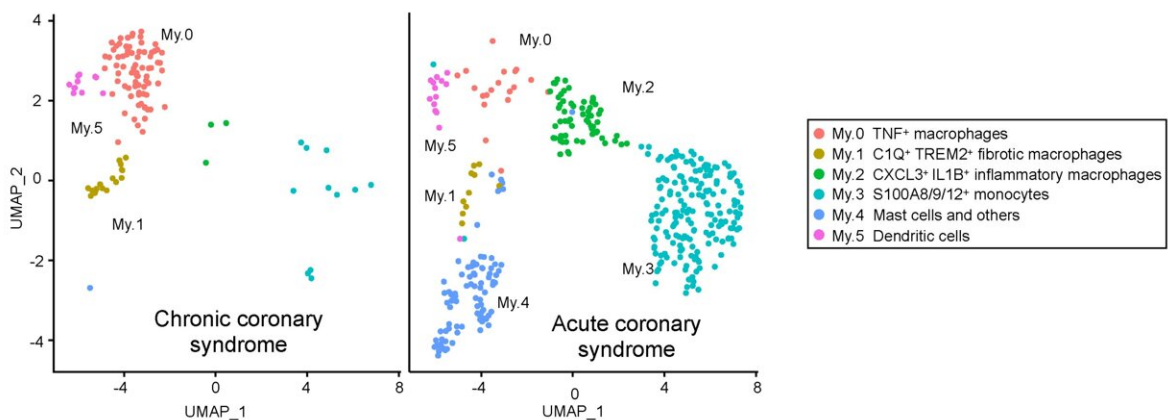


# Revealing the individual immune cells inside carotid plaque

May 6 2022



Comparison of single-cell RNA sequencing results for chronic coronary syndrome and acute coronary syndrome. Credit: *Circulation*

Through single-cell RNA sequencing, a research group has successfully illuminated the characteristics of Myeloid immune cells in coronary plaque, which causes acute coronary syndrome (this term includes conditions such as unstable angina and acute myocardial infarction [heart attack]). Based on this data, they hope to develop a treatment method that can stabilize coronary plaque.

This study was conducted by a research group from Kobe University

Graduate School of Medicine's Division of Cardiovascular Medicine in the Department of Internal Medicine (Clinical Researcher Takuo Emoto, Associate Professor Tomoya Yamashita and Professor Kenichi Hirata) in collaboration with Hyogo Brain and Heart Center (one of Kobe University's collaborative partners).

These research findings were published in *Circulation* on May 3, 2022.

## **Research background**

Recent decades have seen rapid advancement in [analytical techniques](#). One such technique that has received much attention is single-cell RNA sequencing, which enables the gene expression of each individual cell to be comprehensively analyzed. Single-cell RNA sequencing has been carried out on the [plaque](#) that causes carotid arteries to harden (arteriosclerosis), however no such studies have been conducted on carotid plaque due to it being very difficult to obtain a sample.

It was previously revealed that the formation of artery-hardening plaque is strongly linked to inflammation. However, the following points have not been fully understood: What kind of immune cells are found in the carotid plaque of an actual human being, and what characteristics do these cells have? And does carotid plaque act at the onset of acute coronary syndrome?

## **Research methodology**

Samples for this study were obtained by conducting directional coronary atherectomy procedures on consenting patients at Hyogo Brain and Heart Center between October 2022 and June 2021. Single-cell RNA sequencing was carried out on samples from four cases of chronic coronary syndrome and three cases of acute coronary syndrome. The

results revealed the presence of the following myeloid cells in the plaque: macrophages (three types), monocytes, [mast cells](#) and dendritic cell clusters. In addition, a comparison of the results for the chronic cases with those of acute cases revealed that more monocytes, mast cells and inflammatory macrophages (the latter of which exhibited higher expression of CXCL3 and IL1B) accumulated in the coronary plaques in acute coronary syndrome cases.

In a world first, this study revealed the distinct characteristics of myeloid immune cells in the coronary plaque of patients with [acute coronary syndrome](#). Next, the researchers aim to use this data to develop a treatment method that can stabilize coronary plaque.

**More information:** Takuo Emoto et al, Single-Cell RNA Sequencing Reveals a Distinct Immune Landscape of Myeloid Cells in Coronary Culprit Plaques Causing Acute Coronary Syndrome, *Circulation* (2022). [DOI: 10.1161/CIRCULATIONAHA.121.058414](https://doi.org/10.1161/CIRCULATIONAHA.121.058414)

Provided by Kobe University

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