A gene atlas of ‘structural immunity’

The haematopoietic cells of the immune system carry out their functions within tissue frameworks created by structural cells of the epithelium, endothelium and stroma (mainly fibroblasts). Interactions of these structural cells with immune cells have been difficult to study owing to their essential roles in organ function. Krausgruber et al. used multi-omics profiling of structural cells from 12 mouse organs to create a high-resolution atlas of immune gene activity. They hope that this will aid further study of immune functions in non-haematopoietic cells — a field they refer to as ‘structural immunity’.

Structural cells purified from mouse organs were sorted on the basis of expression of CD31 (endothelial cells), EPCAM (epithelial cells) and GP38 (fibroblasts). Gene expression profiling by RNA sequencing (RNA-seq) showed that different structural cells within the same organ were more similar to each other than the same structural cells across organs, which indicates that there is a major effect of the tissue environment. As well as predicting crosstalk between structural cells and haematopoietic cells on the basis of known receptor–ligand pairs, the RNA-seq dataset showed high levels of activity of ‘immune gene’ modules in structural cells in cell type-specific and organ-specific patterns.

Next, the authors looked at gene regulation by profiling chromatin accessibility and active H3K4me2 marks. Similar to the RNA-seq data, chromatin and histone profiles were generally more similar within an organ than within a structural cell type, although a subset of immune genes

T cells shape behaviour by helping microglia to mature

There is mounting evidence that the immune system influences behavioural responses, but limited understanding of the processes involved. Adrian Liston and colleagues now report that CD4+ T cells are resident in the healthy brain and are necessary for the proper maturation of microglia. The absence of brain-resident CD4+ T cells leads to defective microglial cell function and behavioural abnormalities.

The presence of CD4+ T cells in the brain is typically associated with disease. Here, Pascuito et al. asked whether CD4+ T cells also have physiological roles in the healthy brain. By a combination of confocal microscopy and high dimensional flow cytometry, they were able to detect rare CD4+ T cells scattered throughout the healthy mouse brain. They estimated there are ~2,000 CD4+ T cells, of which ~150 are regulatory T (Treg) cells, in the healthy adult mouse brain. The vast majority were not detected in blood vessels or in the meninges, but in the underlying brain tissue. Single-cell sequencing showed that, compared with peripheral blood counterparts,