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Using Soft-X-Rays to study the organization of immune cells: T cells and synaptic contacts

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The metabolic activity of T cells involves the control of cellular proteostasis, including gene transcription, protein translation, de novo protein folding, post-translational modifications, secretion, degradation and recycling. Some of these steps are regulated by the chaperonin complex CCT, which is involved in the correct folding of certain proteins. By limiting CCT levels with siRNA in quiescent cells, lipid composition and metabolic rewiring are altered due to dysregulation of the dynamics of interorganelle contacts, as studied by soft X-ras tomography and fluorescence microscopy. During the activation of T lymphocytes to form immune synaptic contacts, the cytosolic chaperonin CCT (chaperonin-containing TCP1) controls changes in the reciprocal orientation of centrioles and the polarisation of tubulin dynamics induced by T cell receptor activation. These changes ultimately determine the function and organisation of the centrioles, as shown by three-dimensional reconstruction of resting and stimulated primary T cells using cryo-soft X-ray tomography and functional live confocal and TIRF microscopy.

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