VIDEO | 08:00
Video Details →

This *Journal of Cell Biology* “biosights” podcast describes our recent work on the molecular and cellular mechanisms of inhibitory NK receptor signaling.

Inhibitory Signaling Responses in NK Cells

VIDEO | 00:16

Inhibitory Signaling Responses in NK Cells

Video Details →

NK cells are regulated by a diverse set of cell surface receptors that transduce either activating or inhibitory signals. Activating receptors induce target cell killing and cytokine secretion, while inhibitory receptors block these activating responses. To better understand the cell biological context within which conflicting activating and inhibitory signals are integrated and resolved, we developed an approach for stimulating the inhibitory NK receptor KIR2DL2 with UV light. Using this system, we can unleash inhibitory signaling in individual NK cells during ongoing activating responses, and in this manner study interactions between the conflicting pathways.

In this video, an NK cell expressing KIR2DL2 (labeled with mCherry) together with the activating receptor NKG2D (labeled with GFP) is shown both before and after KIR2DL2 photostimulation. UV irradiation of the entire cell (indicated by the appearance of UV in magenta text) induces the clustering of KIR2DL2 in the cell periphery, followed by cytoskeletal retraction. KIR2DL2 photostimulation also suppresses the formation of centripetally mobile NKG2D microclusters, which are visible before, but not after, UV irradiation. More information can be found in Abeyweera et al., Journal of Cell Biology 192, 675-690. [PubMed Abstract]

Reorientation of the T Cell Microtubule-Organizing Center

VIDEO | 00:09

Reorientation of the T Cell Microtubule-Organizing Center

Reorientation of the T Cell Microtubule-Organizing Center

Video Details →

The reorientation of the T cell microtubule-organizing center (MTOC) toward the region of T cell receptor (TCR) stimulation maintains the specificity of secretory responses by allowing the T cell to secrete cytokines and cytolytic molecules directionally. MTOC reorientation may also play an important role in the differentiation of naïve T cells after primary stimulation with antigen. Using our TCR photoactivation system, we have shown that MTOC reorientation is driven by the localized accumulation of diacylglycerol in the cell membrane (Quann et al., Nature Immunology 10, 627-635). [PubMed Abstract]

This video shows a photoactivation experiment in which DAG production is monitored using a construct containing DAG-binding C1 domains linked to GFP, and the MTOC is monitored using RFP labeled tubulin. Photoactivation (indicated by the appearance of a green oval) triggers the localized accumulation of DAG in the irradiated region, which is followed by the reorientation of the MTOC.

Cytotoxic T Cells Exerting Force

VIDEO | 00:09

Cytotoxic T Cells Exerting Force

Video Details →

Cytotoxic T lymphocytes (CTLs) fight infections and cancer by forming immunological synapses with infected or transformed target cells and then secreting cytolytic proteins into the synaptic space to induce target cell apoptosis. The synapse is a highly dynamic interface characterized by dramatic actin remodeling. We recently showed that CTLs harness this remodeling to transmit mechanical force against the target cell. Force exertion promotes cytotoxicity by increasing target cell tension, which potentiates plasma membrane pore formation by the cytolytic protein perforin (Basu et al., Cell 165, 100-110). [Pubmed Abstract]

We measured synaptic force exertion by imaging CTLs on stimulatory arrays of deformable micropillars. The video shows a CTL (blue) interacting with a pillar array of this kind (pillar tops in red). As the CTL lands and spreads, it imparts force against the array, moving the pillars from side to side.

Faculty positions

Postdoctoral positions

Communication preferences
Cookie preferences
Legal disclaimer
Accessibility Statement
Privacy policy
Public notices