**T-cell immunological synaptosomes: Physiology and Application**

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Microvilli are outer membrane organelles that contain cross-linked filamentous actin. Unlike well-characterized epithelial microvilli, T-cell microvilli are dynamic similar to those of filopodia, which grow and shrink intermittently via the alternate actin-assembly and -disassembly. T-cell microvilli are specialized for sensing antigens on the surface of antigen-presenting cells (APCs). Thus, these finger-shaped microprotrusions contain many signaling-related proteins and can serve as a signaling platforms that induce intracellular signals. However, they are not limited to sensing external information but can provide sites for parts of the cell-body to tear away from the cell. Cells are known to produce many types of extracellular vesicles (EVs), such as exosomes, microvesicles, and membrane particles. T cells also produce EVs, but little is known about under what conditions T cells generate EVs and which types of EVs are released. We discovered that T cells produce few exosomes but release large amounsts of microvilli-derived particles during physical interaction with APCs. Although much is unanswered as to why T cells use the same organelles to sense antigens or to produce EVs, these events can significantly affect T cell fate, including clonal expansion and death. Since TCRs are localized at microvilli tips, this membrane event also raises a new question regarding long-standing paradigm in T cell biology; i.e., surface TCR downmodulation following T cell activation. Since T-cell microvilli particles carry T-cell message to their cognate partner, these particles are termed T-cell immunological synaptosomes (TISs). We discuss the potential physiological role of TISs and their application to immunotherapies.