Fluorescent artificial antigens revealed extended filopodia networks utilized by live dendritic cells for antigen uptake

Dendritic cells (DCs) can infiltrate tight junctions of the epithelium to collect remote antigens during immune surveillance. While membrane filopodia represent a plausible structure to perform this task, their functional mechanisms remain elusive owing to the lack of high-resolution characterizations in live DCs. Here, we developed fluorescent artificial antigens (FAAs) based on quantum dots coated with polyacrylic acid. Single-particle tracking of FAAs enables us to super-resolve the filopodia network responsible for antigen uptake. Using the DC2.4 cell line as a model system, we discovered the extensive membrane network approaching 200 μm in length with tunnel-like cavities about 150 nm in width. The filopodia network also contained heterogenous circular migrasomes. Disconnecting filopodia from the cell body decreased the intracellular FAA density. Our study enables mechanistic investigations of DC filopodia and nanocarriers that target this mechanism.