

## TWO TYPES OF NANOTUBULAR CONNECTIONS BETWEEN EPITHELIAL CELLS

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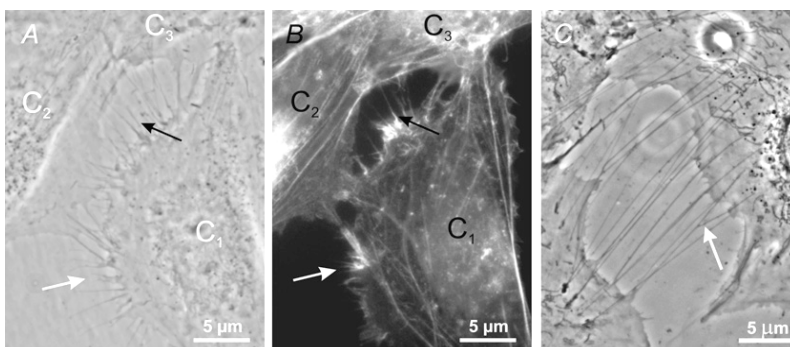
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Communication between cells is crucial for a proper functioning of multicellular organisms. The recently discovered membranous tubes, named tunneling nanotubes, that directly bridge neighbouring cells may offer a very specific and effective way of intercellular communication. Our experiments on epithelial cells revealed that nanotubes can be divided into two types. The nanotubes of type I are shorter and dynamic in exploration of their surroundings. They contain actin filaments and are able to make contact with neighbouring cells with kind of adherence junctions. Along the nanotubes of type I frequently dilatations (gondolas) can be seen that move in both directions and indicate for intercellular transport. The nanotubes of type II are longer and more stable. They contain cytokeratin filaments and are usually attached to the membranes of a connected cell by desmosomes. They became formed when two already connected cells start to move apart. These nanotubes function as an Ariadne thread to give cells a positional information and to let them return to the original position, if needed.

Both types of nanotubes represent a direct connection between cells at fairly long distances and enable a contact intercellular communication.



Type I nanotubes: The white arrows in figures **A** and **B** indicate short and dynamic nanotubular protrusions. The black arrow in **A** points at protrusions that have already connected to the target cell. In all these multiple tubular connections, actin filaments are present (arrows in **B**). Bridging nanotubes of type I can be more than 20  $\mu\text{m}$  in length and occasionally bifurcations are seen (arrow in **C**).