The Structural Organization of the Cytoskeleton of Parasitic Protozoa

Wanderley de Souza

Instituto de Biofísica Carlos Chagas Filho, Instituto Nacional de Ciência e Tecnologia and Centro Nacional de Biologia Estrutural e Bioimagens, Universidade Federal do Rio de Janeiro, 21941-900, Rio de Janeiro, Brazil (email:wsouza@biof.ufrj.br).

All eukaryotic cells contain several cytoplasmic structures which play a fundamental role on the maintenance of their shape and that are generally known as the cytoskeleton. These structures are formed due to a regulated process of assembly of special proteins. For each structure there is a major protein and several other associated proteins. In mammalian cells these structures appear as microtubules and different types of filaments. Mostly important, usually these structures are highly dynamic, with a regulated process of assembly and disassembly. In the case of protozoa in addition to microtubules and filaments there are other more complex structures such as the paraflagellar rod in trypanosomatids, the costa in trichomonads, the adhesive disk in Giardia, the conoid in some Apicomplexa, etc.

The visualization of the cytoskeleton structures requires the use of immunofluorescence microscopy as well as different modalities of electron microscopes. Here we will present the main techniques used to characterize some of the most important cytoskeleton structures found in parasitic protozoa. They include (1) high resolution scanning electron microscopy (SEM), (2) high resolution ion microscopy (HIM), (3) atomic force microscopy (AFM), (4) transmission electron microscopy (TEM) of replicas of quick frozen, freeze-fractured and deep-etched samples. They have allowed the obtaining of important information on the 3-D organization of cytoskeleton structures with the use of focused ion beam coupled to high resolution SEM and electron microscopy tomography coupled to TEM. All these techniques were used by our group to analyze the structural organization of the cytoskeleton of Trypanosoma cruzi, Toxoplasma gondii, Tritrichomonas foetus and Giardia intestinalis. In addition they have been also used to obtain high resolution images of protozoa within the host cell as will be exemplified with T. gondii.

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