

STRUCTURE AND MICROCHEMICAL ANATOMY OF ACIDOCALCISOMES IN PROTOZOAN PARASITES

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Acidocalcisomes are calcium-rich acidic compartments that have been shown in several microorganisms. A combination of microscopy methods has been applied to characterize the structural and microchemical anatomy of these organelles in different protozoan parasites and higher eukaryotic models. Observations of cells following routine procedures for EM showed electron-lucent vacuoles with an electron dense content apposed to the inner face of their membranes. In contrast, energy-filtered TEM images of whole intact cells showed that the acidocalcisomes are the most naturally electron dense structures in different trypanosomatid and apicomplexan parasites. X-ray elemental mapping of these preparations showed that most of the intracellular ions, namely O, Na, Mg, K, Ca, Fe and Zn are concentrated in the acidocalcisomes and bound to phosphate, present namely in the form of pyrophosphate and polyphosphates. Semi-quantitative analyses have shown that the elemental profile of the acidocalcisomes is similar among different microorganisms. However, the relative concentrations of the cations can significantly vary according to the species or as a function of different stimulation conditions. Morphometric analyses have shown that the number and volume of the acidocalcisomes significantly vary according to the species and they occupy approx 2% of the cell volume. In addition, polymorphic acidocalcisomes with distinct structural characteristics have been shown in *Leishmania* and *Phytomonas* species. Immunoelectronmicroscopy studies have shown the presence of a number of pumps and exchangers in the acidocalcisome membrane, corroborating data obtained with physiological and biochemical methods. Association between acidocalcisome and different organelles, such as mitochondria, subpellicular microtubules, lipid droplets and contractile vacuole has been shown in some organisms, pointing new roles for these organelles in the cell biology of protozoan parasites.