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Cybrid model to understand mitochondria-nuclear cross talk in cancer

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Mitochondria, the powerhouse of mammalian cells, vary in their number and function in different cell types with different energy demands. Mitochondria, which harbor the bulk of oxidative pathways, are packed with various redox carriers that can potentially leak single electrons to oxygen and convert it into a superoxide anion, a progenitor ROS. Mutations in mitochondrial DNA (mtDNA) and functional alterations frequently occur in human tumors. Any such mitochondrial functional alterations are most likely an adaptive process to the altered production of ROS inside cells. Mitochondria are getting more attention in current cancer research and are considered as potential targets for chemotherapy. Persistent alterations of mitochondrial respiratory chain (MRC) biogenesis and functions may cause changes in the responsiveness of cells to anticancer drugs. Transmitochondrial cybrids are great utility for the study of the functional effect of mitochondria in a defined nuclear background. Cybrids are constructed by fusing enucleated cells harboring mitochondria of interest with ρ0 cells (in which the endogenous mtDNA has been ablated). Our in vitro and in vivo tumorigenic studies using different types of 'transmitochondrial cybrid' systems in defined nuclear backgrounds strongly suggest that mitochondrial retrograde signaling is playing important roles in oncogenic transformation. Even with the same cancerous nuclear background, unlike cybrids with mitochondria from metastatic breast cancer, mitochondria from benign breast epithelium inhibited oncogenic properties. We are currently investigating thesignificance of mitochondrial-nuclear cross talk in oncogenic transformation.

Biography

Kaipparettu has completed his Ph.D from India and postdoctoral trainings from the Dr. Margarete Fischer-Bosch-Institute of Clinical Pharmacology (IKP), Stuttgart, Germany and Baylor College of Medicine, Houston. He is currently Assistant Professor in the Department of Molecular and Human Genetics, at Baylor College of Medicine. His research focuses on the mitochondira-nuclear cross talk in cancer stem cells and tumor progression. He has published several research papers and reviews in reputed journals and serving as an editorial board member of different research publications.

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