

Cancer Metastasis and Interactions with Bone Microenvironment

Razi Vago

Avram and Stella Goldstein-Goren, Department of Biotechnology Engineering, Ben Gurion University of the Negev, Israel

Solid cancers originating in the breast, prostate, and lung tend to metastasize to bone. Once deployed in bone these tumor cells harness this microenvironment, shift to a quiescent mode or initiate a vicious cycle that often leads bone destruction and gain an increased tumorigenicity by mechanisms which are not yet fully understood. Here we introduce a new three-dimensional model which closely resembles a living natural bone that can be used to study cellular and molecular cues in bone tumors and metastasis. Using this model we showed that the mineral phase may have an important role on cellular characteristics of mesenchymal stem cells (MSC's) and tumor cells. We also revealed that interactions with MSC's increased migration and invasion capacities along with fibrosarcomas (FS) and osteosarcomas (OS) proliferation. Moreover, we showed that via regulation of pathways such Wnt, cadherins, Notch and their downstream target genes such as c-Myc, these capacities were further enhanced when accommodated with the bone like biolattice and directly interacted with the MSCs. We also suggest that progression in OS aggressiveness can also be attributed to a transition in Wnt signaling from canonical to noncanonical pathways, which is intensified in presence of MSCs. We suggest these kind of tumor promoting interactions may be found in the natural and tumorigenic bone microenvironment. New insights on the interplay between these signaling cues and their effects tumor progression will be discussed. A better understanding of the molecular signaling mechanisms involved in the tumor development and bone metastasis may contribute to development of new cancer therapies.

Biography:

Prof. Vago earned his Ph.D. from the Department of Life Science, Bar-Ilan University. He was later gained an Australian Institute of Marine Science Post Doctoral Fellow award. In 2000 he took a part in the foundation of the Department Biotechnology Engineering at Ben-Gurion University. He is a recipient of the Koret Foundation Grant Award for 1998 and 1999, and the Israeli Ministry of Science Grant Award and fellowship (1999-2000). In last six years Prof. Vago is the Head of the Avram and Stella Goldstain-Goren Department of Biotechnology Engineering. The research in his laboratory combines bioengineering and basic approaches for studying biology and bioengineering of mesenchymal stem cells on one hand and their role in development and metastasis of cancer on the other.