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Identification of novel surface membrane phenotypes of cancer stem cells in epithelial cancers

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Many human cancers fulfill a model in which only a fraction of cells drives tumor formation and growth. These cells are termed "cancer stem cells" (CSCs) and can propagate the tumor upon transplantation in immune-comprised mice. Colon and breast cancers are among the best-established models to fulfill the CSC theory. We used flow cytometry to analyze the expression of a vocabulary of surface molecules on breast and colon cancer cells from continuous cell lines and fresh tissues. We identified putative CSC subpopulations that were subsequently isolated by cell sorting and extensively studied through in vitro and in vivo experimental approaches. The classical phenotype of breast CSCs is $CD44^+/CD24^{low}$. We identified CSCs with the $CD44^+/CD24^{hi}$ phenotype, within a model of basal-like breast cancer that seems to be derived from a mammary epithelium luminal progenitor cell. We found that $CD24^{hi}$ cells were able to form mammospheres with higher efficiency than $CD24^{low}$ cells and injection of NOD/SCID mice with $CD24^{hi}$ led to the formation of tumors strongly expressing stem/progenitor markers. In human colon, CSC phenotype was previously described as characterized by CD133 or CD44 positivity. Interestingly, from our characterization emerged the presence of a small (0.6%) population of $CD133^+/CD44^+$ cells simultaneously expressing other distinctive surface markers. This population may represent the 'true' CSC in colon cancers. We observed a reduced disease-free survival in patients with higher percentages of $CD133^+CD44^+$ cells. These data suggest that this cell population could function as the root of the tumor, promoting relapses after resection of the primary tumor.

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Biography

Dr. Del Vecchio received an MD from Federico II University of Naples in 1979. He was Head of Laboratory of Cellular Immunology at the Division of Immunohematology and Transfusion Medicine, A. Cardarelli Hospital, Naples (1994-2005), Associate Professor of Clinical Biochemistry and Clinical Molecular Biology at Federico II University of Naples (2005 to present), Head of Laboratory of Clinical and Experimental Cytometry at CEINGE – Biotecnologie Avanzate Institute, Naples (2005 to present). He has published 110 research papers on peer-reviewed journals in the field of phenotypic complexity of onco-hematological diseases.