The role of the human polyomavirus BK in the development of prostate cancer

In recent years the scientific literature in the field of the prostate carcinoma (PCa) pointed out on the genetic heterogeneity occurring in this tumour, while little attention was given to the causes that threaten the genomic integrity of the prostate. Together with chemical and physical agents, biological agents such as viruses with oncogenic potential, which interfere with the cell cycle, are responsible for gene alterations and might be included in the putative genomic evolution of PCa. Polyomavirus BK (BKPyV) encodes two viral oncogenes, the large T antigen (LTag) and small t antigen (tag). Transformation of animal and human cells by BKPyV is operated by these two viral oncoproteins. LTag binds and abolishes the functions of the tumour suppressor p53 and pRB family proteins, whereas tag interacts with the phosphatase PP2A, which activates the Wnt pathway. Moreover, tag activates the phosphatidylinositol 3-kinase, an enzyme involved in pathways crucial for cell proliferation and transformation. LTag is also clastogenic and mutagenic. These activities are able to hit the cellular genome, which accumulates many gene mutations/chromosome aberrations. Considering that BKPyV infection is ubiquitous in the general population, it is difficult to assess a specific role of this virus in cellular transformation. BKPyV is kidney-tropic and remains latent in many human organs/tissues, mainly the urogenital tract. The lifelong period of BKPyV infection, together with the fact that about 95% of PCa are slow-growing organ-confined indolent tumors, could be responsible of those gene/chromosomal damages, which initiate the development of this malignancy. Footprints of this small DNA tumour virus has been revealed at higher prevalence in early stages PCa than in healthy control tissues, thus providing an indication for an increased risk of PCa development with the presence of BKPyV infection. Loss-of-function mutations in p53 gene at very early stages of PCa are rare. Therefore, the sequestration of wild-type p53 exerted by BKPyV LTag oncoprotein at initial phases is a hallmark for BKPyV involvement and may ensure the genetic heterogeneity of PCa.

Biography

Maurizio Provenzano graduated as a MD from La Sapienza University of Rome and obtained his specialization in Medical Oncology at the University of Milan and his PhD in Virology at the University of Padua. He is a tenured investigator in the position of the Head of Research at the Department of Urology, University Hospital of Zurich and Lecturer at the Faculty of Medicine, University of Zurich. Since 2007, he has been member of the Cancer Network of Zurich. He has authored more than 70 peer-reviewed publications including, reviews, book chapters and conference papers, many of which are in highly qualified scientific periodicals and has been serving as an Editorial Board Member of reputed journals. He has been recipient of professional awards and prizes for the contribution to the field of Viral Oncology and Onco-immunology.

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