

Polycomb group genes as novel cancer biomarkers

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Polycomb group genes (PcGs) are epigenetic effectors involved in gene silencing. PcG activity was first recognized as essential for stem cell maintenance during embryo development. Subsequently, several PcGs were shown to play a role in cancer initiation, progression, and chemotherapy resistance. For example, PcG member BMI1 is up-regulated in prostate cancer cells compared to normal counterparts, and mediates prostate cancer invasion and resistance to chemotherapy. Another PcG member (EZH2) is up-regulated in high grade and high stage breast, colorectal and brain tumors. At present, PcGs have been identified as negative prognostic markers in most human cancers. Easy-to-perform genetic analyses may pave the way to the emergence of PcGs as cancer biomarkers. For example, Germinal *EZH2* polymorphisms predict lung cancer risk and colorectal cancer prognosis. Somatic *EZH2* mutations were found to drive B-cell lymphoma progression. In addition, a small molecule inhibitor of EZH2 showed promising anti-tumor activity in breast, brain and prostate tumor models. Thus, PcGs may emerge as novel prognostic and predictive markers in Oncology. Despite the well-recognized role of PCGs in cancer cell biology, few researches explored the clinical potential of these genes. In this presentation, I will summarize current evidence on PcGs and cancer, with particular emphasis on what they can add to traditional oncology biomarkers. In addition, I will illustrate a paradigm for rational development of PcG-targeting anticancer regimens, suggesting specific therapeutic strategies. Hopefully, PcGs may emerge as novel prognostic and predictive biomarker, as well as viable targets to target cancer initiation and metastatic spreading.

Biography

Francesco Crea has completed his MD in 2006 and his PhD in 2010 (both cum *Laude*) at Scuola Superiore Sant'Anna, Pisa. He has spent 18 months at National Cancer Institute-Frederick (USA) as a Guest Scientist. He is currently Lecturer in Clinical Pharmacology at Pisa University. There, he is directing a research project on Polycomb genes in cancer. He has published more than 15 manuscripts on in peer-reviewed international journals, including the *Journal of Clinical Oncology*, *Trends in Pharmacological Sciences* and *Molecular Cancer Therapeutics*. He is Contributing Associate Editor-in Chief for the *World Journal of Gastroenterology*, and Editorial writer for *Epigenomics*.