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Mate-Pair Sequencing (MP-Seq) as a powerful clinical tool for the management of cancer patients

Advances in DNA sequencing based upon massively parallel sequencing (Next Generation Sequencing- NGS) have dramatically increased sequence output. The Illumina sequencing platform is now capable of producing billions of simultaneous DNA sequences and this facilitates a number of different ways of characterizing nucleic acids. The most powerful use of NGS is for whole genome sequencing (WGS), but there are a number of limitations of utilizing WGS for the management of cancer patients, including the total cost and difficulties in interpreting the resulting data. A powerful alternative to WGS is the construction of mate-pair libraries and the sequencing of libraries of DNA fragments that were originally kilobases apart. We have been utilizing MP-Seq to characterize oropharyngeal squamous cell carcinomas (OPSCC) which are cancers that are increasingly caused by human papillomavirus. We will describe how MP-Seq can characterize the physical status of HPV in HPV-positive OPSCCs and the clinical significance of this characterization. This work has demonstrated that HPV plays different roles in the development of OPSCCs and many of these are quite distinct from HPV's role in the development of cervical cancer. In addition, MP-Seq can characterize genomic changes in each cancer and these can be used to develop cancer-specific markers, which can be used to monitor an individual patient response to therapy. Thus, MP-Seq could be a powerful and yet affordable tool that can be used as a clinical tool for the management of cancer patients.

Biography

David I Smith completed his PhD from the University of Wisconsin in Madison and then did his Post-doctoral studies at the University of California in Irvine. Since 1996, he has been a Professor at the Mayo Clinic in the Department of Laboratory Medicine and Pathology. He is also the Chairman of the Technology Assessment Group for the Center for Individualized Medicine at the Mayo Clinic. His laboratory studies include the common fragile sites and the role that these regions of instability play in the development of cancer. His group also studies the different ways that HPV can contribute to the development of different cancers. He has published over 200 papers in reputed journals and serves on the Editorial Board of a number of journals.

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