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A 3D imaging platform to determine the level of genomic instability in cancer

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Our laboratory has developed a unique three-dimensional (3D) imaging platform that is based on the level of genomic instability present in tumor cells. We used the 3D nuclear organization of telomeres as an indicator of genomic instability *in vitro*, then in mouse models. Subsequently, this was assessed in retrospective and prospective patient cohorts to evaluate the platform's potential to blindly stratify patients and monitor their disease progression or stability. We have developed observer-independent quantitative software to measure these changes. After the completion of blinded patient cohort studies, we now demonstrate the ability of the 3D telomeric imaging platform to blindly stratify patients into patients with stable, transitional or aggressive cancer. This will be illustrated with two examples; prostate cancer and multiple myeloma. Our prostate cancer cohort consisted of 50 patients with intermediate risk (Gleason 7, PSA <20) who we followed prior to their radical prostatectomy. 3D telomere profiles of isolated circulating tumor cells (CTCs) stratified the patients into three clusters (stable, transitional or aggressive). Surgery results correlated with CTC 3D nuclear telomeric profiles (p=0.0175). Our multiple myeloma cohorts consisted of 131 patients. We were able to stratify the patients based on their 3D telomeric profiles into distinct non-overlapping clusters of genomic instability. Moreover, we were able to assess their risk to die based on these profiles (p=0.01). In conclusion, our data indicate that 3D nuclear telomere profiling can accurately identify whether a patient presents with 'good' or 'bad' prognostic disease and lends itself to personalized patient management decisions.

Biography

Sabine Mai is a Tenured Professor at The University of Manitoba, Winnipeg, Canada. She has obtained her PhD at the University of Karlsruhe, Germany and her Post-doctoral training at the Basel Institute for Immunology, Basel, Switzerland.

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