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Integrated multiregional analysis proposing a new model of colorectal cancer evolution

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Cancer is heterogeneous disease; each tumor in different patients has different cancer genomes. Furthermore, another level of heterogeneity exists: Even a single tumor harbors multiple genetically distinct subclones. This intratumor heterogeneity is presumably one of causes of therapeutic difficulty and its understanding is clinically necessary. In this study, we investigated intratumor heterogeneity in colorectal cancer by analyzing sample obtained from geographically separated regions of 9 colorectal tumors. Our integrated data analyses combined with computational simulation strongly suggest that, after clonally shared alterations were accumulated by aging; numerous subclones were generated by neutral evolution. Importantly, this view can explain the robustness and evolvability of cancer: Therapeutic action inducing an environmental change would convert some of the numerous neutral mutations to driver genes that confer therapeutic resistance. We believe that this study not only provides insights into colorectal cancer pathogenesis but also constitutes a new basis for designing therapeutic strategies.

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Endomicroscopy, new surgical pathology & optical biopsy

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Technological advances in optical microscopy and the diagnostic capacity of a wide variety of optical techniques call for a reappraisal of the role of the pathologist. Today, neither microscopes nor tissue staining and processing are essential for diagnosis. However, in order to set the gold standard for these techniques, more publications on the morphology of in vivo biopsies and non-invasive optical biopsies are needed. Those techniques should be the responsibility of pathologists or alternatively should be a computational pathology left on the hands of Machine Learning techniques and Computer Vision methods that automate image classification to support clinical decisions to thereafter be confirmed by pathologist taken as "gold standards" on any robotic procedure. Following telemedicine similarities, this type of pathology is called: PoCP (Point of Care Pathology) or real time morphological examination at a cellular level. It relies upon software identify procedures showed in the paper such as: Artificial vision, automatic random sub windows and decision trees, content base image retrieval. Together with all novel techniques such as liquid biopsy that should be progressively integrated in a Digital Pathology Lab. We are facing a new sub-specialization that embraces most medical fields, in our case Pathology Informatics. It requires a serious re-definition of medical training to introduce the Body of Knowledge (BoK) of "medical informatics, telemedicine and bioengineering applied to distance or robotic medicine". We must introduce a transversal and essential topic that assure that the new robotic millennium provide medical support by experienced doctors trained to provide QoC (quality of care) with the forthcoming tools.

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