Structure, dynamics and efficiency of tumour vascular networks

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Multi-scale modelling of biological processes is a very active and promising area of Mathematical/Systems Biology. In this talk I will present one such model applied to study tumour growth and tumour induced angiogenesis (i.e. the process whereby, under the influence of signalling cues secreted by the tumour, new vessels are formed by sprouting from the native vasculature). I will show that the patterns of neo-vascularization emerge from the balance between vessel formation and tumour-induced vessel degradation, with vascular adaptation (i.e. the ability of the vasculature to produce an acute response to different stimuli) playing a major role in the structure and stability of the emerging vascular patterns. Finally, I will comment on the possible relevance of these results for normalisation strategies in anti-angiogenic treatments.