Modelling Solid Tumour Growth

Introduction

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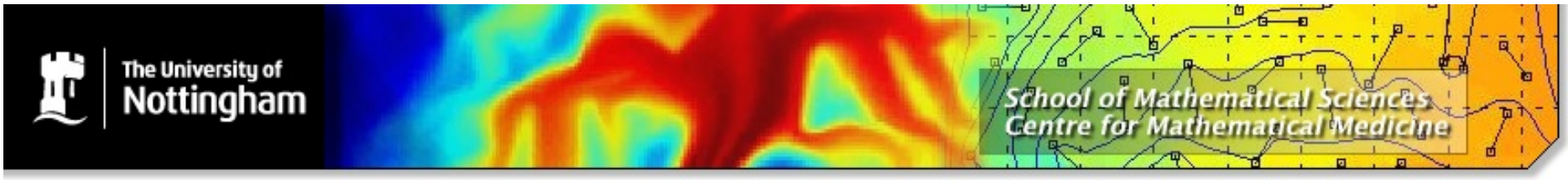


Some Preliminaries

- Course Aims
- Course Structure
- Background Tumour Biology

Course Aims

Course Aims

- Working knowledge of tumour biology and related mathematical research
- Appreciation of current and emerging research directions
- Experience of, and familiarity with, mathematical modelling
- (Some) enjoyment!

Lecture Plan

1. Spatially-averaged models of avascular and vascular tumour growth (ODE models)

2. 1D, spatially-structured models of avascular tumour growth (moving boundary problems)

3. Tumour invasion and symmetry breaking (linear stability)

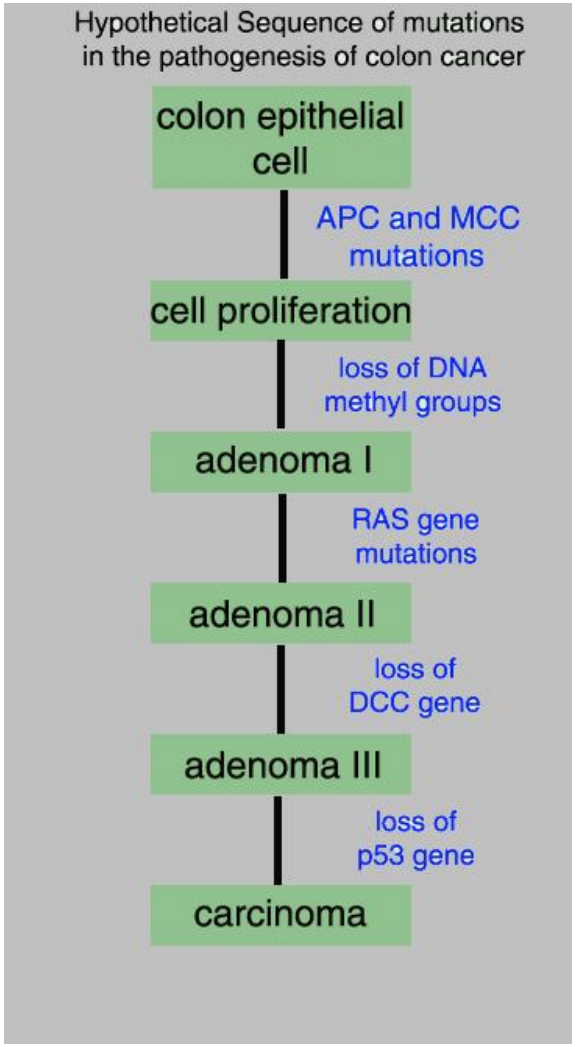
4. Angiogenesis models (discrete vs continuous)

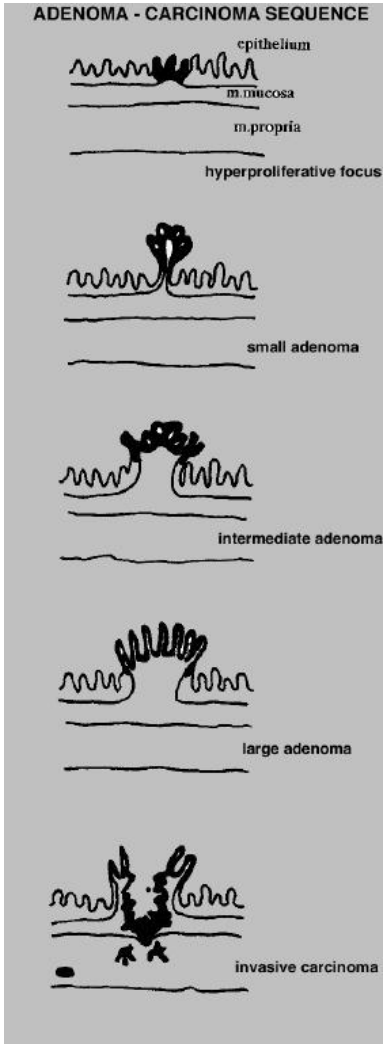
5. Summary and future directions (vascular tumour growth; emerging therapies)

Tutorial Plan

- Basics of model building
- Group work on modelling projects
- Group presentations of modelling problems

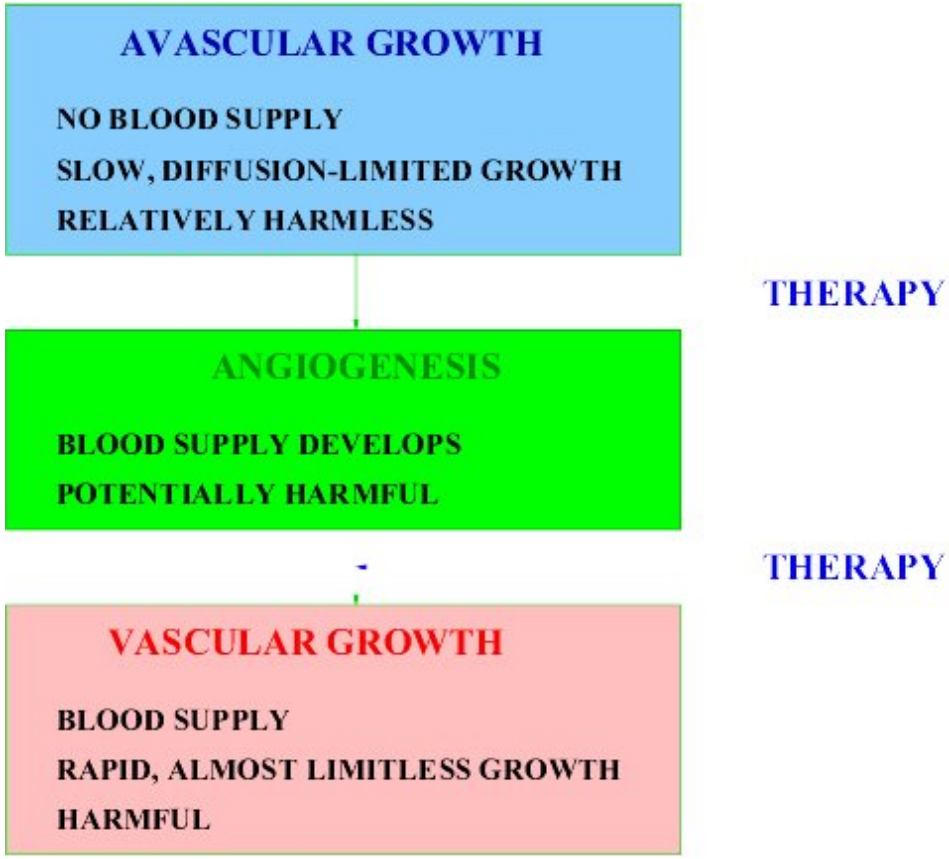
Background Biology





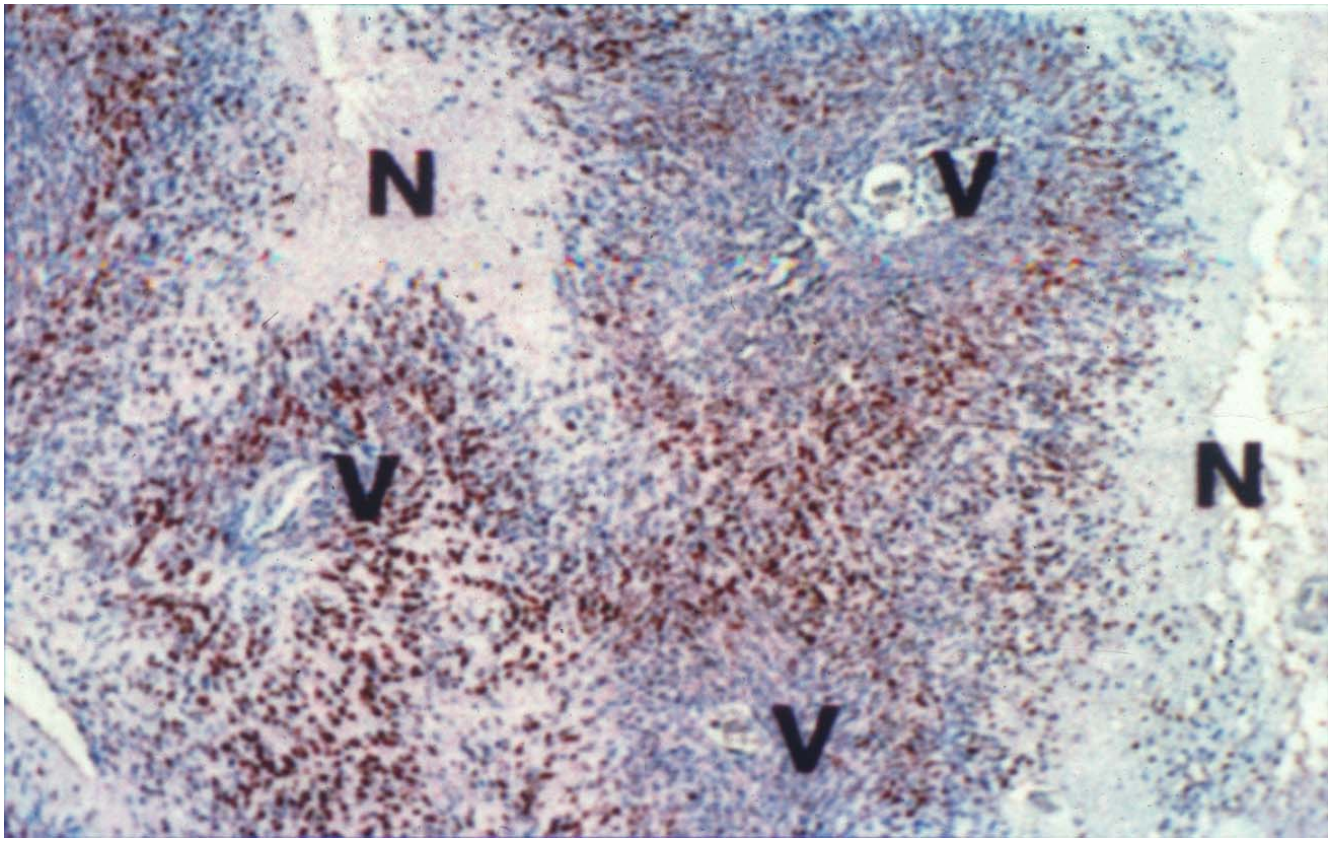
Tumour Progression - The Genetic Perspective

Background Biology



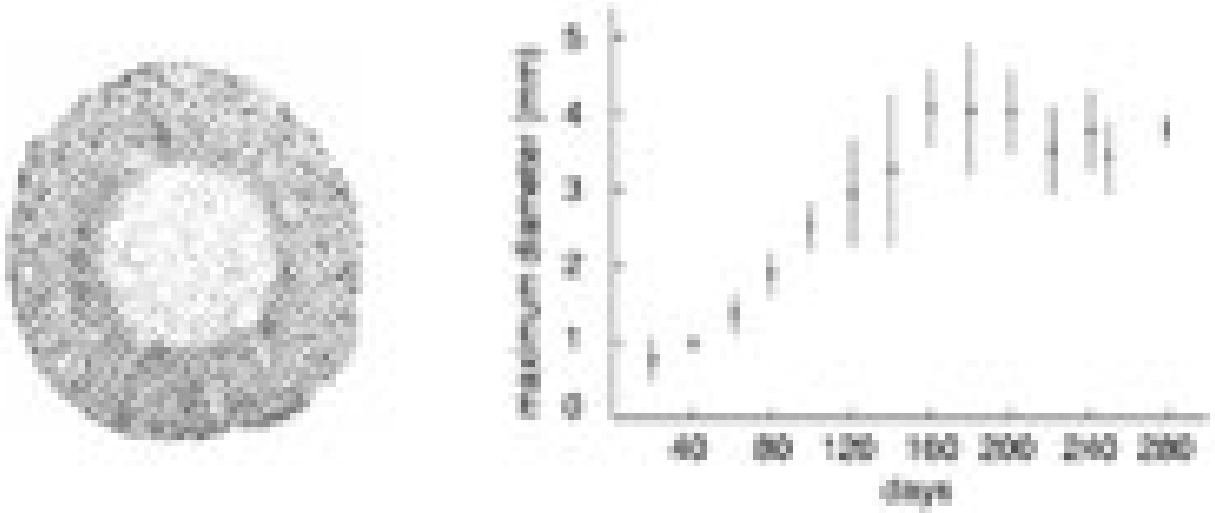
Tumour Progression - The Macroscopic Perspective

Background: Spatially-Averaged Growth



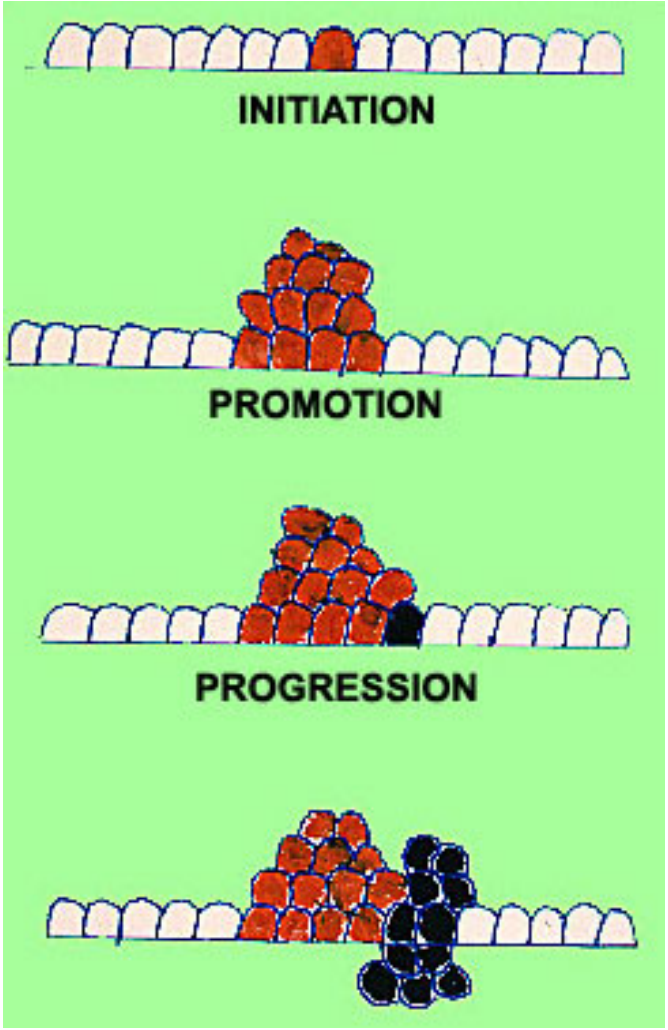
Cross section through vascularised tumour (lecture 1)

Background: Avascular Tumour Growth



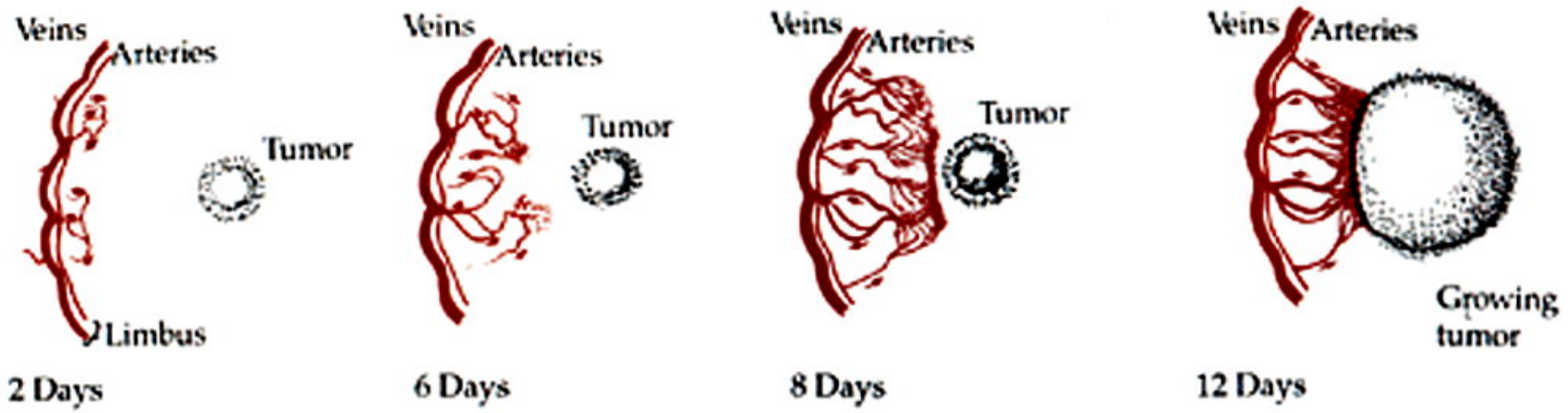
Well-developed avascular tumour (lecture 2)

Background: Tumour Heterogeneity and Invasion



Schematic diagram illustrating tumour heterogeneity and invasion (lecture 3)

Background: Tumour Angiogenesis



Schematic diagram of tumour angiogenesis (lecture 4)

Background: Vascular Tumour Growth

Schematic diagram of a vascular tumour (lecture 5)