

Bioresearch in functional genomics is poised to make major contributions to our understanding of normal development and human disease. This promise will, in part, rely on the development of new micro-imaging technologies to provide quantitative longitudinal assessment of morphological and functional development of normal and abnormal tissues. In addition, imaging tools will need to be further refined to enable high throughput phenotypic assessment of the rapidly escalating numbers of targeted and random mouse mutations. This presentation will focus on the development of high frequency (20 to 70 MHz) ultrasound biomicroscopy (UBM) for mouse imaging. While UBM does not provide molecular specificity, it has the advantage of low cost, rapid imaging speed, portability and high resolution (30-100 microns). The physics of high frequency ultrasound will be reviewed and the latest developments in instrumentation will be presented. Applications of 2 and 3D imaging to mouse cardiovascular assessment, cancer and ocular diseases will be described. Recent advances in 3D UBM imaging now permit the volumes of growing experimental tumors to be assessed with relative ease. Examples of tumor growth studies will be presented. In particular, a human melanoma (MeWo) and a model of retinoblastoma will be examined. Further analysis of Doppler and other flow related data offers insight to microvascular development and its alteration during treatment. This is particularly relevant to angiogenesis and antiangiogenic treatments. As an example of antiangiogenic therapy, a study of DC101 (ImClone Systems), a monoclonal anti-VEGFR2 antibody will be presented.

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