BME 695L Engineering Nanomedical Systems
November 7, 2007

Lecture 19: In vivo model systems to study nanomedical approaches to cancer detection and intervention

I. Role of animal models in translational cancer research
   A. Steps from the "bench" to the "bedside"
   B. The in vivo environment (3D, blood supply, microenvironment, immune system)
   C. Types of studies performed in animal models: biodistribution, pharmacokinetics, toxicity, "efficacy"
   D. Expertise of the team needed to take new approaches from the "bench" to the "bedside"

II. Types of animal models available for translational cancer research
   A. Tumors induced by chemicals, irritants, light/radiation
   B. Syngeneic models
   C. Immunocompromised animals and "foreign" xenografts
   D. Transgenic animals
   E. Naturally-occurring animal models of cancer

III. Naturally-occurring cancer in dogs as models for human cancer
   A. Models identified to date
   B. Naturally-occurring urinary bladder cancer in dogs
   C. Examples of ongoing studies in pet dogs

IV. Nanomedicine approaches studied in animals in the Knapp / Leary / Bergstrom labs and the Knapp / Frangioni labs
   A. Targeting programmable multilayer nanoparticles in breast cancer
   B. Sentinel lymph node mapping in urinary bladder cancer
   C. Future applications of nanomedicine approaches in urinary bladder cancer

References

Knapp DW, Glickman NW, DeNicola DB, Bonney PL, Lin TL, Glickman LT. Naturally-occurring canine transitional cell carcinoma of the urinary bladder: A relevant model of human invasive bladder cancer. Urol Oncol, 5:47-59, 2000.

Knapp DW, Adams LG, DeGrand AM, Niles JD, Weil AB, O'Donnell MA, Lucroy MD, and Frangioni JV. Sentinel lymph node mapping of invasive urinary bladder cancer in animal models using invisible light. Euro Urology, in press, 2007.