Oncospace: eScience technology and opportunities for oncology

Radiation Oncology is based on past experiences and clinical trials for the understanding and advancement of patient care. In the current practice we study the effects of radiation on our patients through controlled trials. These trials represent less than 5% of our patient population, take years for results, and are controlled with more rigor than the standard clinical practice. A vast amount of untapped knowledge is contained in our clinical data. The question is how to access it.

The workflow in radiation oncology has multiple stages from simulation to treatment planning, to daily record of treatments and follow-up visits. Throughout this process there are multiple opportunities to capture meaningful information that is relevant to the complications and successes of the treatment. Current practices lack the organized collection of much of this data, and few tools exist to evaluate and analyze the data in order to re-apply the new knowledge at the point of care.

Today we have many studies looking at anatomical, functional and molecular images to better characterize our patient’s disease. We use pathology, and in the future, genetic information to better understand the nature of a specific patient’s disease. We look at radiation dose distributions, fractionation patterns and patient motion to understand how it impacts treatment outcome. We complicate the practice further with concurrent chemo- and hormonal therapies in addition to surgery.

eScience refers to the practice of studying immense amounts of data through the use of computer networks and well organized databases. Such systems enable distributed collaboration among colleagues in the specified discipline. In radiation oncology, we are very good at the immense amount of data part, but we are lacking in the management of that data to practice eScience. Oncospace is an initiative to apply eScience concepts to radiation oncology for both a physician’s tool for personalized medicine and a collaborative tool for multi-institutional research on clinical data.

Oncospace is composed of several components: Data collection and workflow where the clinical workflow is altered to inherently collect information on our patients relevant for future analysis; Data warehouse design to create the active database model for efficient analysis, and web services to support web-based access with security levels in place to protect patient privacy; Human interface design to make it easy to ask clinically relevant questions of the data and present the answers in ways the physician think about the problems; Statistical analysis tools to allow us to better understand the relative importance and validity of the clinical data that is a less controlled than a typical clinical trial; and decision support tools to allow us to apply knowledge from the system to our clinical practice.

This presentation will give an overview of the potential of eScience to help uncover clinical knowledge and apply it at the point of care.

Educational Objectives:
1. Basic understanding of eScience concepts and implementation
2. Expose the potential of expanding our knowledge base utilizing our clinical data