Radiodiagnostická klinika a Ústav nukleární medicíny 1. LF UK a VFN v Praze
si dovolují Vás pozvat na přednášku

Maryellen L. Giger, Ph.D.

A. N. Pritzker Professor of Radiology
The University of Chicago
Chicago, Illinois, USA, &
Editor-in-Chief, Journal of Medical Imaging (SPIE)

Quantitative Radiomics and Deep Learning in Cancer Imaging for Precision Medicine

v úterý 25. 4. 2017 v 15 hod. v posluchárně ÚNM - U nemocnice 5, Praha 2 (zvýšené přízemí vlevo)

Po skončení programu v ÚNM (16-16.15 hod.) bude setkání a neformální diskuse s prof. Giger pokračovat od 16.30 hod. ve vinárně Orlík, Masarykovo nábřeží 10, Praha 2 (10 min. chůze).

Pro zajištění rezervace míst prosíme o potvrzení účasti na (a) přednášce a (b) setkání v Orlíku telefonicky na linku 22496-5813 nebo e-mailem na adresu nukle@lf1.cuni.cz do 18.4.2017.

za pořádající pracoviště

Prof. MUDr. Jan Daneš, CSc.
Doc. MUDr. Andrea Burgetová, Ph.D.
Prof. MUDr. Martin Šámal, DrSc.

Souhrn přednášky

Adapting the Precision Medicine Initiative into imaging research includes studies in both discovery and translation in order to enable the conversion of current radiological interpretation from that of the "average patient" to the precise interpretation and patient-care management decisions specific to the individual. The goal is to individually detect disease, and then give the right person the right treatment at the right time. Discovery is a multi-disciplinary data mining effort involving researchers such as radiologists, medical physicists, oncologists, computer scientists, engineers, and computational geneticists. Similar to how the genomics community approached the big biology of the Cancer Genome project, the radiological community continues to conduct robust collection, annotation, analysis, and evaluation of images of large populations. Advances in computer power and machine learning algorithms are allowing for computer-extracted features (phenotypes), both from clinically-driven computer-extraction systems (such as those from computer-aided detection/diagnosis) and deep learning methods, to yield "quantitative radiomics", i.e., the high throughput conversion of image sets into a multi-dimensional feature space.

Quantitative image analysis (QIA) and computer-aided diagnosis (CAD) methods (i.e., computerized methods of analyzing digital breast images: mammograms, ultrasound, and magnetic resonance images) can yield novel image-based tumor characteristics (i.e., signatures that may ultimately contribute to the design of patient-specific breast cancer treatments). The role of QIA continues to grow. With computer-aided detection (CAD) of breast cancer, the aim was to provide a 'second opinion' to aid the radiologist in locating suspicious regions within screening mammograms. Today, the role of QIA/CAD is expanding beyond screening programs towards applications in risk assessment, diagnosis, prognosis, and response to therapy as well as in data mining to discover relationships of lesion characteristics as they apply to disease states. With QIA, computerized methods are being developed to (a) quantitatively characterize the features of a suspicious region or tumor, e.g., those describing tumor morphology or function, (b) merge the relevant features into diagnostic, prognostic, or predictive image-based biomarkers, (c) estimate the probability of a particular disease state, (d) retrieve similar cases, (e) compare the tumor in question to thousands of other breast tumors, and (f) explore the complex relationships among image-based tumor characteristics across large populations and association studies between the image-based signatures (i.e, image-based phenotypes) and histological/genomic data for imaging genomics.

My lecture will focus on such quantitative radiomics of breast cancer. With quantitative imaging, a patient's tumor can be characterized quantitatively via these "virtual digital biopsies". Ultimately translation of the discovered relationships will include applications to the clinical assessments of cancer risk, prognosis, response to therapy, and risk of recurrence.

https://radiology.uchicago.edu/directory/maryellen-l-giger
https://spie.org/publications/journals/journal-of-medical-imaging