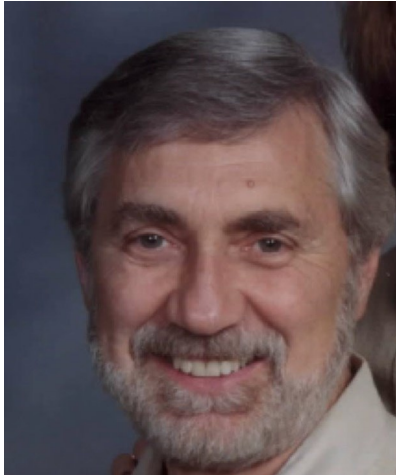




Medical Physics Seminar

Monday, February 19, 2018

1325 HSLC ~ 4:00 P.M.



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Forty Years of Imaging Tools for Diagnostic and Interventional Radiology

During the past 40 years, there has been a continuous collaboration between Medical Physics and Radiology in the development of imaging methods for Diagnostic and Interventional Radiology. The introduction of Digital Subtraction Angiography (DSA) established a new era in interventional vascular radiology by eliminating film and facilitating real time interventions.

In the 1990's an MR version of DSA called TRICKS was introduced and became the worldwide standard MR modality for time resolved MR angiography. The temporal and spatial resolution of MRA were increased using a constrained reconstruction technique called HYPR which, in combination with 3D radial MR acquisition (VIPR), provided high quality images while violating the Nyquist Theorem by a factor of 800.

A variation of the HYPR technique was applied to C-arm X-ray acquisition to provide a 4D version of DSA in which 30 3D volumes per second were generated using the time resolved projection information in a C-arm rotation. Algorithms were developed to extract velocity and flow information from the vascular signal curves. The ideas of 4D DSA have recently been extended to CT angiography where 4D CT DSA can now provide exceedingly high frame rates along with velocity and flow information.

Recently we became aware that interventional radiologists typically do not use CT fluoroscopy because of the high radiation dose and poor image quality that it provides. We have recently devised a method for reducing the operator radiation dose by a factor of 500 and greatly improving image quality in CT fluoroscopy and have demonstrated it in animals for percutaneous needle insertion and guidance of vascular interventions. The dissemination of these techniques will provide a revolution in interventional radiology similar to that provided by DSA 37 years ago. All interventions will now be possible using CT and the need for combined CT/C-arm rooms should disappear.

1325 Health Sciences Learning Center (HSLC) 4:00 - 5:00 P.M.