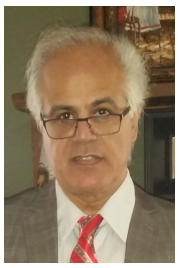
UCR Department of Bioengineering Presents Colloquium Speaker



Ultra-High Field Magnetic Resonance Imaging

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Magnetic resonance imaging (MRI) provides exquisite images of anatomy, physiology and biochemistry of human body. Magnetic field of MRI scanners has a decisive role on the information obtained from the body. As such there has been a relentless race to build scanners with higher field strengths. In 1998, construction of an 8 Tesla MRI scanner gave birth to ultra high field (UHF) technology which quickly was adopted by manufacturers who offered commercial 7 Tesla scanners. Today, more than 50 institutions around the world have installed UHF MRI scanners. Research on these scanners has proven that this powerful technology could finally offer sensitivity and specificity for various pathologies and provide insight to the inner working of complex physiological functions such as the human mind. UHF MRI has the potential to revolutionize medicine and through that greatly impact healthcare policy. Specifically, UHF MRI has the potential to offer image of the mind in addition to the brain, functional viability of heart muscles and chemistry, in-vivo non-invasive biopsy of brain tumors, etc. A UHF technology called resting state functional connectivity (RSFC) along with a diffusion tensor imaging (DTI) with the potential to show structural connectivity could reveal profound knowledge about the inner working of the human brain. In this presentation, an account will be given of some of the technologies that within the next ten years will roll out of the research labs with great public policy implications that might require new healthcare policies. In addition, a closer look at the potentials of these scanners to go beyond imaging of body parts and become an organ-specific, tissue-specific, and ultimately a tool for cellular and molecular imaging will bring molecular medicine to bear. A brief discussion of other technological achievements of UHF MRI and their applications and their potential in different field of medicine and their collective impact on healthcare delivery will be discussed.

Biosketch: Alayar Kangarlu did his undergraduate in Physics at Sharif University of Technology in Tehran. He obtained his PhD in Physics in 1987 from University of Missouri-Columbia and became an assistant professor of physics in University of Dayton. In 1995, he moved to Ohio State University where his team built the 8 Tesla whole body MRI scanner, the highest field MRI scanner in the world at the time. He moved to Columbia University and New York State Psychiatric Institute in 2004 using 3T MRI to develop resting state fMRI techniques combined with transcranial magnetic stimulation (TMS) technique to treat psychiatric disorders. He has used the changes in functional connectivity as outcome measure to inform our understanding of the etiology and treatment of psychiatric disorders.

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