

5<sup>th</sup> International summit on

# MEDICAL BIOLOGY & BIOENGINEERING

&

8<sup>th</sup> International Conference & Exhibition on

# BIOSENSORS AND BIOELECTRONICS

September 27-28, 2017  
Chicago, USA



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### Dynamic spectral imaging for the diagnosis and screening of epithelial neoplasia

Dynamic imaging is progressively implemented to almost all biomedical imaging modalities including MRI, optical imaging, x-ray imaging, ultrasound imaging, etc., by developing and utilizing high-affinity magnetically, optically (fluorescent dyes) etc. labeled tracers. It relies on the imaging of the dynamic effects generated by the interaction of contrast agent (s) with organs, tissues, cells, proteins etc. The probing, modeling, parametric analysis and mapping of these dynamic signals offer a new insight into the disease state, physiology and progression. Dynamic Spectral Imaging (DSI) emerges as an advanced imaging modality, capable of probing and monitoring the uptake and washout kinetics of optical contrast agents and biomarkers. The study of the spatial-spectral-temporal characteristics of the generated dynamic optical signals in relation with the underlying disease type and grade would comprise the basis for development of a series of novel, non-invasive, real-time diagnostic methods and technologies. The DSI concept implemented for detecting cervical neoplasia, *in vivo*, underwent validation in large clinical trials, which demonstrated a remarkable improvement (85%) in diagnostic accuracy, over traditional methods. Recent developments involve the compartmental modeling of epithelial transport phenomena, combined with system's biology methods. This innovative approach enabled the estimation of microscopic, neoplasia-related features from macroscopic optical characteristics measured *in vivo*. The method's output is the mapping of model parameters directly correlated with cell packing, functionality of cell junctions and extracellular pH. This valuable information is available in office-based, noninvasive and non-ionizing examinations. By exploiting its unique characteristics, DSI would comprise a new platform for early detection and for personalizing/evaluating treatment strategies.

### Biography

Costas Balas holds a Physics degree and a PhD degree in Medical Physics/Biomedical Engineering, both from the University of Patras, Greece. He is currently full Professor at the School of Electrical and Computer Engineering of the Technical University of Crete, Chania, Greece and Director of the Electronics Lab. He holds several issued international patents and is the Founder of three medical device companies with FDA approved products. He has published more than 80 peer-reviewed articles and book chapters and has delivered numerous invited presentations in the field of biomedical optical imaging.

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