Sixth International Joint Meeting on THORACIC SURGERY

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11th International Meeting on General Thoracic Surgery
Clínic Barcelona | Universitat de Barcelona | Hospital Universitari Sagrat Cor

5th Meeting of the Thoracic Oncology, Thoracic Surgery, Techniques & Transplant, Respiratory Nursing and Respiratory Physiotherapy Areas of the Spanish Society of Pneumology and Thoracic Surgery (SEPAR)
Sociedad Española de Neumología y Cirugía Torácica (SEPAR)

10th International Workshop on Surgical Exploration of the Mediastinum and Systematic Nodal Dissection
Hospital Universitari Mútua Terrassa | Universitat de Barcelona

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3rd Joint Meeting of the Spanish Society of Thoracic Surgery (SECT)
SECT Sociedad Española de Cirugía Torácica

30th Congress of the "Asociación Iberoamericana de Cirugía Torácica" AIACT

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UPDATE IN EXHALED BREATH IN DETECTION OF LUNG CANCER

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Lung cancer (LC) is the most frequent and deadly human cancer; overall survival is 10-15% at 5 years of diagnosis. Yet, LC can be cured if diagnosed early during the course of the disease, when the tumor can be removed surgically. Unfortunately, this occurs in less than 25% of patients because LC is most often asymptomatic until advanced. A large study that used computed tomography (CT) of the chest to screen smokers at risk of LC convincingly shown that mortality can be reduced by 20-40%. However, CT screening is expensive, difficult to implement logistically and not exempt of radiation exposure. Thus, alternative LC diagnostic methods suitable to use at the point of care are needed. Our proposal is to use volatile metabolomics. The rationale behind this approach rests on the fact that the human metabolome expresses distinct and immediate changes when pathological processes occur and alter the body's biochemistry via a combination of oxidative stress, cytochrome p450, liver-enzymes and carbohydrate and lipid metabolism. Volatile Metabolites are transferred from blood to breath in the alveoli. Volatile Organic Compounds (VOCs) present in human breath will originate from normal and abnormal cells, although in different mixture compositions. A subset of VOCs may appear exclusively in abnormal cells but not in healthy cells. The particularly significant feature that we will exploit in this approach is that each disease may be characterized a unique VOC pattern so that the technique may be optimized in selectivity for a certain condition irrespective of other diseases. The study of VOC integrates cutting-edge scientific and technological knowledge form multidisciplinary fields (biomedicine, analytical chemistry, gas chromatography - mass spectroscopy (GC-MS), microelectronics, nanotechnology, computational metabolomics and machine learning based on artificial intelligence (AI)). The challenge now is the development of a novel and self-contained tool for the clinical practice. This tool will be the combination of complex technologies that still face many practical challenges, including, but not limited to, the following areas: 1) the fast evolving field of the human metabolome, 2) the rapidly maturing field of nanotechnology that enables unprecedented sensing solutions for biological samples and very low detection levels, 3) the challenging analysis of omics data featuring extremely high dimensional data with limited number of examples, conditions that require the latest techniques for model development and validation to avoid false discoveries or optimistic results, therefore we are just at the begging of a very long journey.

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