



Wolfson Department of Chemical Engineering Seminar

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Room #6

Detection of Metabolic Syndrome Through Skin Based Volatiles

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PhD Seminar

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Metabolic Syndrome (MetS) is a general term for a cluster of conditions that includes hyperglycemia, hyperinsulinemia, dyslipidemia, and hypertension. An escalation in these conditions increase the risk towards the development of type 2 diabetes, Non-Alcoholic Fatty Liver Disease (NAFLD) and their pursuing complications. Currently there are millions of diabetes patients worldwide who are unaware to their condition (mainly due to lacking health care or social services), mainly at those stages the disease is still non-symptomatic. The current research examines the utility of Volatile organic compounds (VOCs) exerted through skin as potentially simple, non-invasive, and cost-effective method to detect the MetS. This is achieved through a diabetic based clinical trial and establishing a NAFLD animal model and determine if VOCs can be associated with known clinical biomarkers of MetS measured routinely in high-risk populations. Results of the clinical study revealed a set of 11 VOCs that differed between diabetic and healthy controls ($p < 0.05$). GC-MS tentative identification revealed compound dominance of branched alkanes associated with oxidative stress. Linear discriminant analysis allowed to discriminate diabetic from healthy controls with a 85% accuracy (86% Sensitivity, 93% Specificity). Further investigation of the data revealed a subset of 11 VOCs that allowed discrimination between diabetic patients with no complications vs diabetic patients with complications. Linear discriminant analysis was used with 93% accuracy (Specificity 100%, Sensitivity 86%). General screening of the population and in particular high-risk populations is not cost effective for reasons of preventive medicine. These findings suggest VOCs monitoring might present a cost-effective opportunity for risk stratification where the general population can benefit greatly.