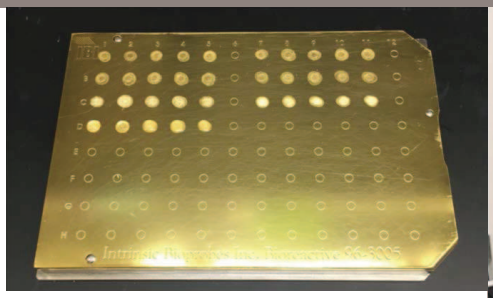
Early Detection for Risk of Diabetes and Cardiovascular Disease



Diabetes mellitus (DM) currently affects over nine per cent of the population in both the United States and European Union, constituting an enormous healthcare and socioeconomic burden. Type-2 DM (T2DM) accounts for over 90 per cent of newly diagnosed diabetes cases. Research is increasingly focused on validating novel circulatory biomarkers which may help to stratify individuals across the T2DM spectrum – from pre-diabetic individuals to more serious T2DM sufferers with underlying cardiovascular disease (CVD). This will enhance the clinical decision-making ability of health care professionals, allowing them to tailor appropriate intervention strategies for "at-risk" individuals to prevent, and even reverse, T2DM progression.

Arterial hardening or "vascular calcification" is an important risk factor for the increased CVD mortality in T2DM. It can cause premature ageing of arteries, damage to the heart ventricles, and rupture of fatty plaques within blood vessels, ultimately leading to heart attack. A series of regulatory proteins, namely osteoprotegrin (OPG), receptor-activator of nuclear factor kappa B ligand (RANKL), tumour necrosis factor-related apoptosis -inducing ligand (TRAIL), and bone morphogenetic protein-2 (BMP-2), are centrally involved in the arterial hardening process, and unsurprisingly are receiving considerable attention as predictive circulatory biomarkers of T2DM and CVD.

A strategic ASU-DCU research collaboration employing mass spectrometry immunoassay technology has recently demonstrated (May 2015) that these proteins potentially exhibit multiple post-translationally modified variants within circulation. This is information that could be harnessed to create multi-dimensional biomarker views of the T2DM syndrome.

Future work will focus on optimisation of assay sensitivity, definitive identification of the modified protein variants involved, and clinical studies to better understand their diagnostic relevance and exploitability.

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