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The Use of Biomarkers in The Early Diagnosis of Dengue and as Possible Markers for Disease Severity

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The main objective of this study is to identify dengue disease biomarkers from peripheral blood mononuclear cells (PBMC) and serum, from dengue infected patients by using two-dimension electrophoresis (2-DE) and mass spectrometry analysis.

Blood were collected from dengue fever (DF), dengue haemorrhagic fever (DHF) and healthy individuals The PBMC and serum were separated before subjecting to two-dimension electrophoresis (2-DE). We identified eight proteins that were 2-fold or more up-regulated in patients compared to healthy individuals from the PBMC samples. Out of these 8 proteins, at least three of them, aldolase, thioredoxin peroxidase and alpha tubulin, are related to dengue infection. These proteins were found to be up-regulated in DF (n=10) and DHF (n=10) patients compared to healthy individuals (n=8). Both thioredoxin peroxidase and alpha tubulin were over-expressed by 4.9 and 3.3 times in DHF patients compared to DF patients, while aldolase was up-regulated by 2.2 times in DF patients compared to DHF patients. Thioredoxin peroxidase is a protein that is involved in the thioredoxin redox system which works in parallel with the glutathione redox system and is important regulators of various metabolic functions of cells. It was found that thioredoxin increased during a variety of oxidative stress, including during viral infection. The second protein, alpha tubulin may be involved in the assembly and transport of virions to the extracellular environment after infection while the third protein, aldolase is related to mylagia, a common symptom of dengue. Hence the elevation of these proteins is indicative of active viral infection. For serum samples, the 2-DE analysis revealed two markers, identified by mass spectrometry as alpha -1 anti-trypsin and NS1 proteins, to be up-regulated in DF (n=10) and DHF (n=10) patients compared to healthy individuals (n=8). Both alpha-1 anti-trypsin and NS 1 proteins were over-expressed by two times in DHF patients compared to DF patients. Our findings suggest the potential use of these markers as dengue disease severity marker.