**Identification of Plasma Metabolome in patients with mustard lung disease using 1H NMR**

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**Background**: Sulfur mustard (SM) is a profoundly fatal chemical warfare agent that elicits severe health ramifications in individuals who come into contact with it. Acquiring comprehension regarding the metabolic alterations instigated by SM exposure is vital in comprehending its fundamental mechanisms and establishing efficacious diagnostic and therapeutic measures.

**Methods**: In this study, proton nuclear magnetic resonance (H-NMR) spectroscopy was employed to carry out a metabolomic analysis in patients diagnosed with mustard lung disease (MLD). A non-targeted approach was used for metabolite measurements on plasma samples obtained from a total of 54 subjects, consisting of 14, 20, and 20, healthy control, mild, and moderate MLD individuals, respectively. Multivariate analysis methods were utilized to identify metabolites that differentiate between the various groups, while enrichment analysis was conducted to reveal the biochemical pathways implicated in the disease.

**Results**: Based on the results obtained, it was found that the metabolic profile was able to distinguish between individuals with moderate symptoms and those who were healthy, but not between individuals with mild symptoms and healthy individuals, when using multivariate analysis. The results also indicated that individuals exhibiting moderate symptoms displayed notable changes in both fatty acid and amino acid metabolism in comparison to the control group.

**Conclusion**: Our research offers original perspectives on the metabolic alterations linked to MLD and emphasizes the potential pathways implicated in the advancement of this disease. These results hold significant implications for the advancement of specific diagnostic and therapeutic approaches tailored to MLD.

***Keywords*:** Metabolome, Plasma, MLD, HNMR