It is estimated that 110 million workers around the world work in exposure to welding fumes. In March 2017, the International Agency for Research on Cancer (IARC) established a working group that based on existing data and sufficient evidence of epidemiological studies confirming the occurrence of lung cancer associated with exposure to fumes / welding dust has classified welding fumes as a carcinogen for humans (group 1). Welders are struggling with many real and dangerous threats that can significantly affect the quality of health and life. Welding fumes can cause serious health problems for workers exposed by inhalation to their components. Long-term exposure may cause lung, larynx and urinary tract cancer, and may also cause damage to the nervous and urinary systems. The health consequences for welders depend mainly on the composition of welding fumes. Recently, special attention has been paid to the exposure of welders to hexavalent chromium and nickel, elements with a proven carcinogenic effect, which most commonly occur together with elements such as cobalt and manganese. The toxic effects of welding fumes can be assessed using more or less specific biomarkers, such as exposure markers (metal concentrations in the biological material - blood, urine), or markers of early effects (e.g. oxidative stress markers). It seems that the study of metabolomic and epigenetic processes (telomere length study) taking place at the level of cellular transformations may be a better marker of changes occurring when exposed to welding fumes The UHPLC-QE-MS unsuitable metabolomics method for quantitative analysis of low molecular weight metabolites may be an ideal solution for assessing significant differences in metabolic pathways to explain the metabolic, physiological and pathological mechanisms due to exposure to toxic welding fumes. Thus, such analysis may provide a more accurate view of the molecular mechanism of metal poisoning. It also offers the opportunity to prevent and treat metal poisoning in the exposed population, which is the main goal of occupational medicine and environmental health. Exposure to welding fumes can cause increased production of reactive oxygen species (ROS) and increased oxidative stress markers. It has been hypothesized that oxidative stress may be the primary mechanism responsible for the changes observed in telomere length. This study should explain the function of such epigenetic changes as possible markers of early effects of occupational exposure, dose-response relationships underlying molecular mechanisms. To date, no such studies have been carried out involving workers exposed to welding fumes in several European populations. This study is unique and the results will allow harmonization and the creation of a platform for further exposure assessment and health risk assessment of exposure to toxic fumes. The aim of the project will be to search for new markers of exposure to welding fumes using the latest developments in analytical techniques at the metabolomic level and epigenetic changes. The survey will cover employees employed in several European countries (Poland, the Netherlands, Finland, Portugal, Belgium), exposed to welding fumes, which further increases the value of the expected results.