Endothelial dysfunction represents a major challenge from biological and clinical standpoints because it is associated with vascular damage in major pathological entities such as hypertension, atherosclerosis, diabetes and diabetic complications (micro- and macroangiopathy). Importantly, these diseases are not only the consequence of endothelial dysfunction, but also their cause. Hyperlipidaemia, hyperglycaemia, hyperhomocysteinemia, inflammation, aging and shear stress associated with hypertension are the main factors that affect endothelial cell dysfunction. Particular attention is paid to endothelial dysfunction associated with oxidative stress.

Currently, it is known that redox imbalance is associated with low levels of glutathione (GSH) in the cell. Previous studies in this area have focused mainly on the possibility of increasing GSH levels by administering exogenous GSH and its derivatives, providing nontoxic cysteine precursors, or increasing the rate of reduction of disulfide-oxidized form of glutathione (GSSG) to GSH. Unfortunately, due to its inability to penetrate membranes, exogenous administration of GSH is ineffective. In turn, supplementation with GSH esters (methyl, ethyl, and propyl) is associated with the risk of poisoning with the products of the hydrolysis of these compounds, i.e. with methanol, ethanol or propanol. Cysteine, the amino acid that stimulates *de novo* GSH synthesis, cannot be directly used as a medicine due to its high neurotoxicity. Cysteine precursors, i.e. N-acetylcysteine (NAC), methionine or 2-oxothiazolidine-4-carboxylic acid (OTC), are characterized by much lower toxicity; however, the transformations of these compounds require energy inputs which cannot be provided by the cells affected by oxidative stress. Therefore, understanding the mechanisms of *de novo* glutathione biosynthesis regulation and methods of modulating this process may allow the development of effective therapeutic strategies aimed at increasing the level of GSH in response to oxidative damage. In this aspect, particular attention is devoted to γ-glutamylcysteine ligase (GCL), an enzyme that conditions the rate of glutathione synthesis. Independent research groups are looking for substances that modulate the expression and activity of GCL. The results of our own research suggest that one such substance may be SDX.

The aim of the work is to verify the hypothesis concerning the antioxidant action of SDX on the vascular endothelium associated with modulation of the biosynthesis and metabolism of GSH, and to determine the role of GCL in the mechanism of action of this drug. To answer the questions raised, umbilical vein endothelial cells (HUVEC) will be exposed to oxidative stimuli of varying severity. In both models of oxidative stress, we will evaluate the influence of SDX on cell viability, apoptosis, lipid peroxidation, intracellular concentration of GSH and expression of studied enzymes on the level of gene and protein.

Our research is expected to reveal an unprecedented mechanism of the antioxidant action of SDX that is associated with the modulation of the concentration of intracellular antioxidant GSH. The ability of SDX to modulate the expression of enzymes involved in the synthesis and metabolism of GSH makes it a promising therapeutic strategy to treat diseases associated with oxidative damage to the vascular endothelium.