Anaemia of chronic disease (AoCD) is the most common form of anemia. It occurs in patients with acute and chronic viral, bacterial and fungal infections, autoimmune and inflammatory disorders, solid tumours and in chronic kidney disease. In context of therapy, there is need to improve efficiency of iron delivery. Additionally, at the way of this drug delivery, there show cytokines, such as interleukin (IL)-1 and gamma interferon, which play an important role in the pathogenesis of this anaemia by directly inhibiting erythrocyte production within the marrow and also by a negative effect on erythropoietin production. Next important element of host systems is hepcidin (peptide with iron regulatory properties produced in the liver). Hepcidin binds to ferroportin (a trans-membrane glycoprotein that mediates iron export from enterocytes cells) and inhibits of enteral iron uptake across the gastro-intestinal part and blocks of iron release from reticulo-endothelial stores to transferrin. Hepcidin synthesis is usually up-regulated by anemia or hypoxia. Additionally, there are inflammatory cytokines (IL-6 and IL-1), which cause up-regulated too and in consequence: decrease level of released iron and anemia.

As a result of all of those elements, the best way to deliver iron to patient is intravenous intake. However, there are disadvantages as a free-radical synthesis and unstable formulation, as a result of Fenton reaction. Those reasons show: the best solution is to use liposomal drug delivery system, as a stable in function of time, pH and other environmental properties system. Liposomes are spherical structures, build by phospholipids. Because of composition, there is high biocompatibility of those carriers.

Define the absorption profile of liposomes with different elements inside let us a possibility to revolutionize research area in context of drug delivery systems. Bypassing the pathway actively blocked by hepcidin will allow for better delivery of iron to the body. Additional long-term benefits include: greater comfort for the patient with enteral drug supply and the safety of the treatment used, by limiting side effects, ie the generation of free oxygen and other radicals that damage the genetic material.

The main project objective is to define possibility of internalization liposomal iron (contained different polymers) to eucariotic cells. The objective will be realize by creation of cellular *in vitro* model, which give a possibility to control iron release and transfer to main organism's elements: through enterocytes to bloodstream and lymphatic system, next to macrophages and hepatocytes. By use different iron-carriers, there is possible to modify mechanical properties of carrier. **The main project hypothesis** in is conviction, that we can effectively deliver iron ions associated with polymer encapsulated in liposomes, by eneterocytes to bloodstream and in next step: to macrophages or directly to hepatocytes. It gives a possibility to eliminate mail problems connected with traditional way of iron delivery, including enteric and intravenous (i.v.) intake. Additionally, iron encapsulated inside liposomes is stable in function of time and eliminate free-radicals generation.