The antifibrotic effect of silibinin-coated gold nanoparticles against fibrosis in mouse

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Chronic liver diseases are responsible for about two million deaths annually worldwide, making them the 11th leading cause of death. Liver cirrhosis is the leading cause of death in Slovakia among individuals aged 35-44. Liver fibrosis is the main cause of chronic liver disease, and reducing hepatic fibrogenesis is crucial for the treatment of chronic liver diseases. Therefore, research focused on developing new antifibrotic drugs is essential.

One potential antifibrotic drug could be silymarin. Studies have shown that silymarin has potential therapeutic effects on liver diseases. Silymarin is an extract from the Milk thistle herb and has been traditionally used for its medicinal properties for centuries, especially for liver-related conditions. It is composed mainly of one flavonoid (taxifolin) and seven flavonolignans (isosilybin A, isosilybin B, isosilychristin, silybin A, silybin B, silychristin and silydianin). About half of the silymarin mixture consists of silibinin (silybin A and silybin B in a ratio of 1:1). Silibinin has the highest antioxidation potential of all silymarin compounds and it seems that silibinin may have a key role in the antifibrotic effects of silymarin.

One of the key aspects of the success of a drug is its targeted transport to the liver. Gold nanoparticles are a promising option for drug delivery due to their unique properties and biocompatibility and may enhance silibinin's efficacy. The aim of the project is to prepare silibinin-coated nanoparticles and use them to suppress liver fibrosis *in vitro* and *in vivo*. Further research is necessary to understand its anti-fibrotic mechanisms, optimal dosage, potential drug interactions, and impact on other organs. Changes in profibrotic markers (e.g. *FN1*, *ACTA2*, *COL1A1*, *COL3A1*, *POSTN*), as well as cell viability, proliferation, changes in cytoskeletol will be monitored using various molecular-biological methods to determine whether our silibinin-coated nanoparticles have a better effect than pure silibinin or silymarin.

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