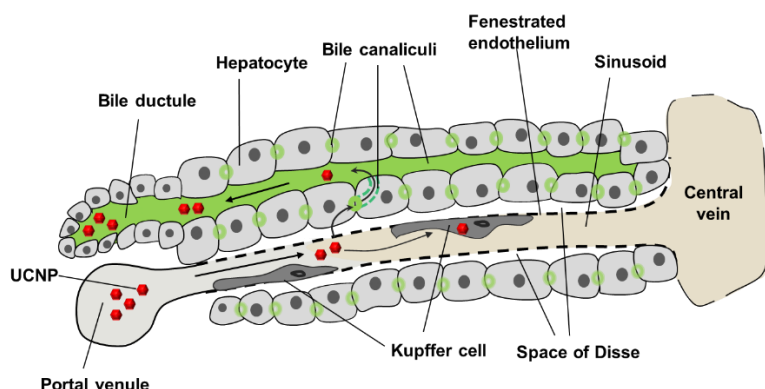


# Exploring Nanoparticle Interaction with Body Systems for Translational Nanomedicine

## Abstract

Nanomedicine is the medical application of nanotechnology. Although there have been over 18000 papers published using the keyword of nanomedicine, there are only a few FDA approved nanomedicine drugs until now. This huge gap is largely caused by the insufficient knowledge of the complex interactions between nanoparticles and body system, especially immune system. From the moment of the administration of nanoparticles for targeted imaging, targeted drug delivery, and tissue engineering, nanoparticles interact with a body system, and clearance/excretion process initiates. The term clearance indicates the elimination of the nanomaterials from circulating blood while excretion refers to the removal of nanomaterials from the organism. The nanomaterials can be cleared from the blood circulation through either renal system or the reticuloendothelial system (RES), which is a type of innate immune system. Meanwhile, there are two major excretory pathways which are hepatobiliary and renal routes. Almost all nanomaterials can exert toxicity in vivo because the nanoparticles generally are captured to immune cells especially in the Kupffer cells in the liver. However, nanoparticles can be excreted through hepatobiliary system when the nanoparticles targeted to hepatocytes rather than Kupffer cells in the liver (**Figure**). Thus, the development of hepatocyte targeting/RES evading nanoparticles would be the key to enhance the biosafety and to improve the chance of clinical translation of nanoparticles.



**Figure. Mechanism of hepatobiliary excretion of nanoparticles**

## References

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