Study on Molecular Pharmaceutics of Serum Protein and Its Pharmaceutical Application

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Human serum albumin (HSA) and alpha1-acid glycoprotein (AGP) are two serum proteins that bind a broad spectrum of endogenous substances as well as drugs. Since becoming a professor in the Biopharmaceutics Department, the speaker has researched the structure and function of these two proteins, with the aim of developing blood dosage forms and a DDS carrier for clinical applications. In the field of biopharmaceutics, we are the first to construct a static and dynamic binding topology of drugs and fatty acids on albumin using various techniques such as spectrophotometry, photoaffinity labeling and site-directed mutagenesis. In addition to mapping the binding sites of steroidal hormones and acidic as well as basic drugs on AGP, the structural transition of protein from beta sheet to alpha helix at the interface of the cell membrane has also been examined. In the field of clinical application, our results confirmed that charcoal hemoperfusion can effectively remove drugs with a protein binding percentage as high as 95%. We have explored the potential of R410C, a genetic variant of HSA with two free thiols, as a NO carrier via S-nitroso formation. Our results show that S-nitroso-R410C possesses antibacterial and cytoprotective properties with a circulation time sufficient for *in vivo* biological activity. To improve the safety profile of albumin infusion, recombinant HSA dimer has been examined and was shown to have a high retention rate in circulating blood and a lower vascular permeability than that of native HSA, which is also a potential candidate for artificial blood production.