Superoxide dismutase (SOD) is important to prevent oxidative stress. It was found previously that oral administrated PTD-SOD, a fusion protein between protein transduction domain (PTD) and Cu/Zn-SOD, exhibited therapeutic effect on ischemic reperfusion, chronic hepatitis and alcohol liver, suggesting its protection and recovery effect on the organs under oxidative stress. Therefore, the uptake of oral administrated PTD-SOD was investigated in mice. Dose-dependent oral absorption indicated that PTD-SOD improved SOD activity in mice brain, heart and liver significantly or very significantly with the best effect at the low dose (1500 U/day). Time-course effect of PTD-SOD showed that SOD activity increased significantly, it reached the maximum after 4h in the 3 organs. It was further found that both the levels of Cu/Zn-SOD and Mn-SOD activities increased, with higher increment in the case of Mn-SOD. Moreover, PTD-SOD could reduce MDA concentration in serum and liver tissue. In vitro gastrointestinal tract tests found that PTD-SOD was trend to be degraded in simulative gastric juice, but kept stable in simulative intestinal juice. Quantitative RT-PCR analysis indicated that oral administration of PTD-SOD tended to increase the mRNA of Mn-SOD in the brain, liver and heart; the mRNA of Cu/Zn-SOD was trend to improve in brain and liver. In conclusion, these results confirmed that oral administrated PTD-SOD had substantial effect to increase the level of SOD in organs, so as to alleviate oxidative stress related symptoms. The underlying mechanism may be its tolerability in gastrointestinal tract and inductive expression of SOD gene.

Keywords: Superoxide dismutase, Protein transduction domain, Oral absorption, Tolerability, Induction