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Kinetics of Lactoferrin-Mediated Iron Transport through Blood-Brain Barrier Endothelial Cells.[1] PRASHANTA DUTTA, AMINUL KHAN, JIN LIU, Washington State University — Abnormally high levels of iron have been confirmed in the brain cells during several neuro-diseases such as Parkinson's, Alzheimer's etc. Although transferrin-mediated transcytosis is the leading mechanism for iron transport to brain, it has been found that the excessive brain irons are not resulted from transferrin. Instead, lactoferrin (Lf) is a prime suspect because of its abundant availability in the affected regions of brain. However, the kinetics of Lf-mediated iron transport is still unknown. In this paper, a mass-action based kinetic model has been presented to address the transport of Lf-mediated irons through the blood-brain barrier. The kinetic rate parameters of the model are estimated by Bayesian inference method. The robustness of the model is verified by perturbing the estimated parameters. Our results show that an increase in high affinity, but not low affinity, receptors results in higher lactoferrin as well as irons in the brain. The Lf contributes free as well as bound irons to the brain. The absence of a feedback loop such as iron regulatory proteins allows continuous transport of Lf and iron through Lf-mediated pathway, which might raise brain irons and contribute to the neurodegeneration.

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