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**Lactoferrin: from the structure to the functional orchestration of iron homeostasis**

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**Abstract**

Iron is by far the most widespread and essential transition metal, possessing crucial biological functions for living systems. Despite chemical advantages, iron biology has forced organisms to face with some issues: ferric iron insolubility and ferrous-driven formation of toxic radicals. For these reasons, acquisition and transport of iron constitutes a formidable challenge for cells and organisms, which need to maintain adequate iron concentrations within a narrow range, allowing biological processes without triggering toxic effects. Higher organisms have evolved extracellular carrier proteins to acquire, transport and manage iron. In recent years, a renewed interest in iron biology has highlighted the role of iron-proteins dysregulation in the onset and/or exacerbation of different pathological conditions. However, to date, no resolutive therapy for iron disorders has been found. In this review, we outline the efficacy of Lactoferrin, a member of the transferrin family mainly secreted by exocrine glands and neutrophils, as a new emerging orchestrator of iron metabolism and homeostasis, able to counteract iron disorders associated to different pathologies, including iron deficiency and anemia of inflammation in blood, Parkinson and Alzheimer diseases in the brain and cystic fibrosis in the lung.

**Keywords:** Anemia of inflammation; Brain iron; Iron homeostasis; Lactoferrin; Lung iron; Transferrin.

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