

## CAUSES OF IRON DEFICIENCY ANEMIA IN NON-DIALYSIS-DEPENDENT CHRONIC KIDNEY DISEASE

**Absolute (true) versus functional iron deficiency:**

### Absolute

Severely diminished or non-existent iron stores in the bone marrow, liver, and spleen

### Functional

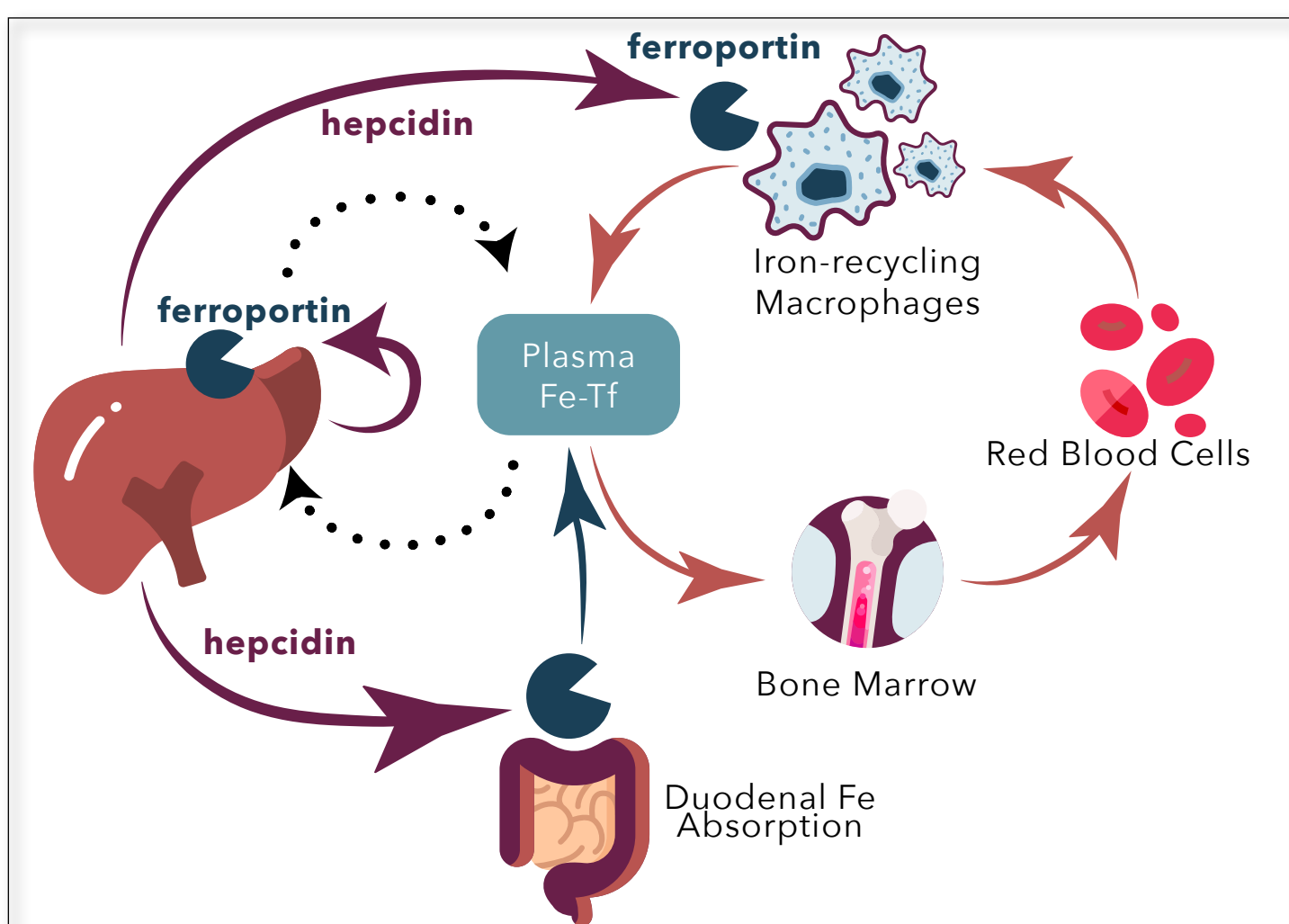
Normal or increased iron reserves that cannot be converted into erythroid precursors for erythropoiesis

### Hepcidin and Ferroportin

**Hepcidin**, secreted by the liver, plays a major role in regulating iron metabolism. Hepcidin blocks the movement of iron by attaching to the **ferroportin iron transporter**, which is found on the basal membrane of enterocytes, reticuloendothelial cells, and hepatocytes.

**Ferroportin** is internalized by the cell after interacting with hepcidin, leading to its eventual destruction.

**Hepcidin** prevents iron from being absorbed or regenerated by reticuloendothelial cells, which lowers the level of iron in the blood.<sup>1</sup>



**Figure 1:** Hepcidin and ferroportin interact to regulate the flow of iron into plasma<sup>2</sup>

Chronic kidney disease (CKD) causes a **rise in hepcidin levels**, which are inversely linked with glomerular filtration rate (GFR).

This condition in CKD is caused by:

- decreased renal clearance<sup>1</sup>
- elevated inflammatory cytokines<sup>1</sup>
- decreased erythropoietin levels<sup>1</sup>

A high rate of iron loss (1-3 g/year) is also a result of:

- **Gastrointestinal bleeding** brought on by platelet dysfunction and gastritis [in both non-dialysis-dependent (NDD) and dialysis-dependent (DD) CKD]<sup>1</sup>
- **Malnutrition** and **decreased gastrointestinal iron absorption**<sup>1</sup>

Iron deficiency is **widespread among CKD patients** who are NDD and DD because of the concomitant reduction in iron absorption and increase in iron losses.<sup>1</sup>

### References:

1. Gafter-Gvili A, Schechter A, Rozen-Zvi B. Iron Deficiency Anemia in Chronic Kidney Disease. Acta Haematol. 2019;142(1):44-50. doi: 10.1159/000496492. Epub 2019.
2. Nemeth E, Ganz T. Hepcidin-Ferroportin Interaction Controls Systemic Iron Homeostasis. Int J Mol Sci. 2021;22(12):6493. doi: 10.3390/ijms22126493.