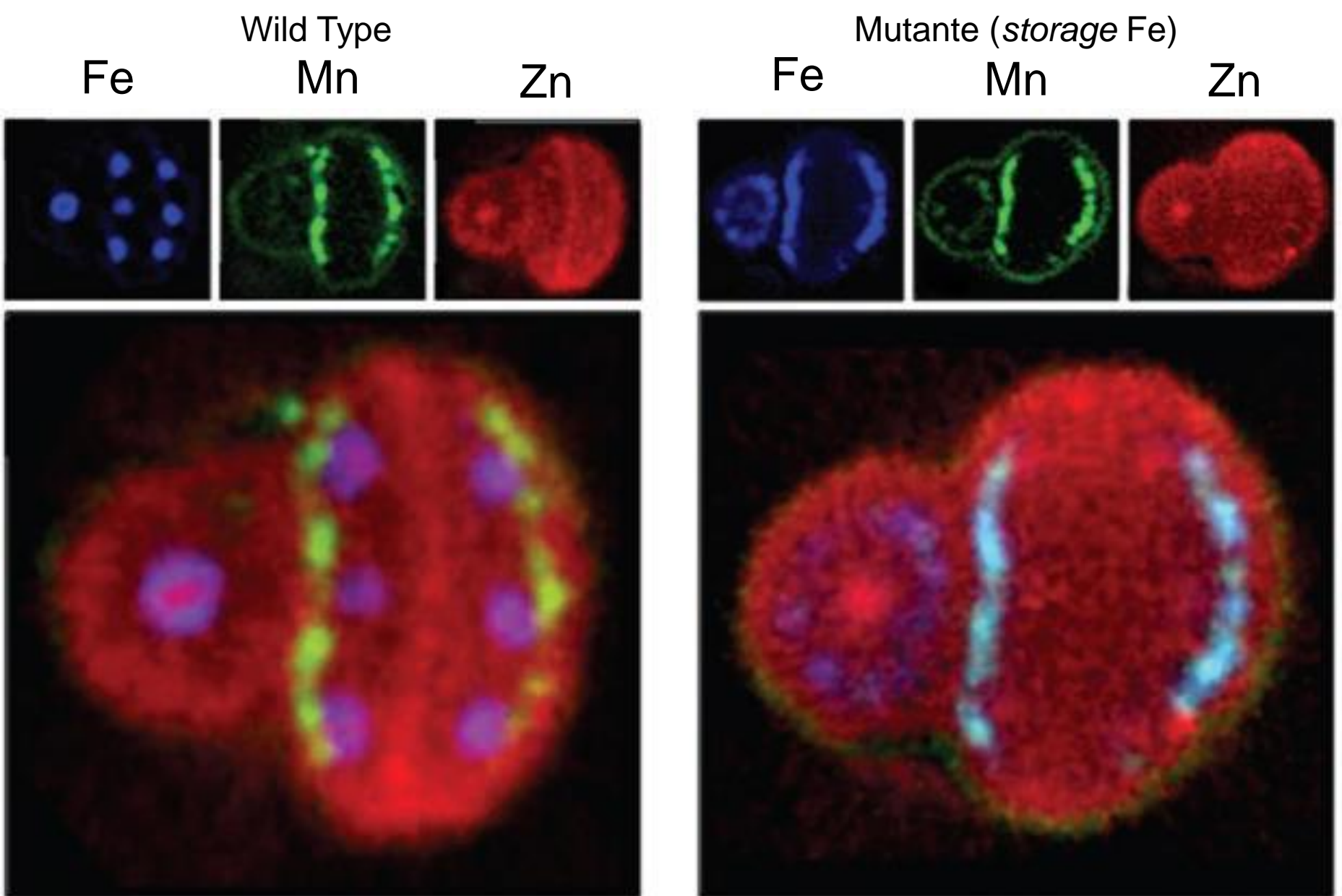
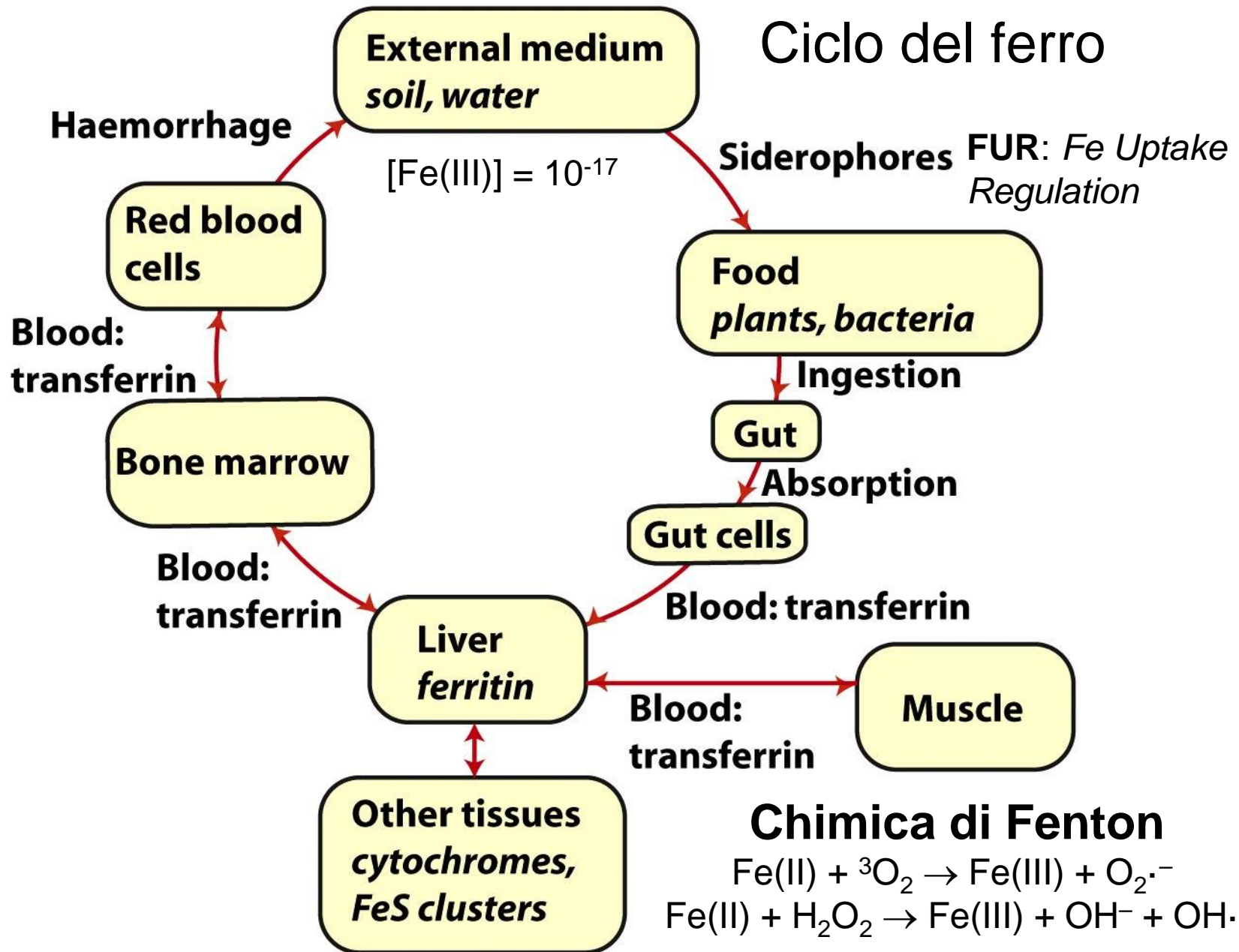


Omeostasi dei trace elements:
uptake, trasporto, *storage*....

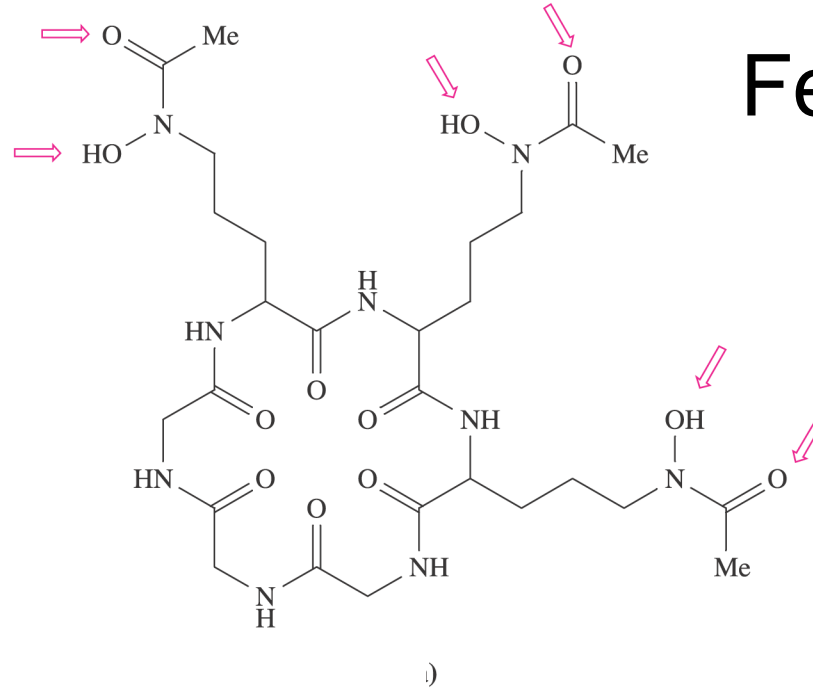


Microtomografia di fluorescenza ai raggi X

Ciclo del ferro



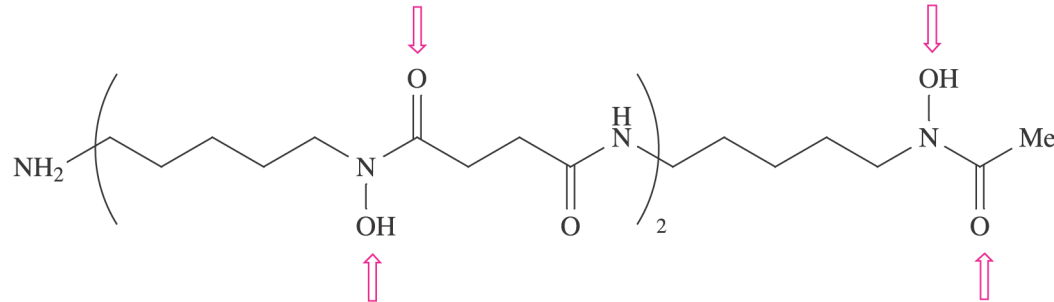
Siderofori
Idrossammati
(funghi, lievito)

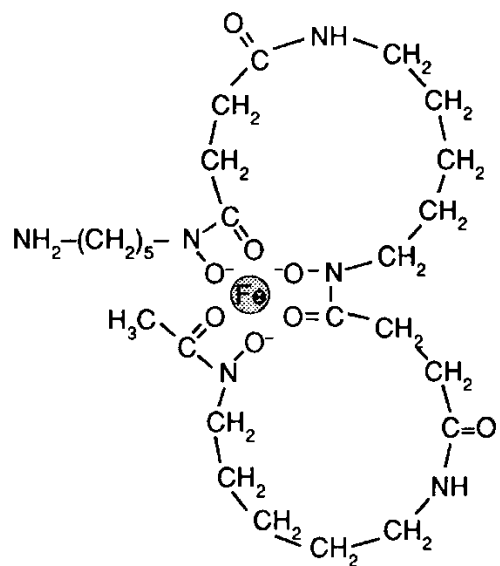


Fe(III) alto spi

desferricromo

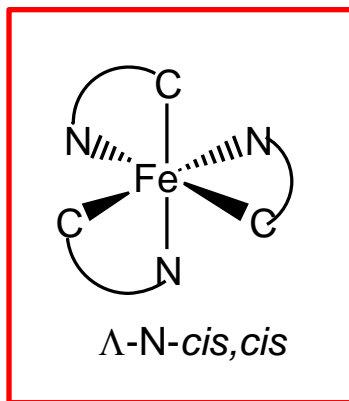
desferriossamina



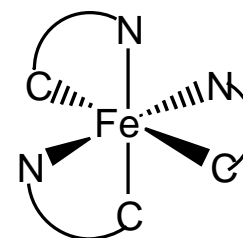


ferrioxamine B

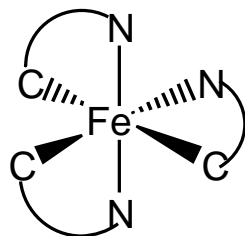
without Fe: deferrioxamine B



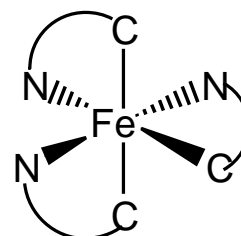
Λ -N-*cis,cis*



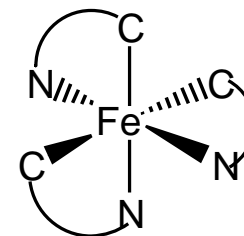
Λ -C-*trans,cis*



Λ -N-*trans,cis*



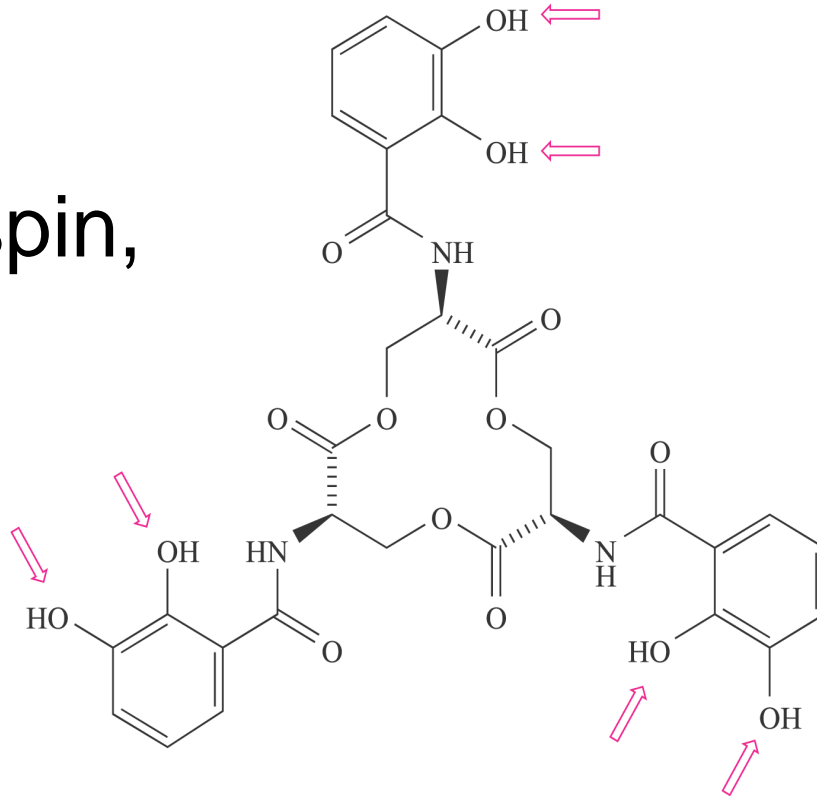
Λ -C-*cis,trans*



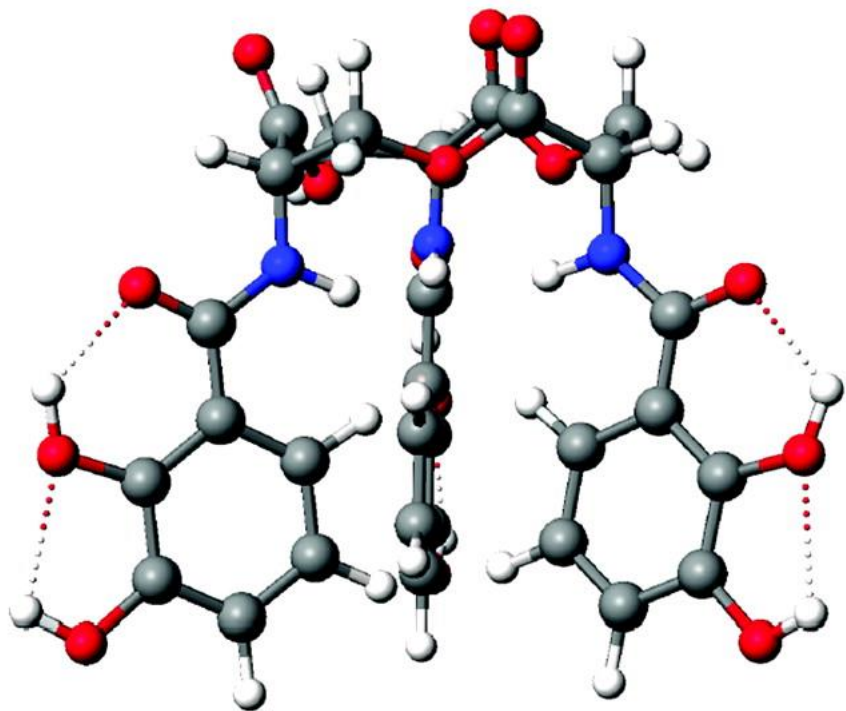
Λ -N-*trans,cis*

Siderofori catecolati (batteri)

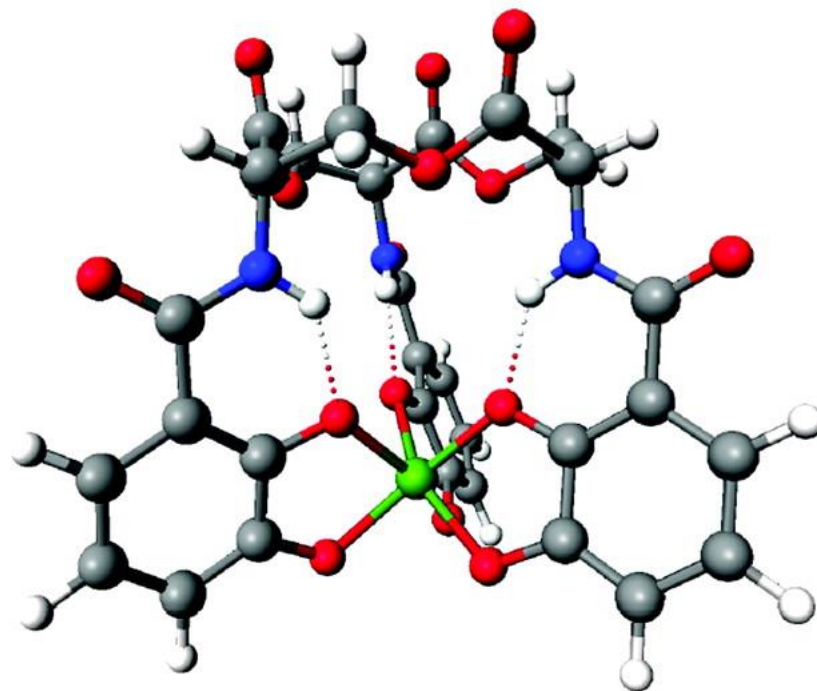
Fe(III) alto spin,
 $K_a = 10^{52}$



Enterobactina

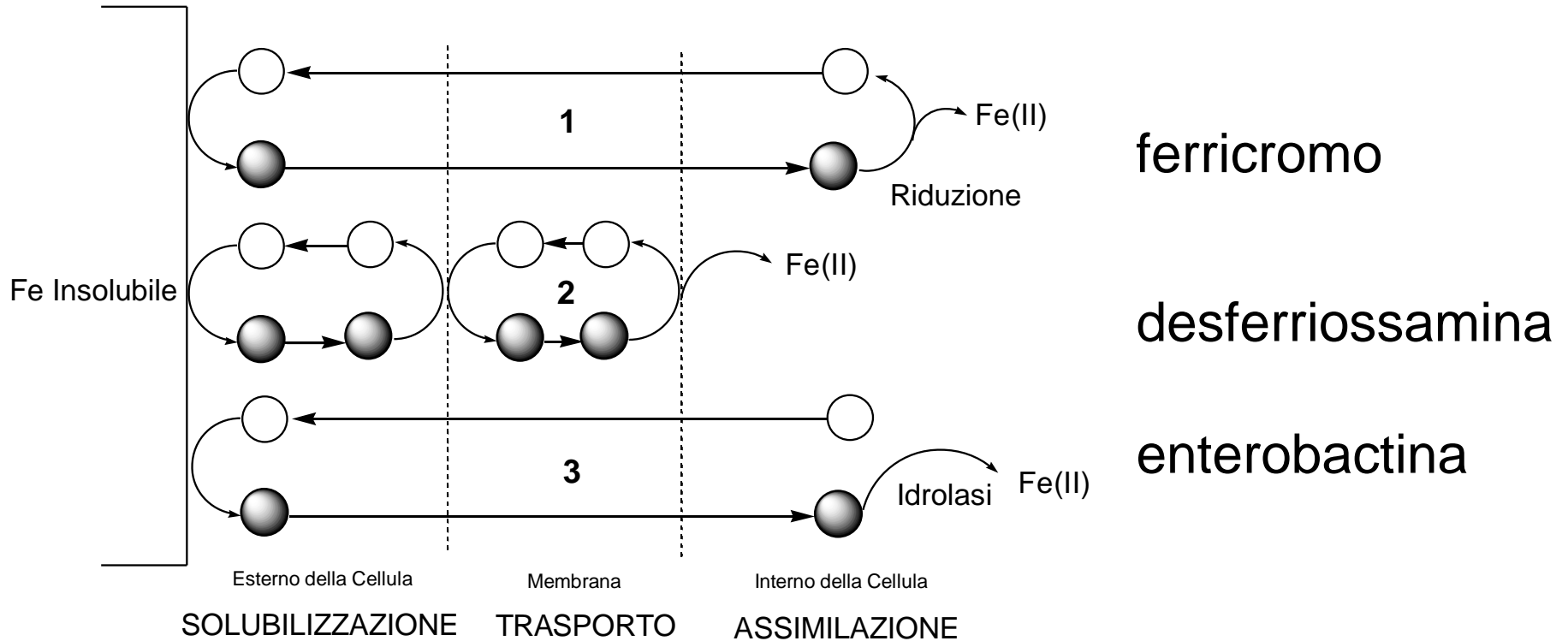


Modello di enterobactina
non coordinata



Complesso V(IV)-enterobactina
 Δ

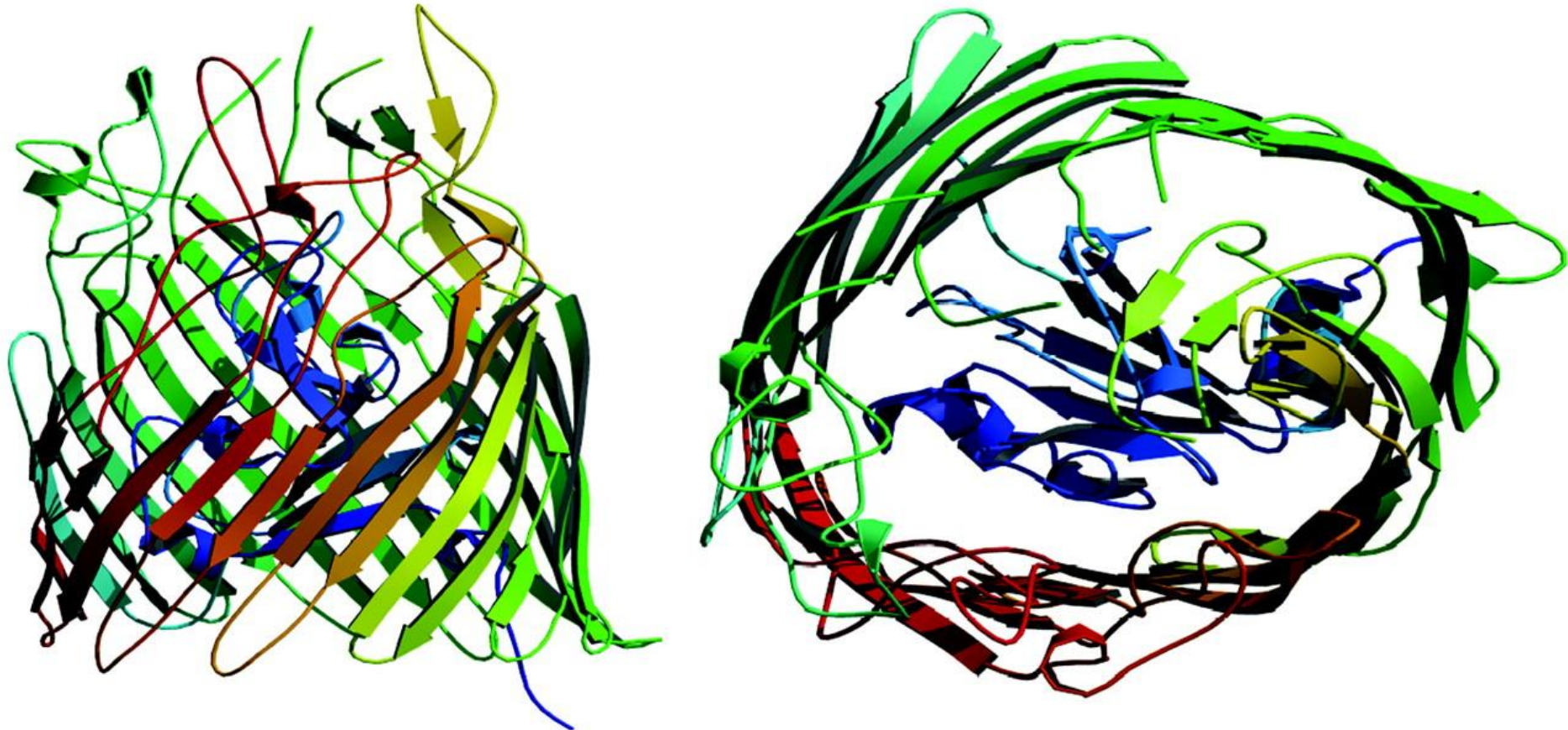
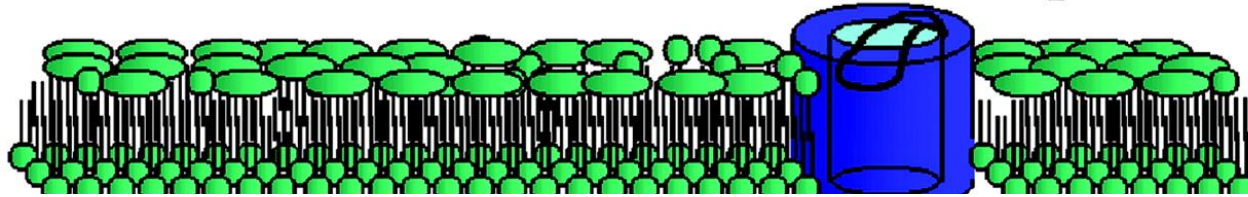
Meccanismi di trasporto trans-membrana



FepA: trasporto trans-membrana di Fe-enterobactina

OM

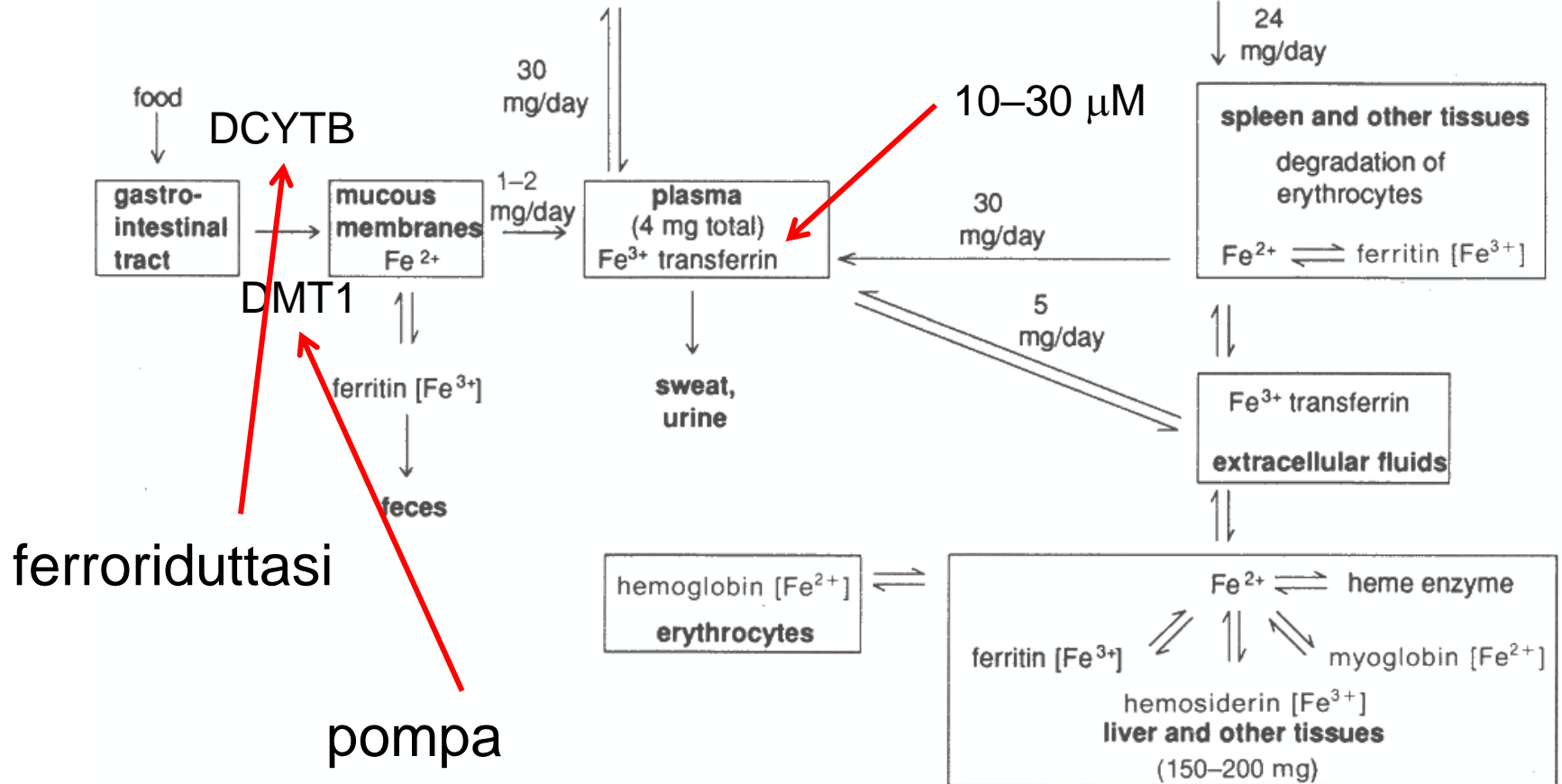
FepA



In blu la «gate protein» N-terminale

Midollo spinale

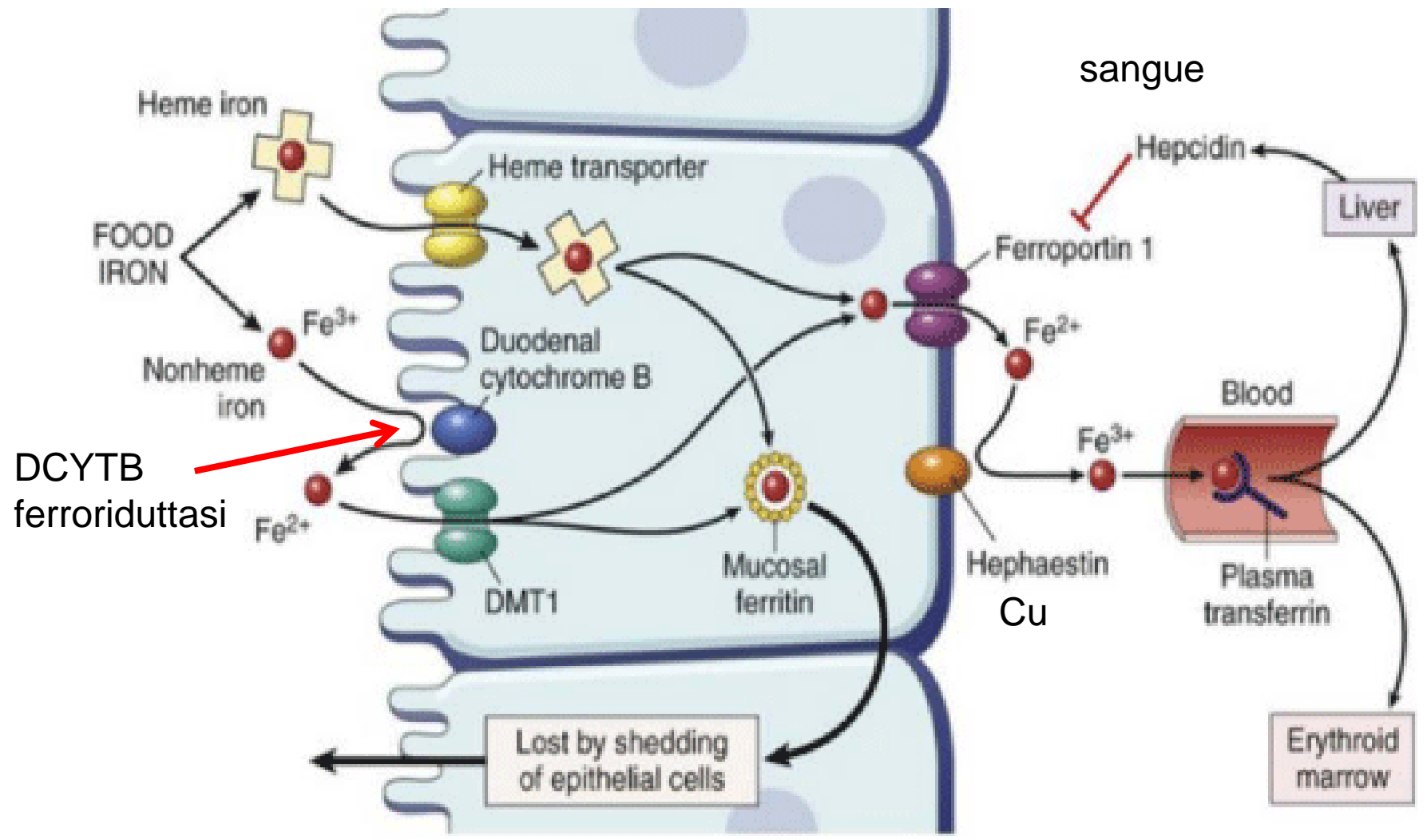
ferrochelatasi

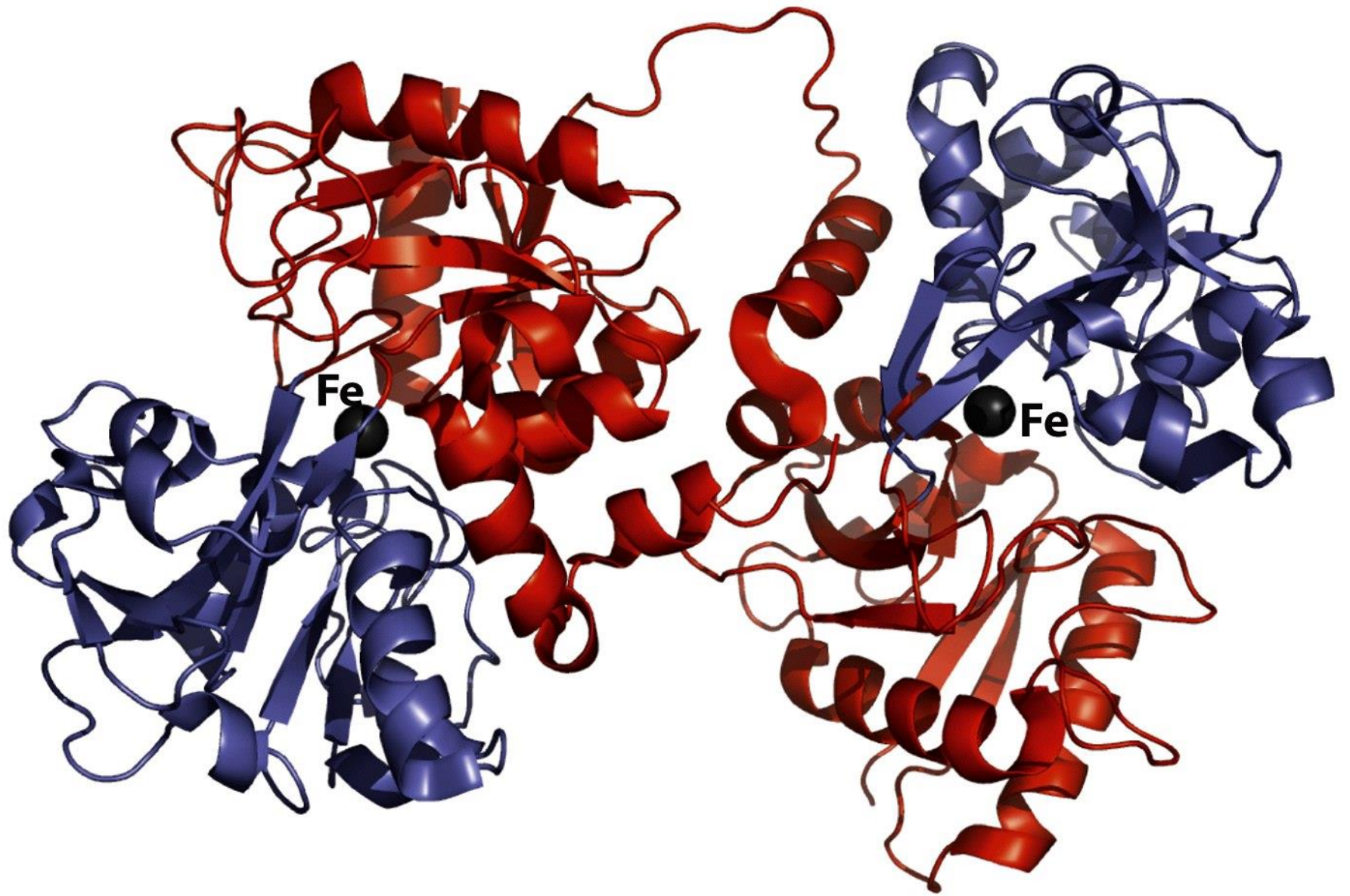


ferritoriduttasi

pompa

Assorbimento del ferro nell'intestino e trasporto attraverso gli enterociti

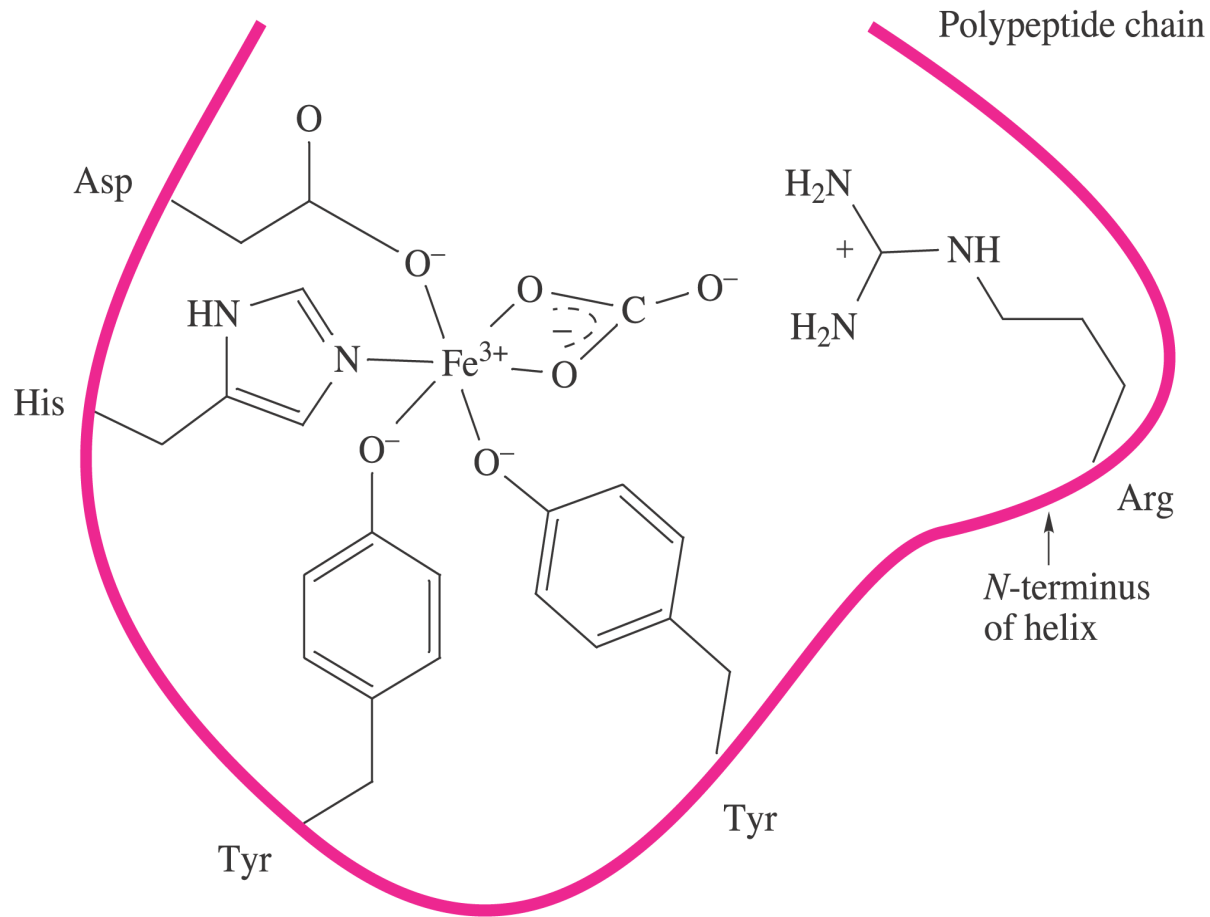




Transferrina

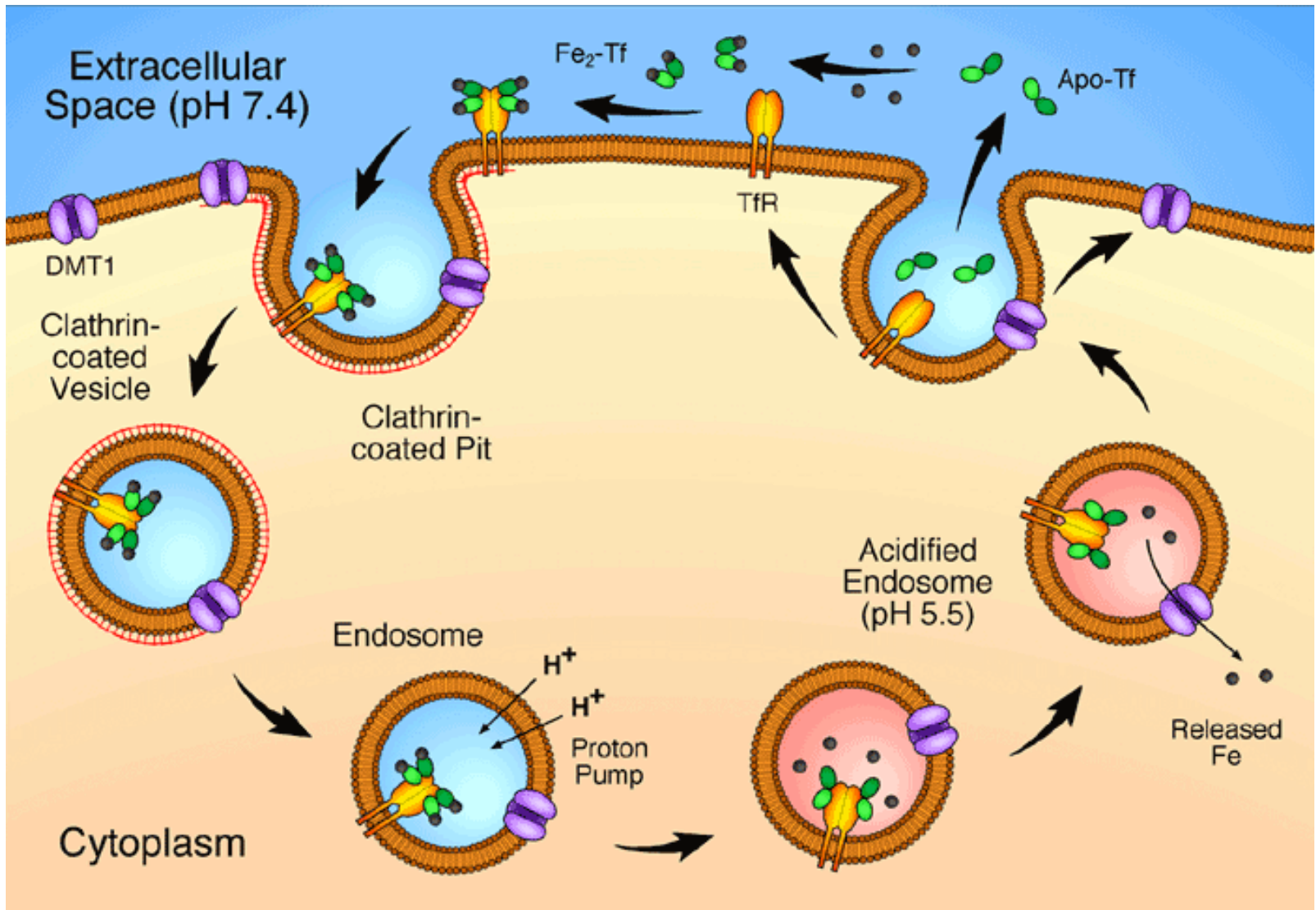
80 kDa

Sito di coordinazione del Fe nella transferrina



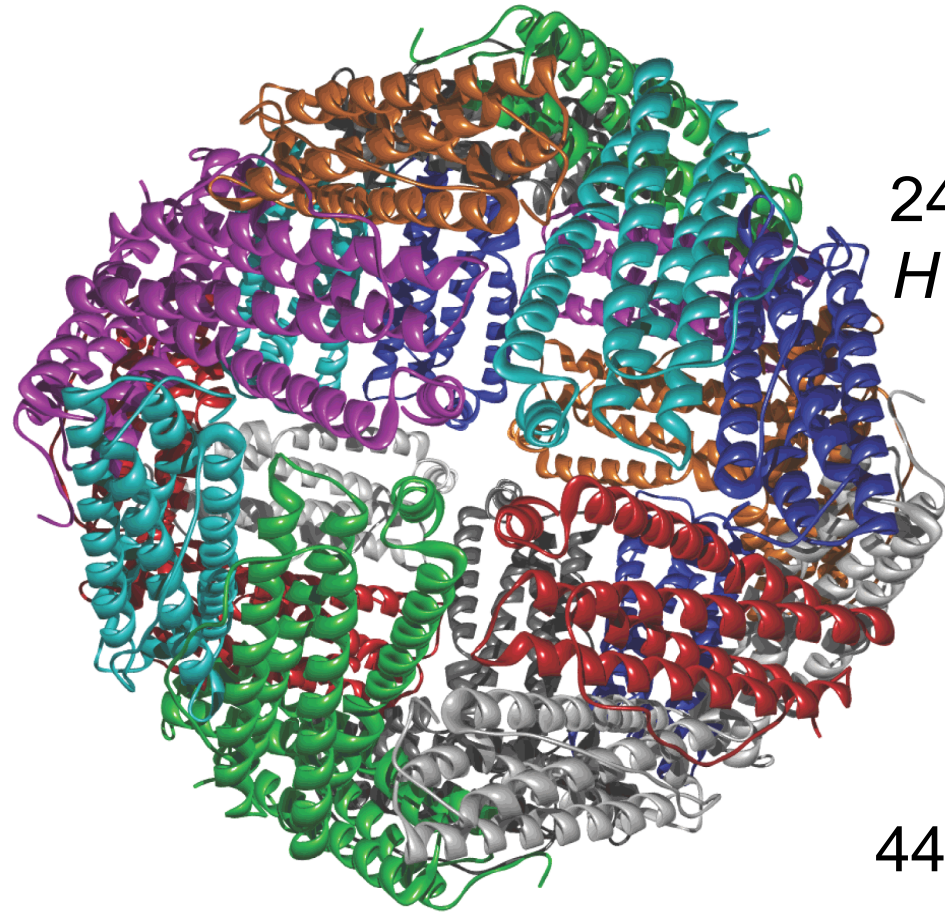
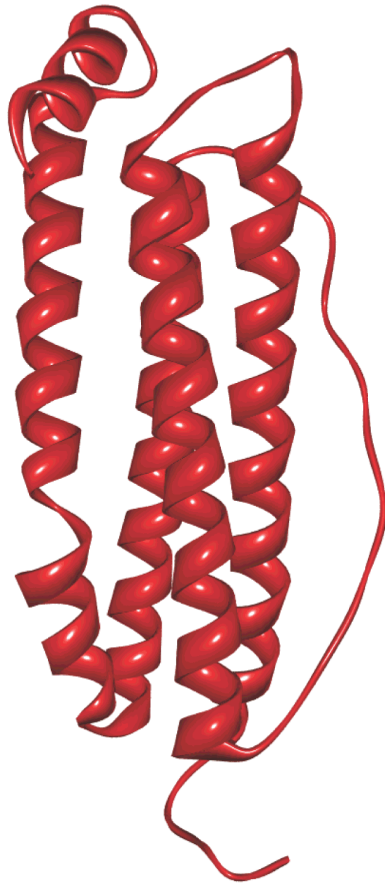
Sito di coordinazione del Fe nella transferrina

Ciclo della transferrina



endocitosi

Ferritina

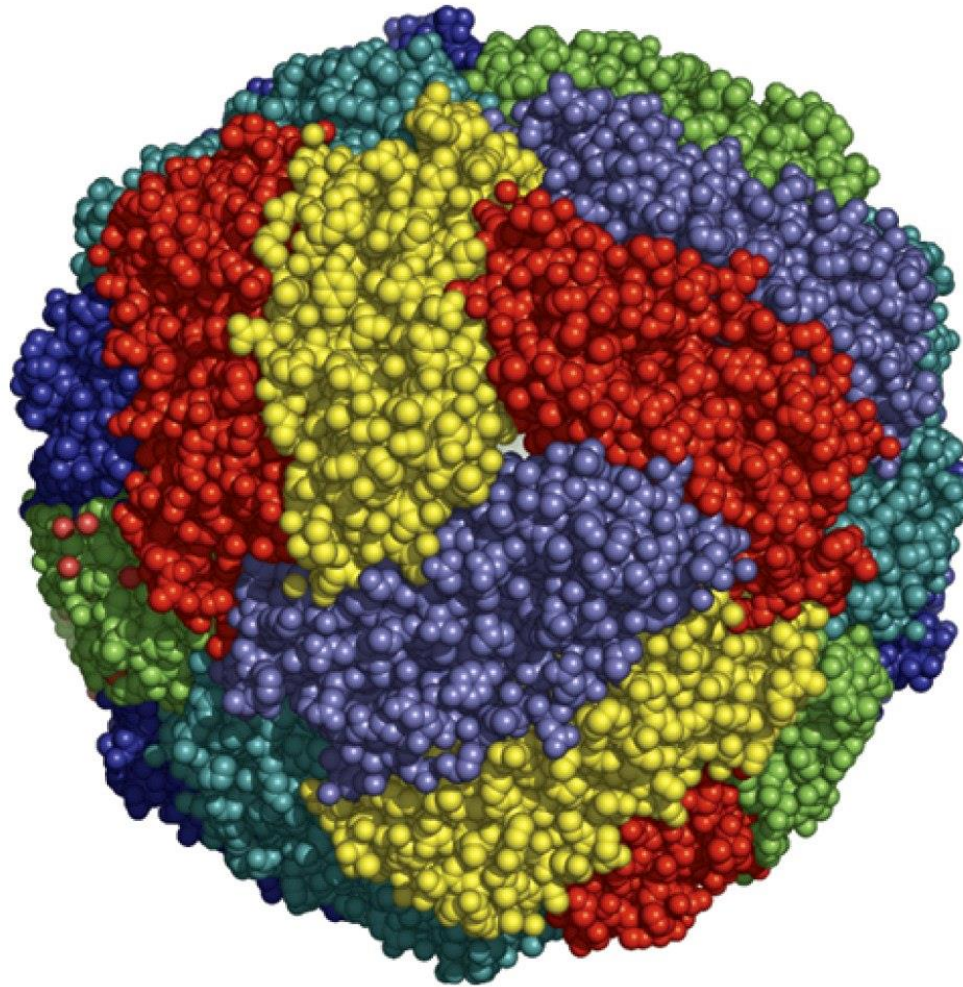


24 unità,
HeL

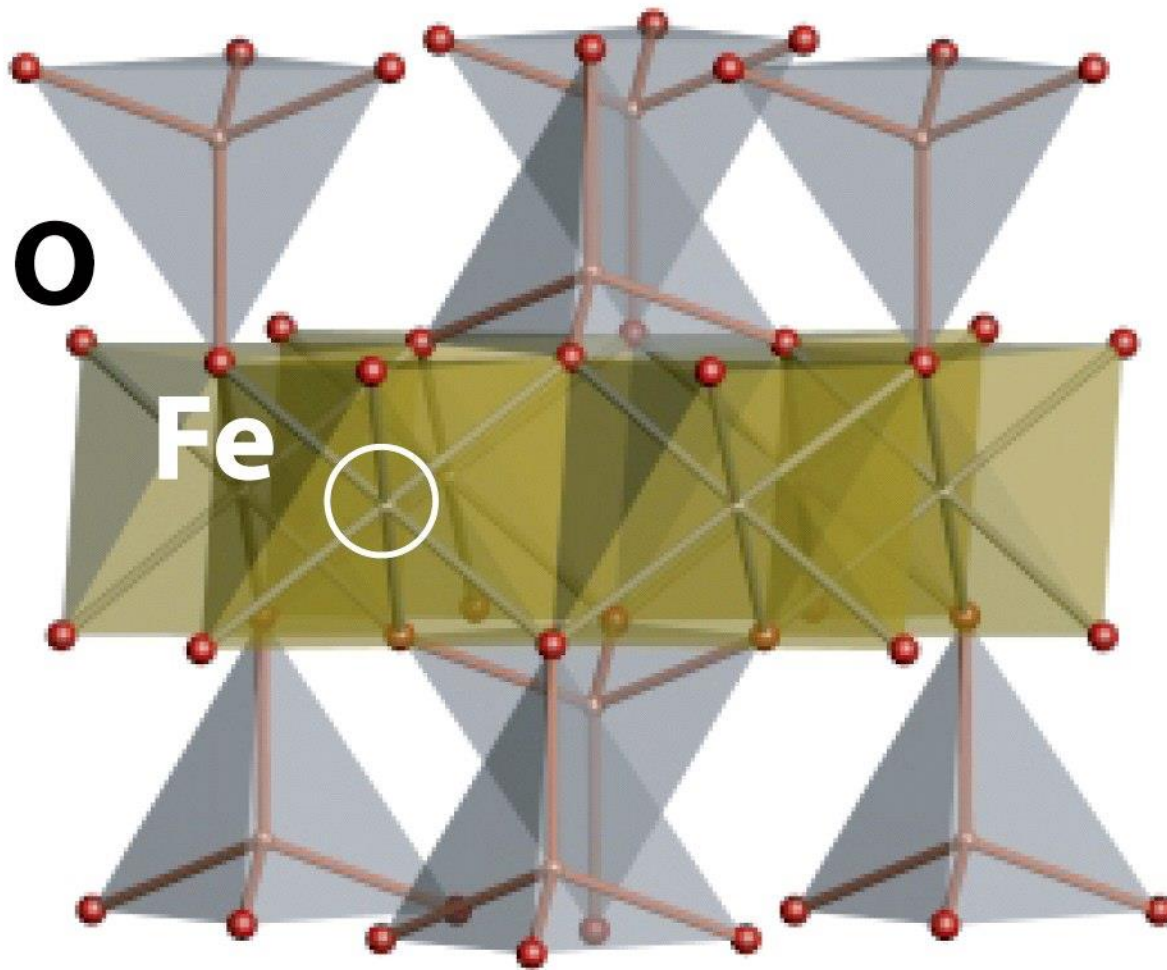
440 kDa

La *Heavy-chain ferritin* ha attività ferrossidasica
8 pori idrofilici con simmetria ternaria (*Fe in*)
6 pori idrofobici con simmetria quaternaria (*Fe out*)

In, 7.5nm

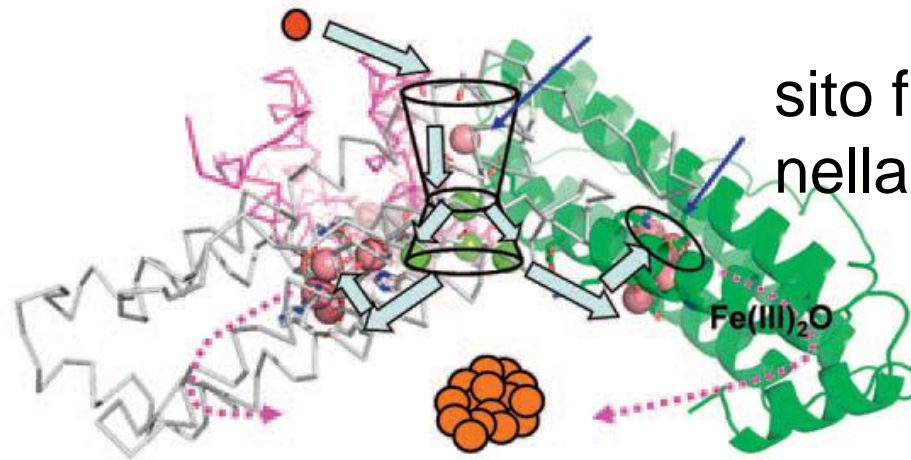
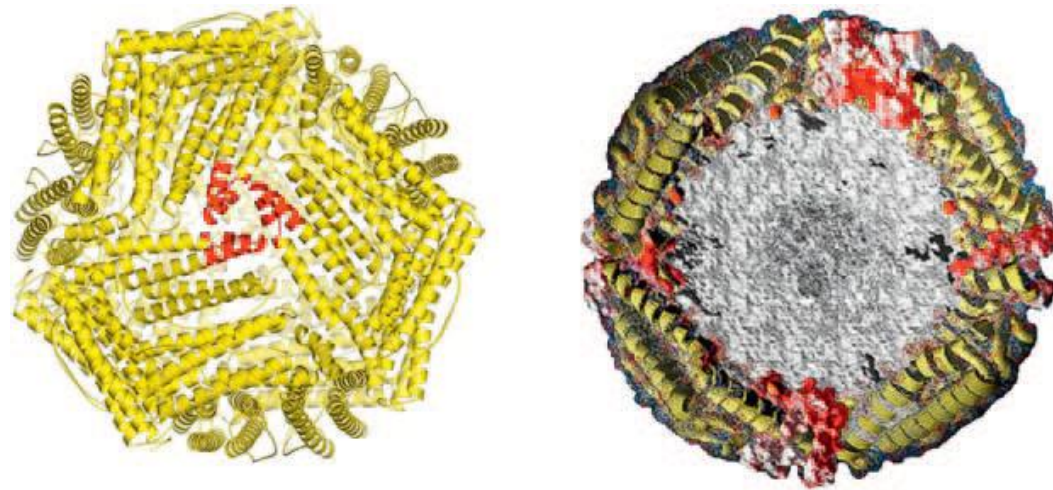


Out, 12 nm



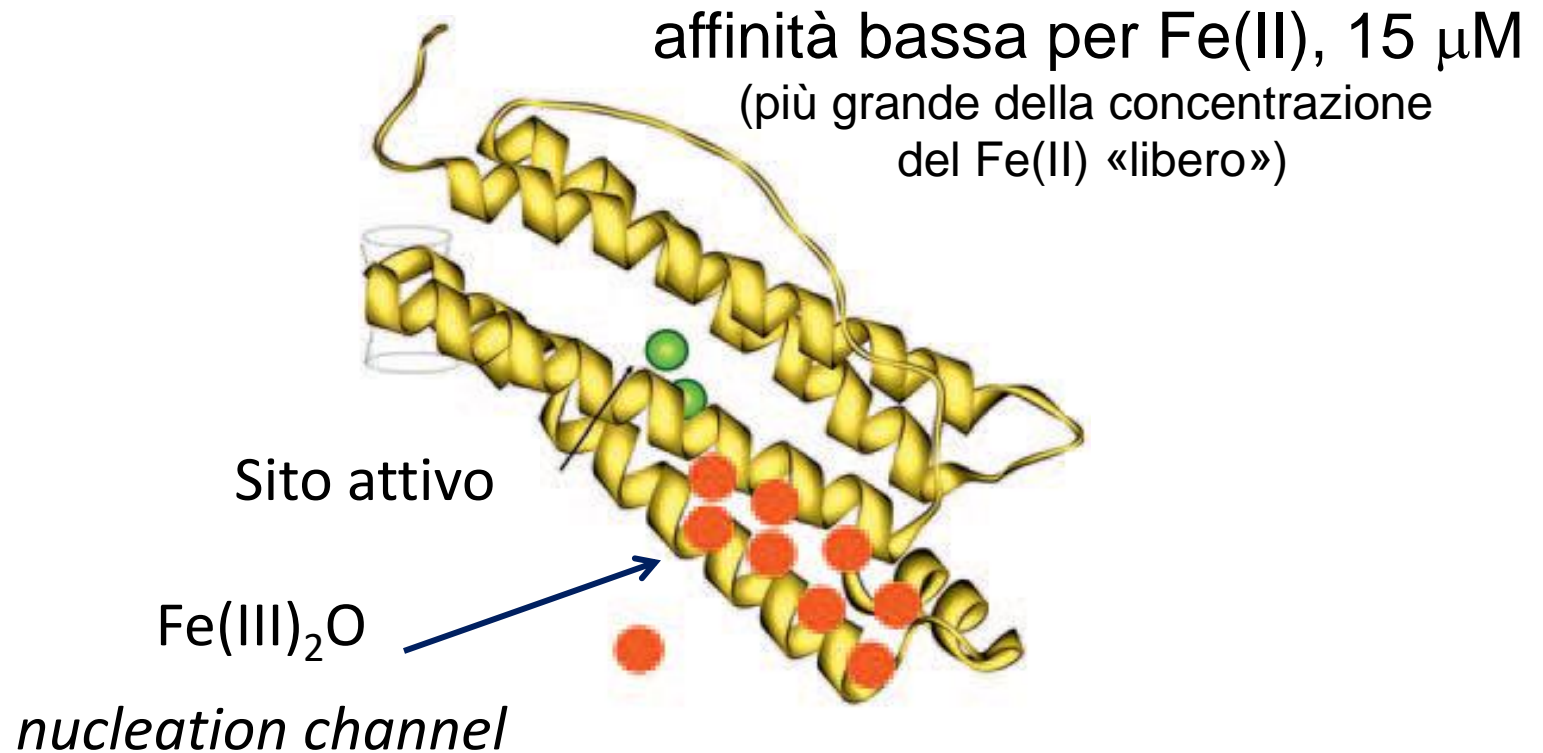
Ferrihydrite

Fino a 4500 atomi di Fe



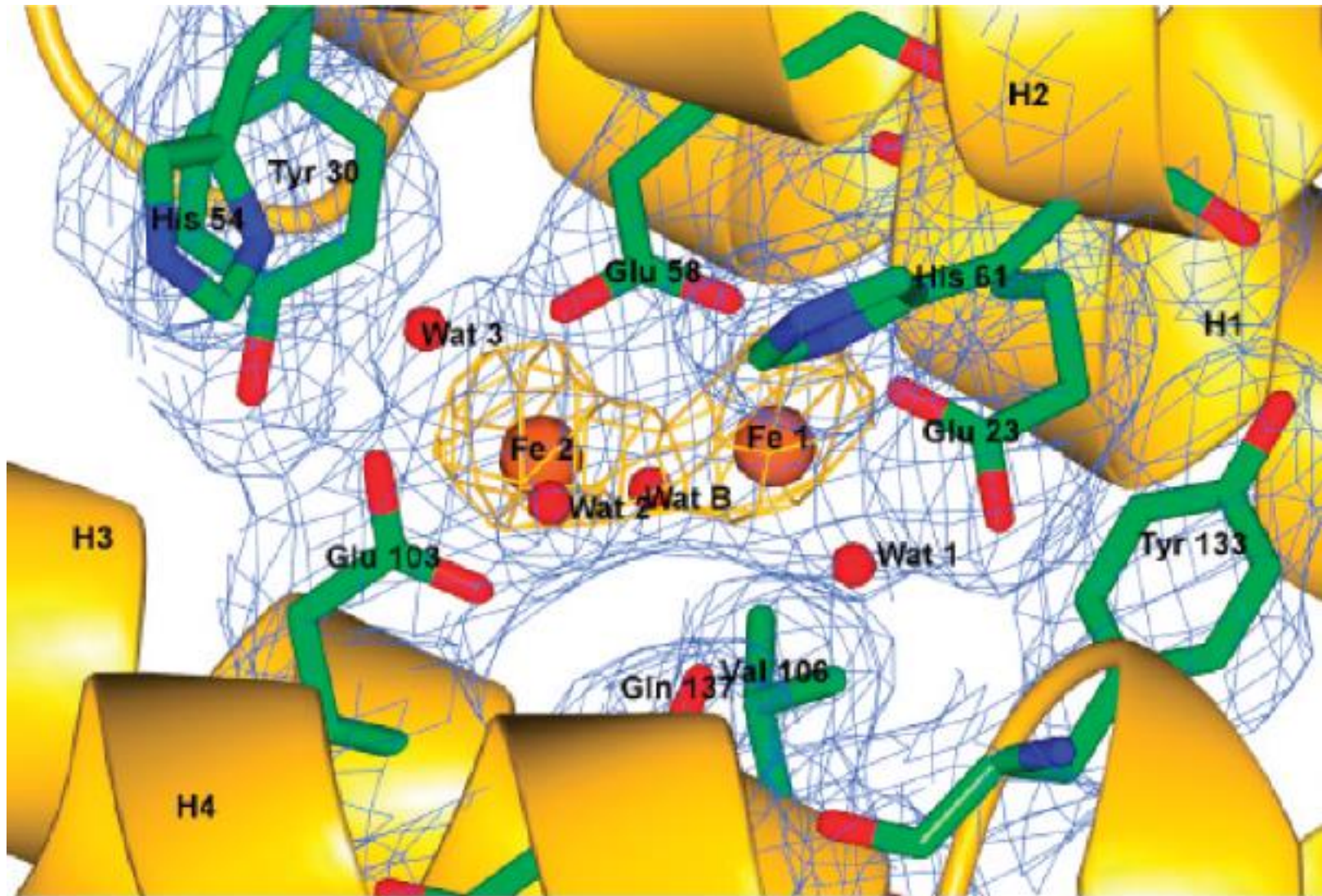
sito ferrossidasico
nella *H*-ferritina

sito ferrossidasico



Ipotesi di proteine *chaperone* per il Fe(II) (e.g. PCPB1)

Struttura ai raggi X di un sito ferrossidasico



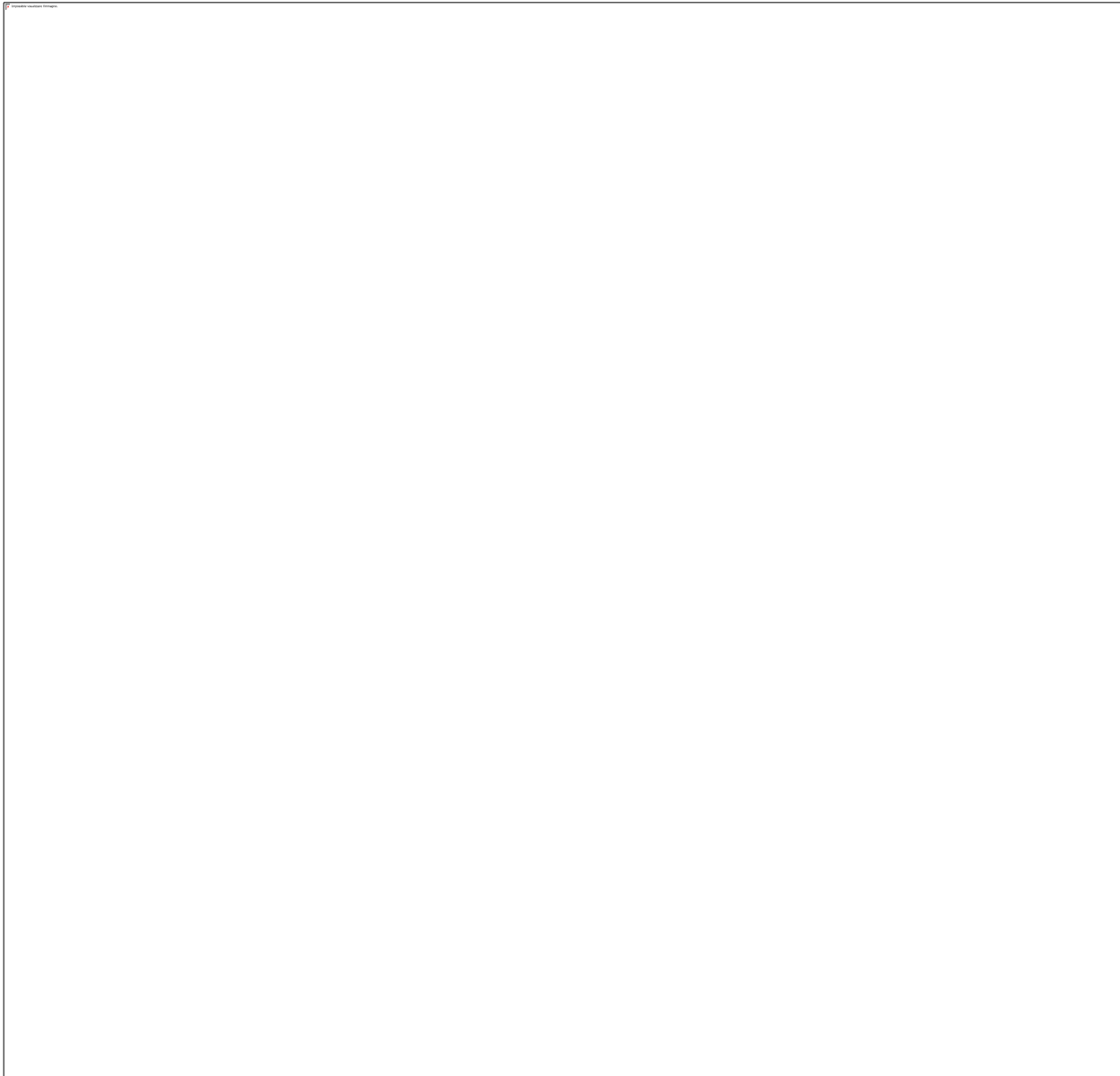
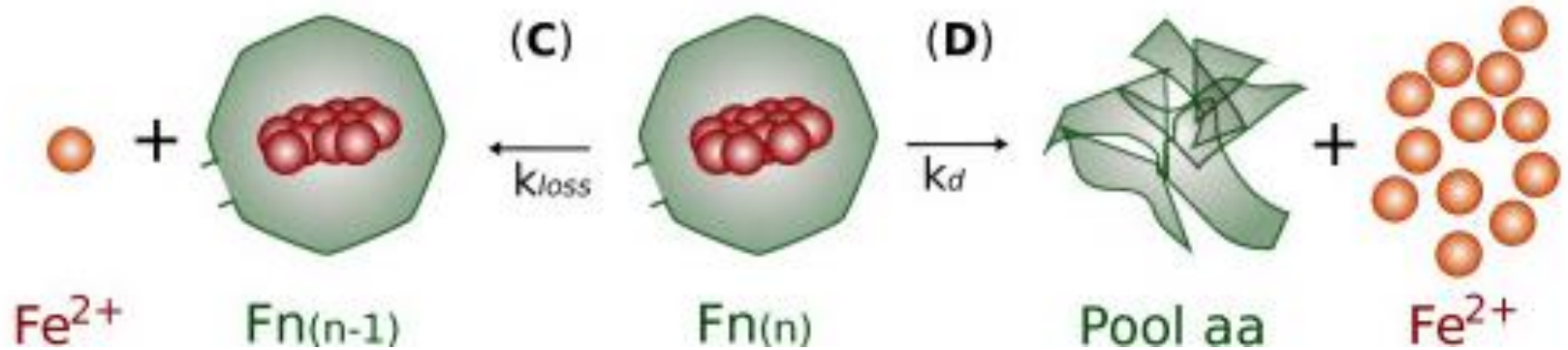
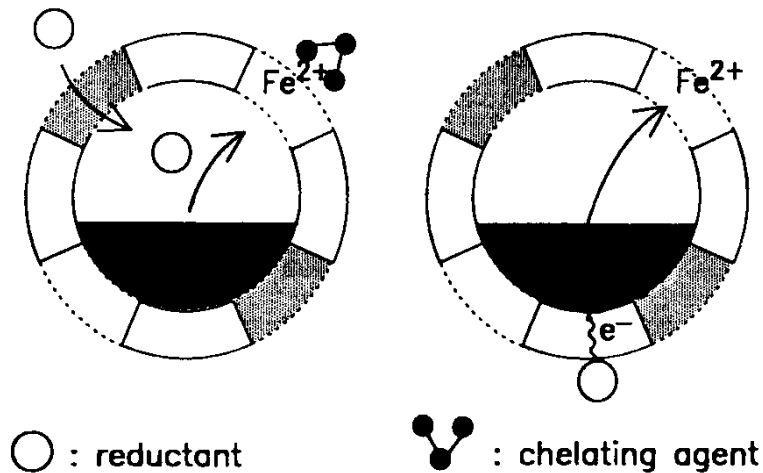


Immagine
TEM

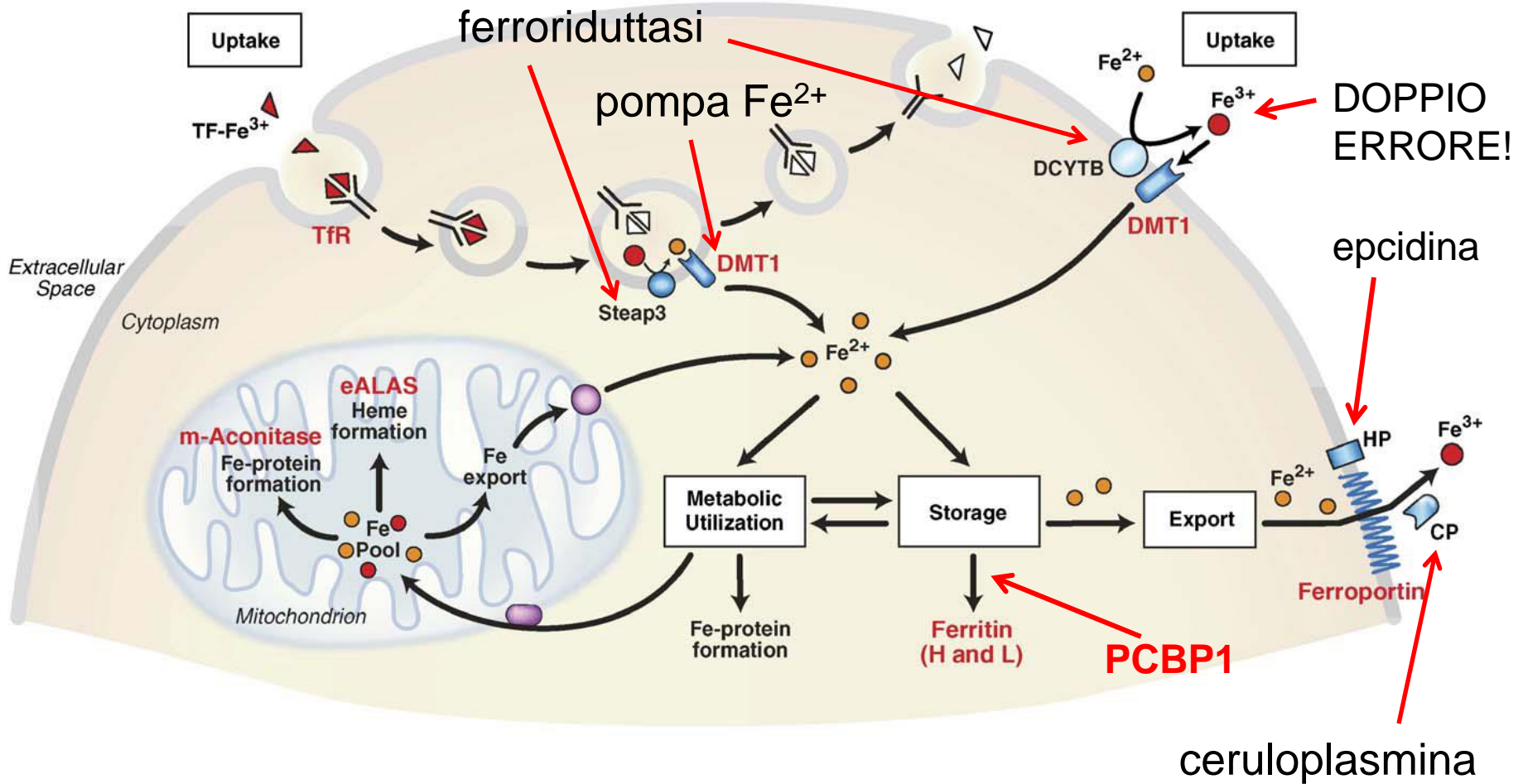
Rilascio del ferro



degradazione della proteina nei lisosomi?



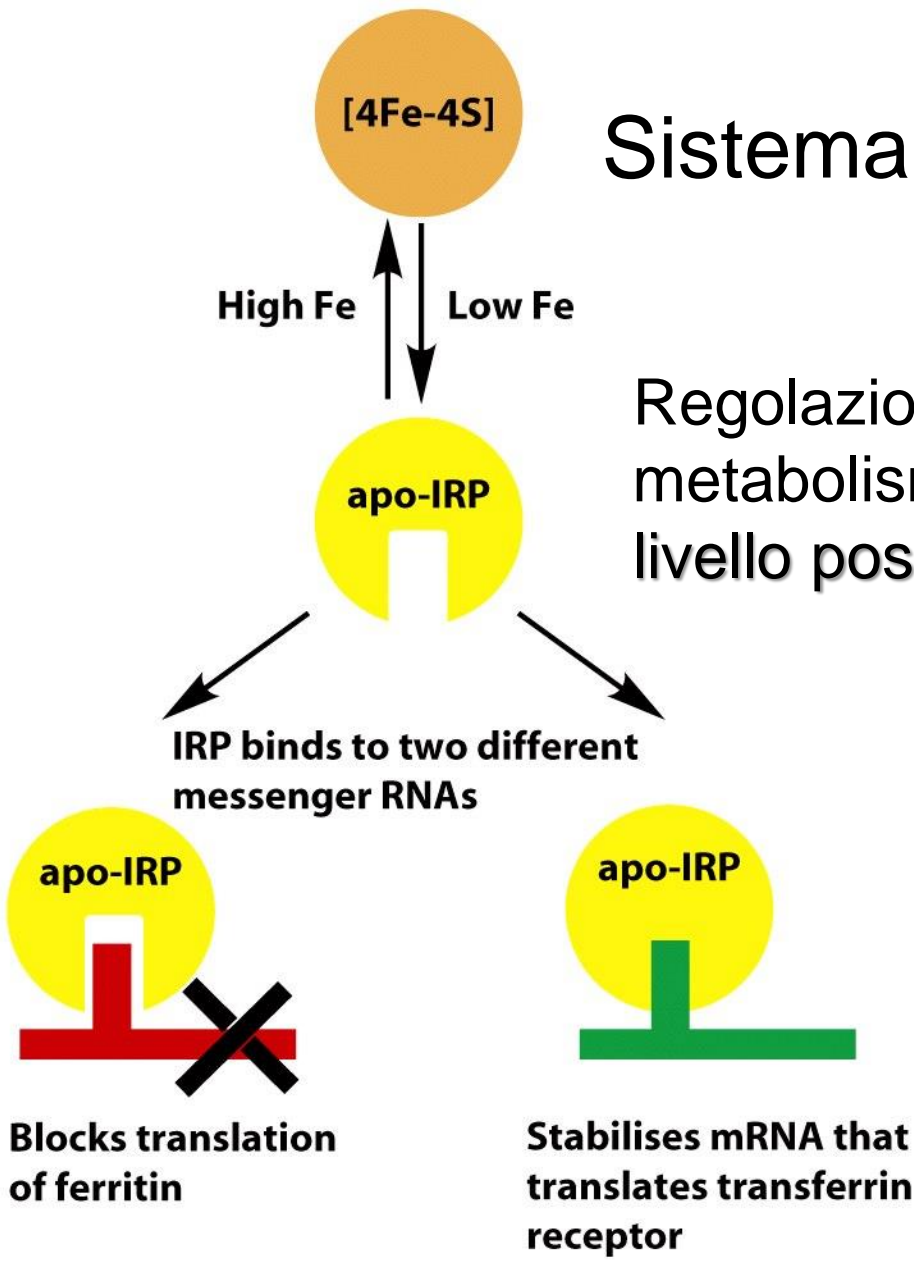
Omeostasi del ferro – Sistema IRP/IRE



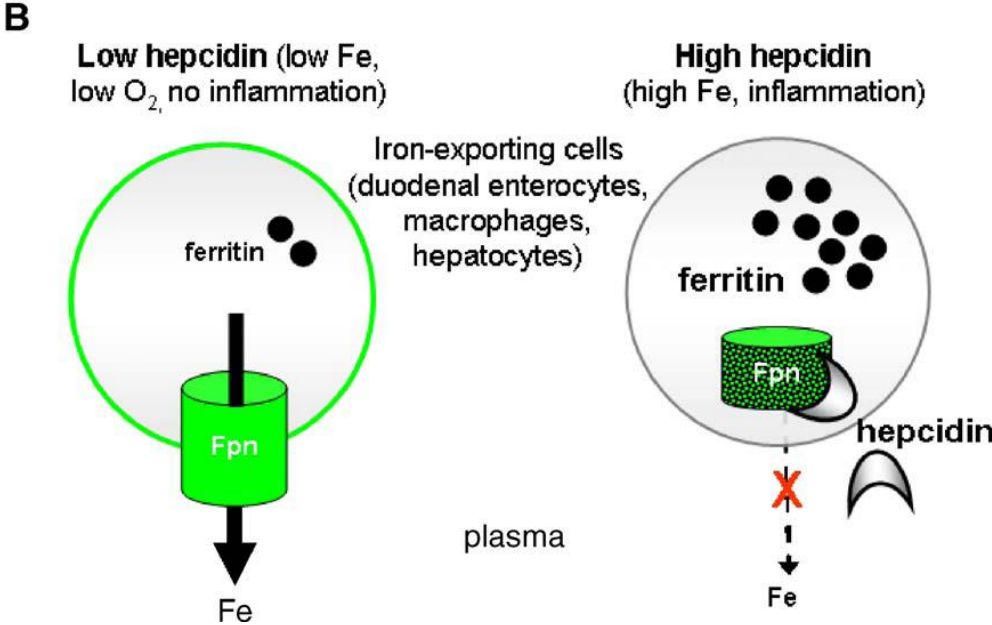
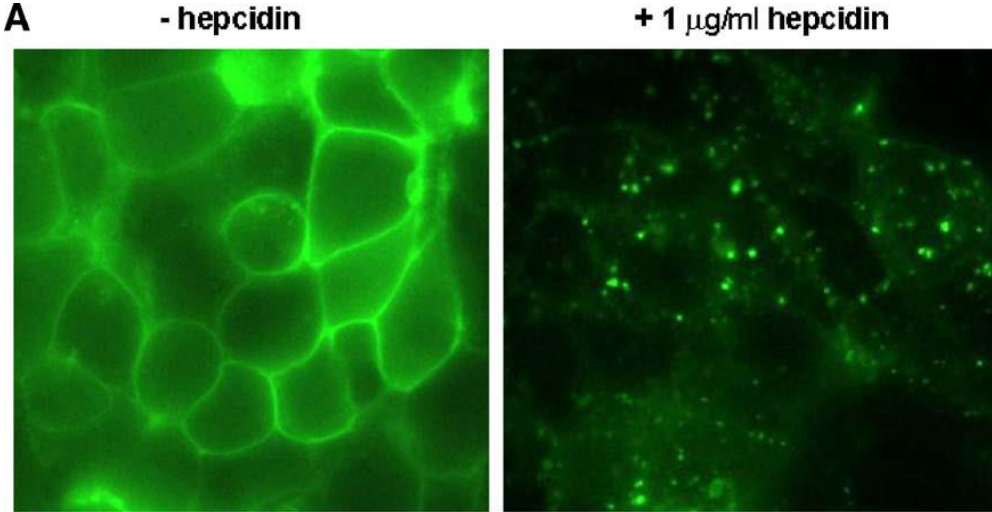
IRP: Iron Regulatory Proteins

IRE: Iron Responsive Elements (mRNA)

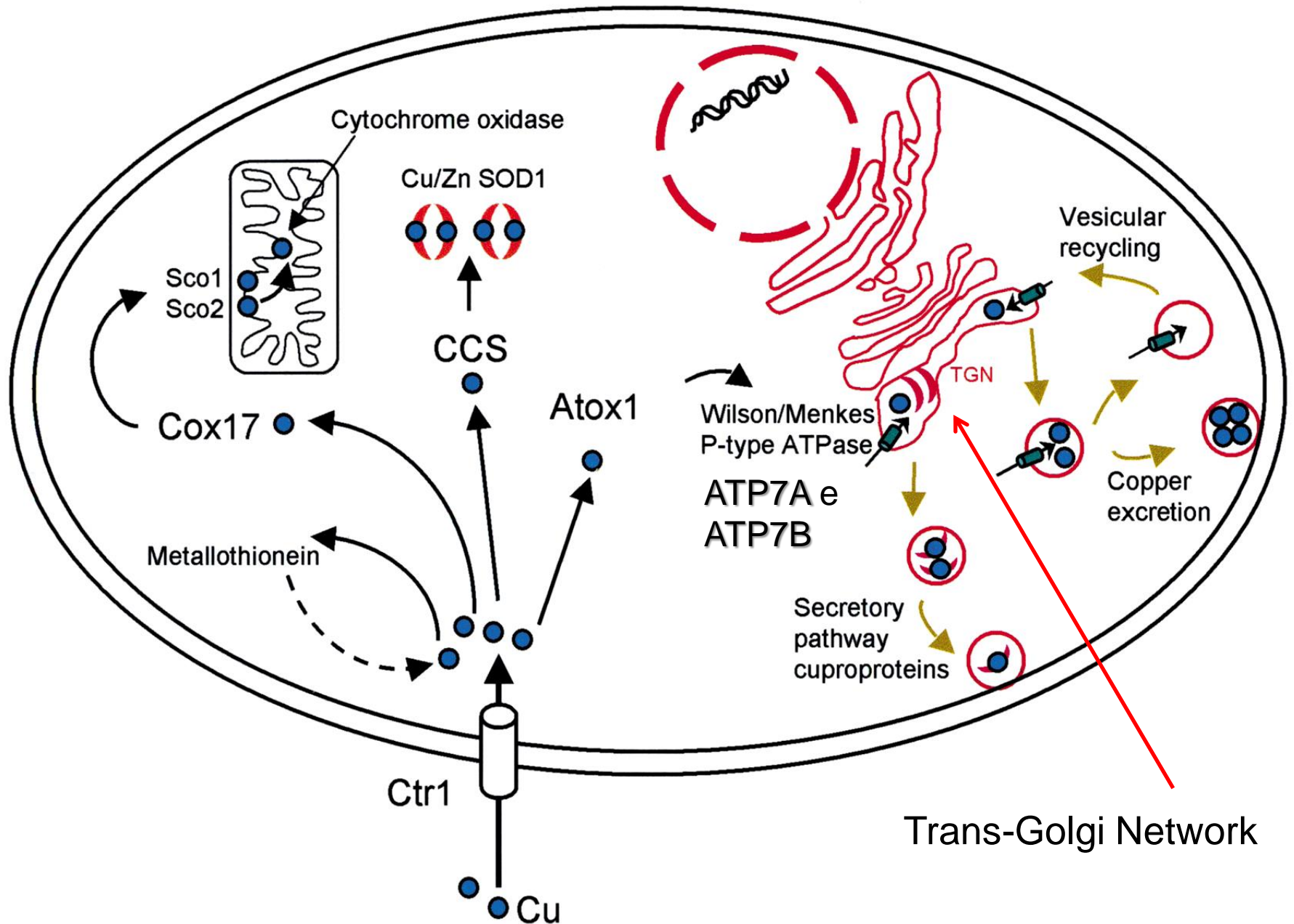
Sistema IRP/IRE

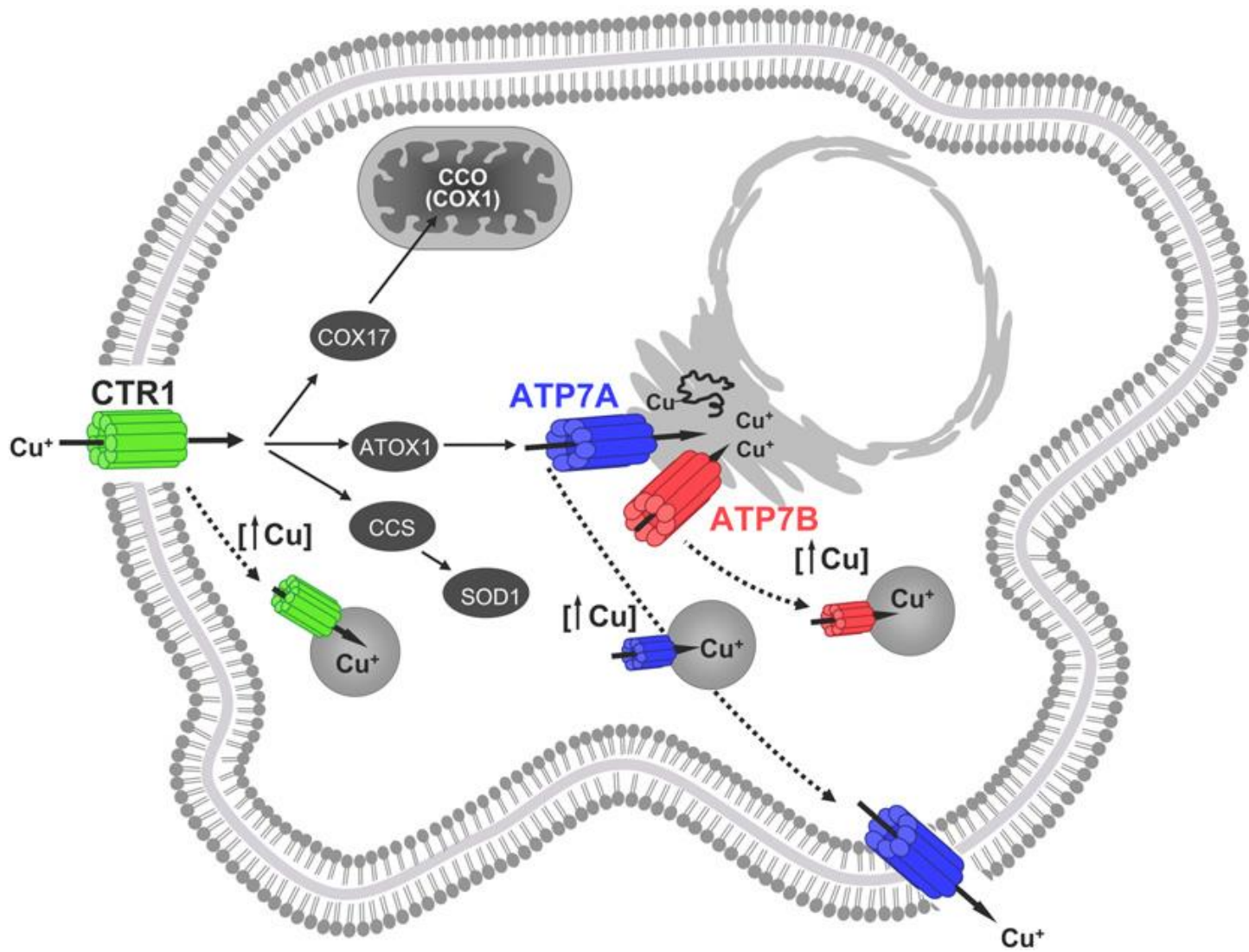


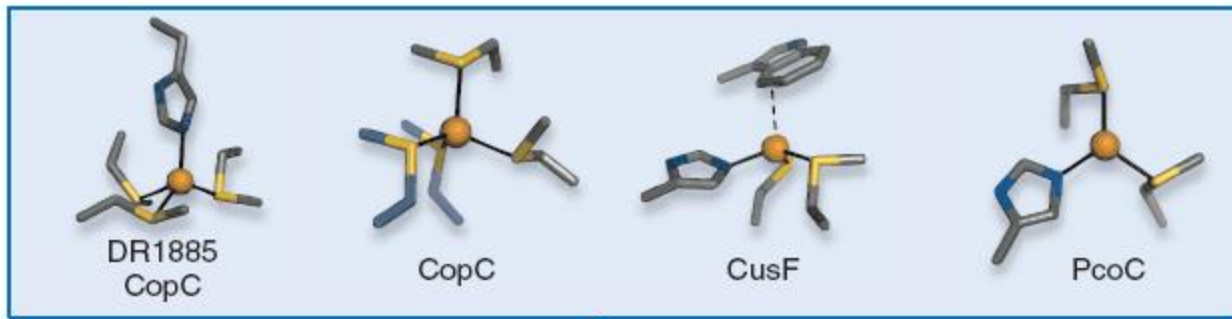
Export del ferro nel plasma regolato da epcidina



Omeostasi del rame

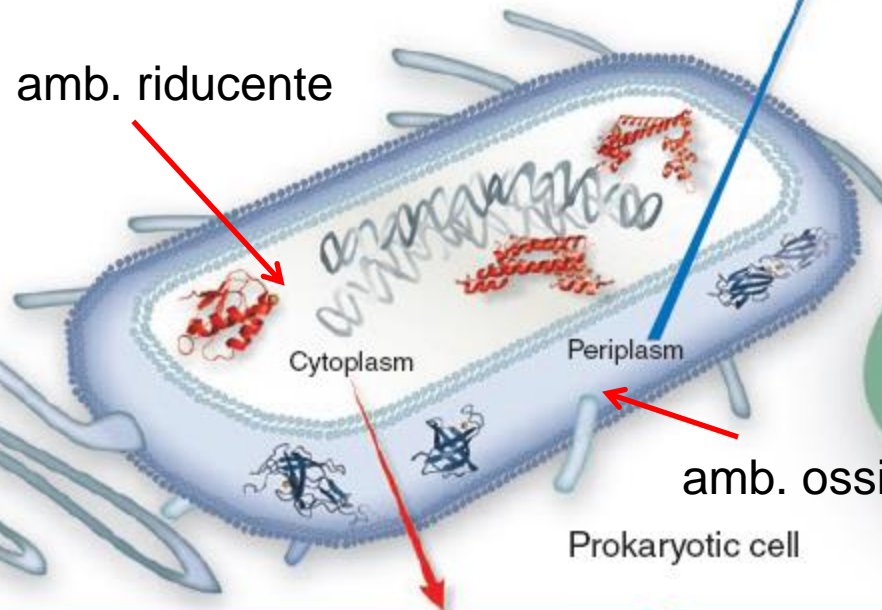






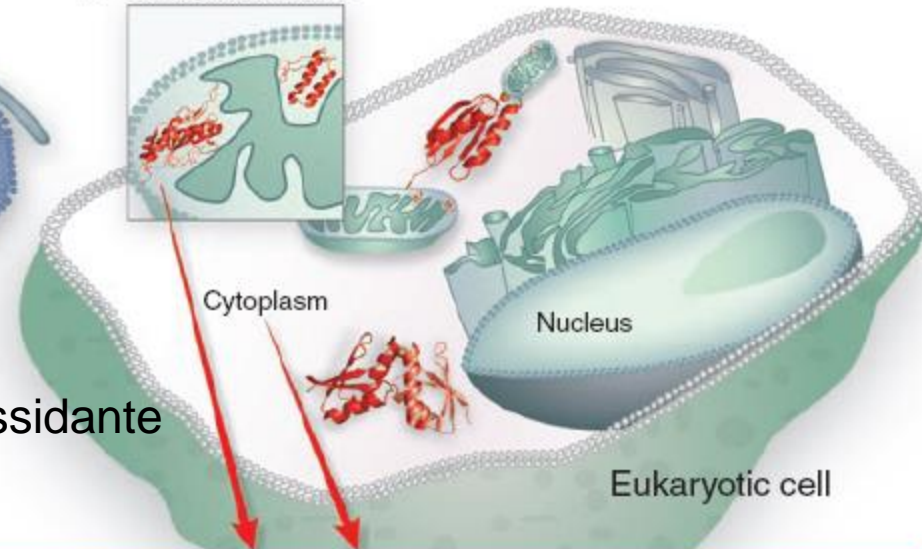
a

amb. riducente



b

Detail, mitochondrion



CopZ
CueR



CsoR



Atx1, Hah1
Ccc2, Mnk, Wnd
Cox17

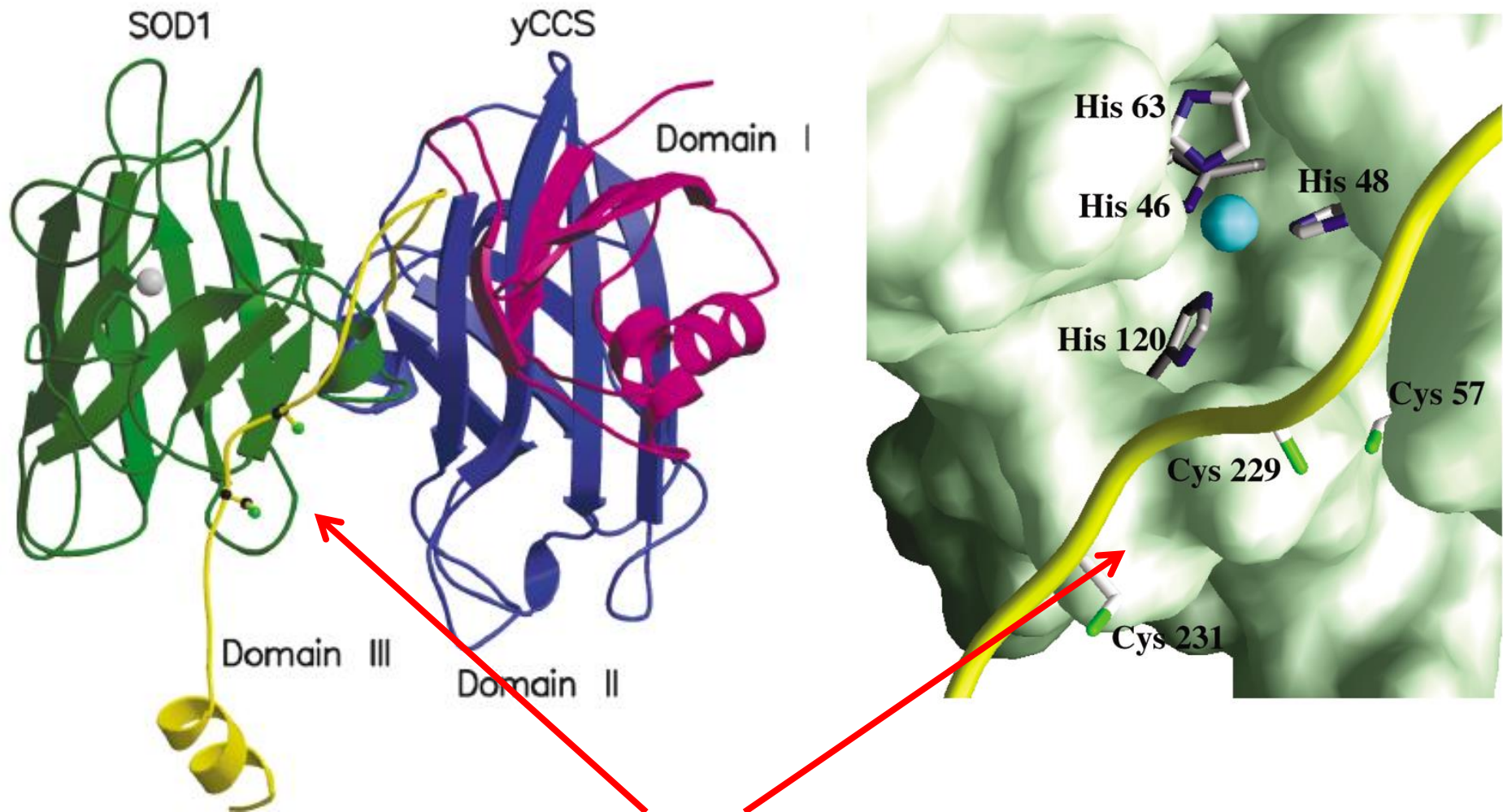


Hah1



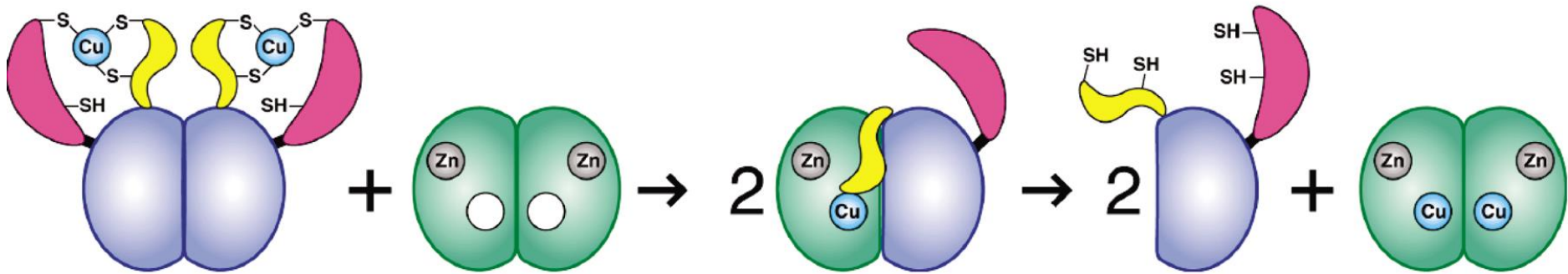
Sco1

CCS/Zn-SOD

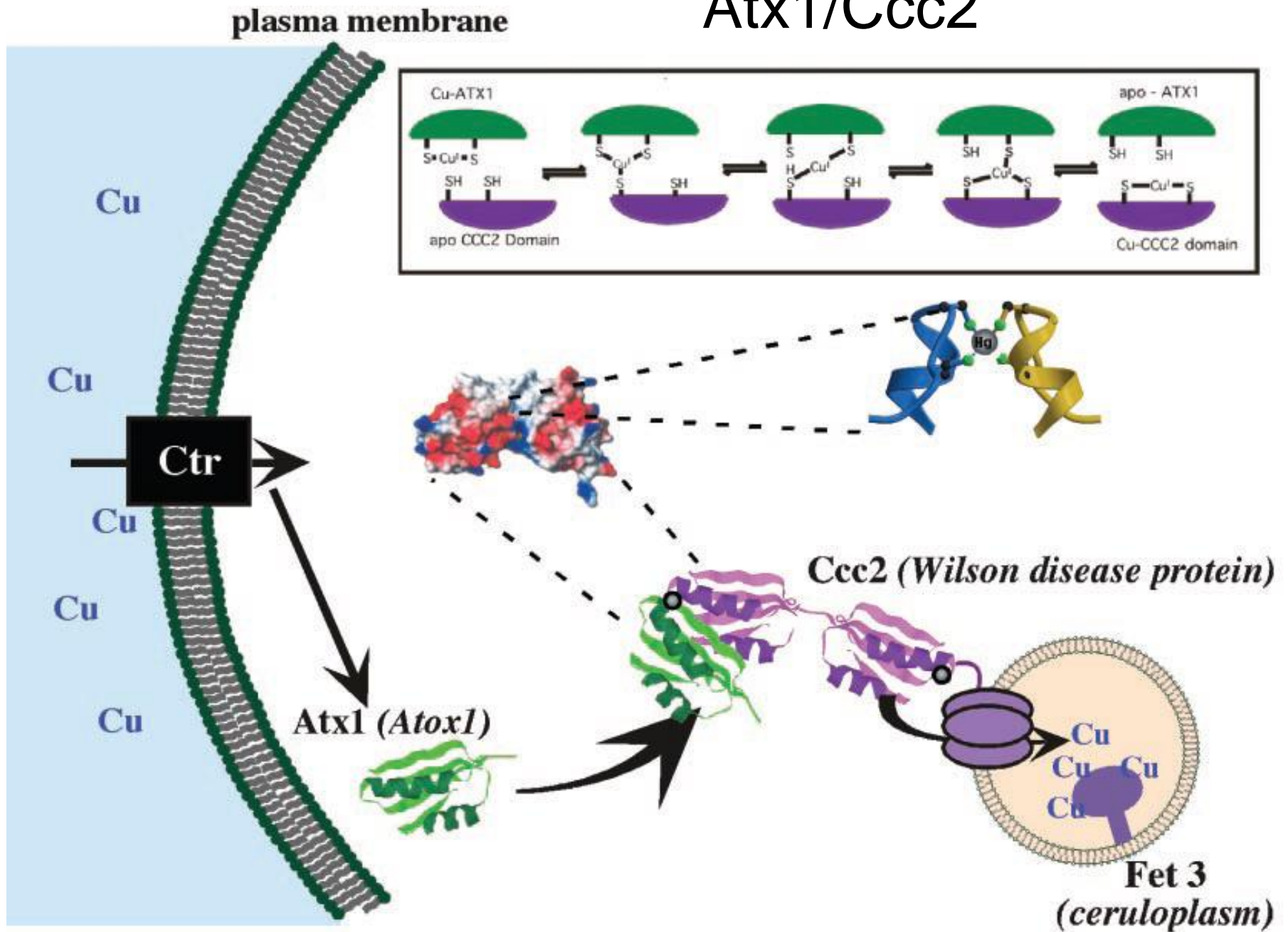


Sito di binding del Cu(I)

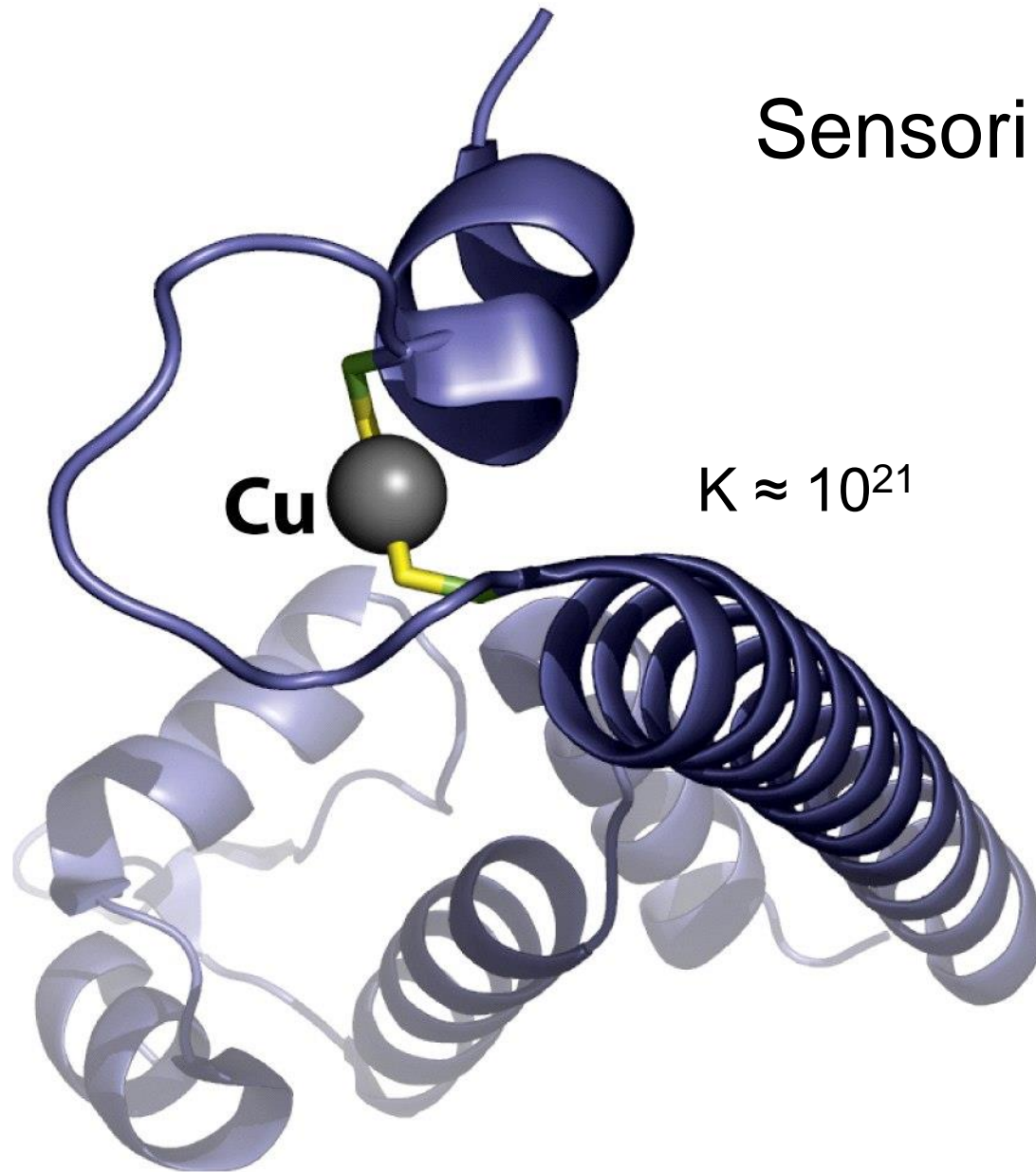
CCS/Zn-SOD



Atx1/Ccc2



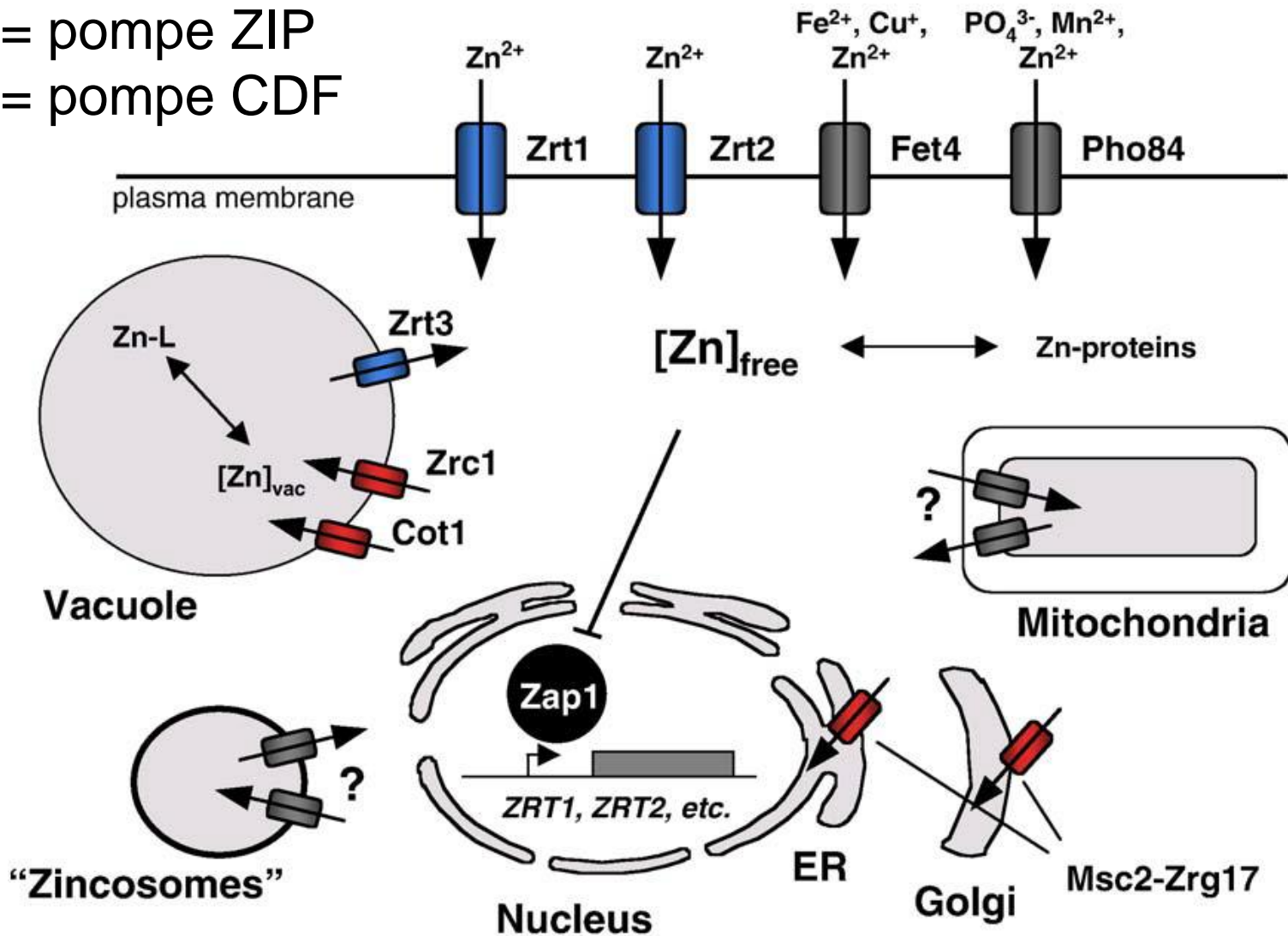
Sensori del Cu



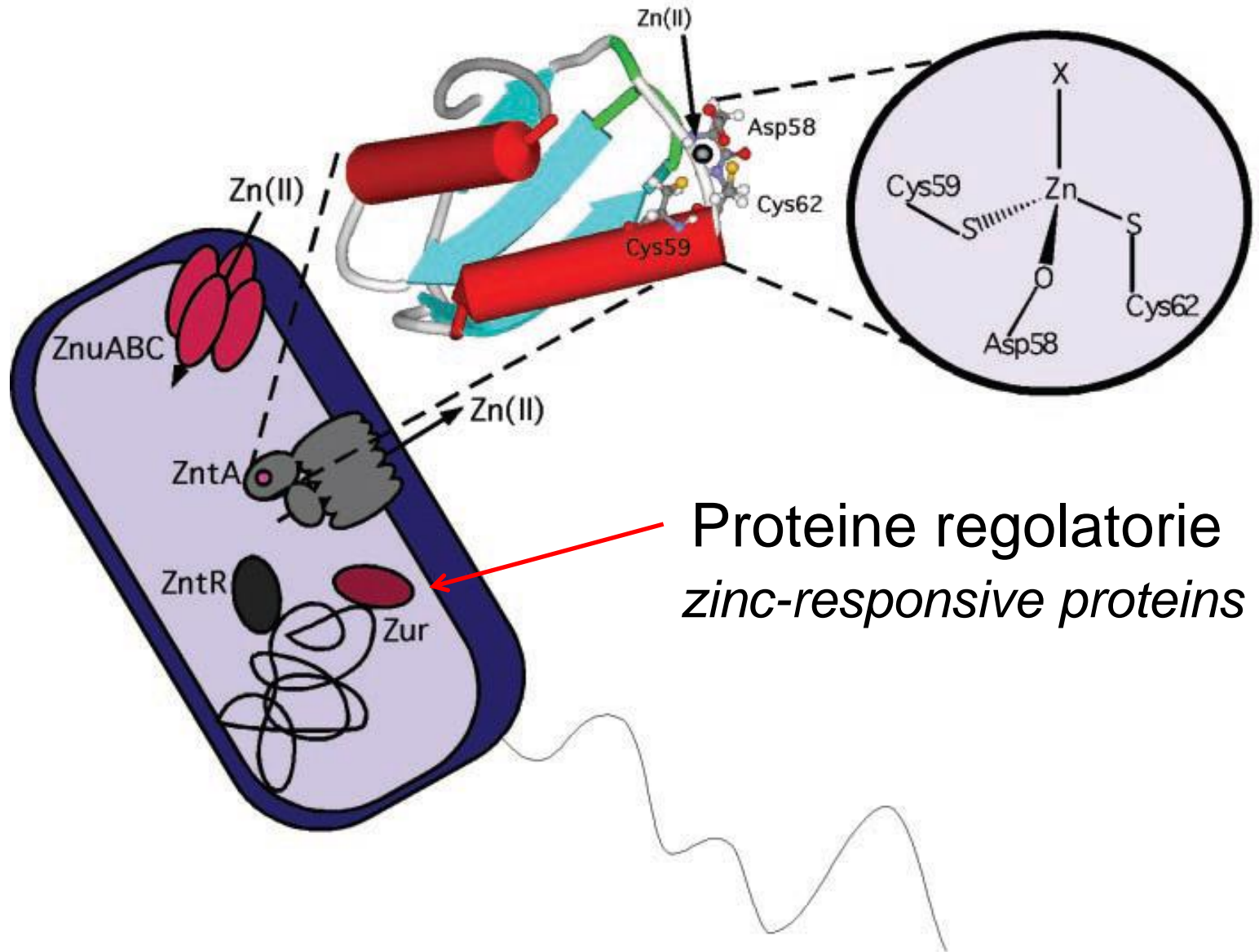
Fattore di trascrizione CueR (da *E. Coli*)

Omeostasi dello zinco in cellule eucariote

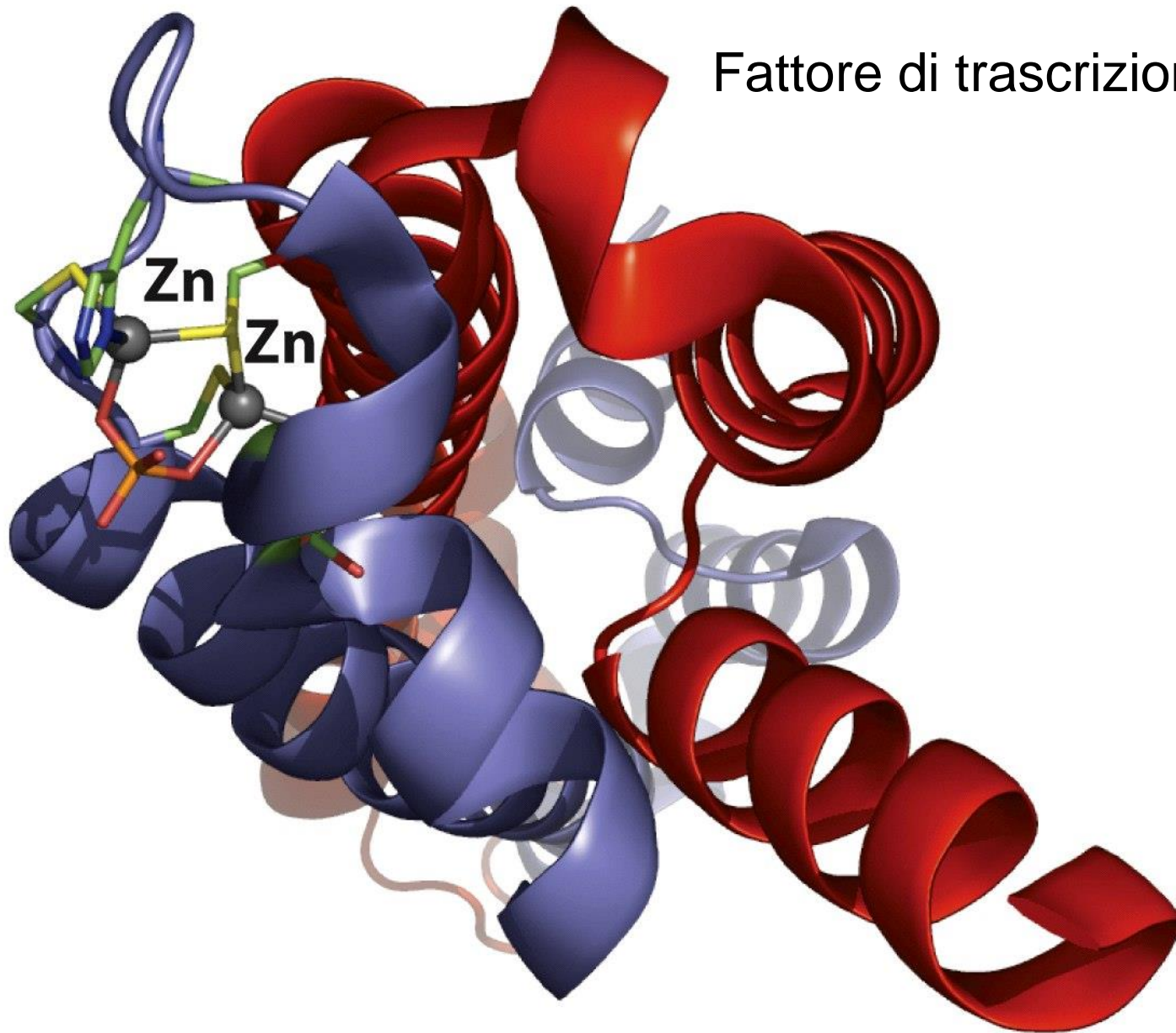
- = pompe ZIP
- = pompe CDF



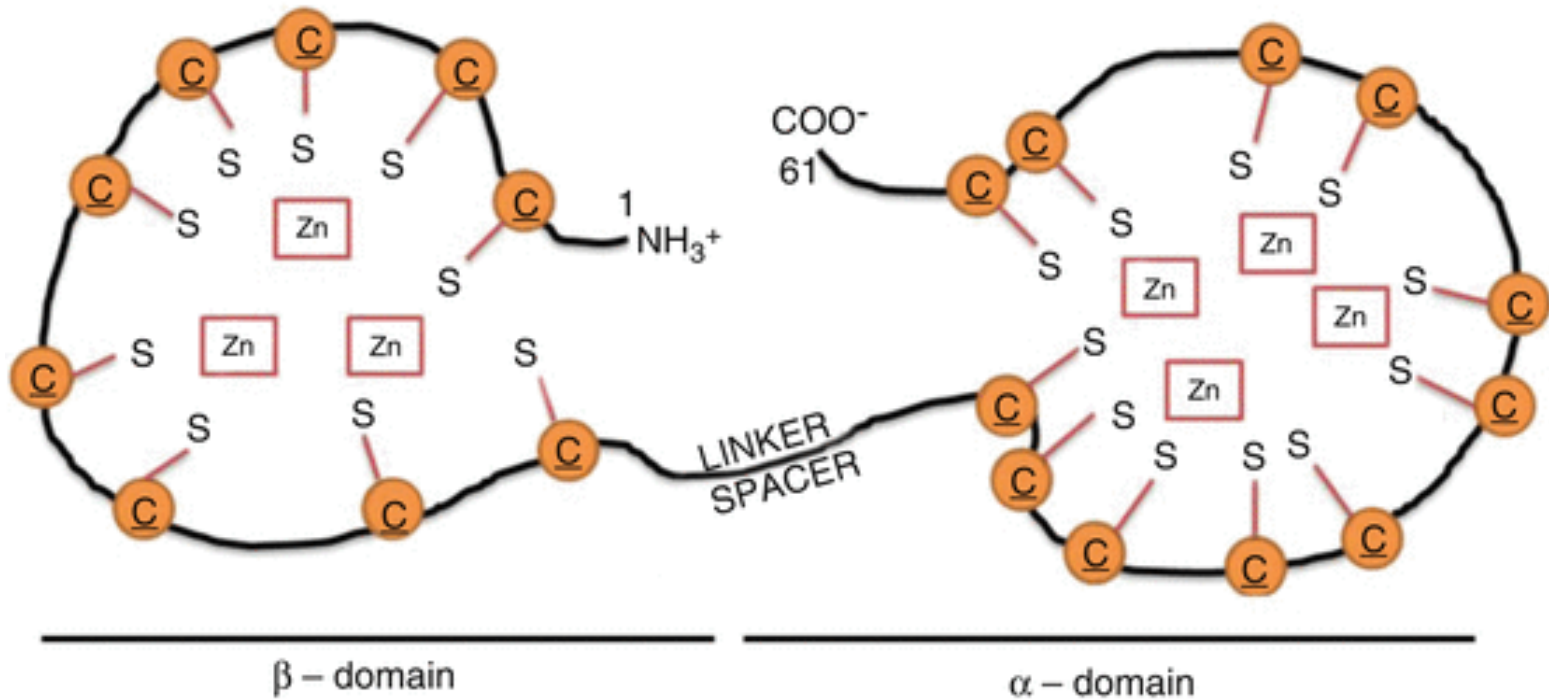
Omeostasi dello zinco nei batteri



Fattore di trascrizione ZntR



Metallotioneine



6 kDa,
ca. 60 a.a.
fino 30% cys

Metallotioneine

