Copper deficiency is rare in humans, but results in the following symptoms\textsuperscript{1,2}:

- Hypochromic anemia
- Decreased white blood cell counts leading to decreased immune function
- Bone abnormalities

Copper deficiency can result in a secondary iron deficiency, since Fe\textsuperscript{2+} can't be oxidized to Fe\textsuperscript{3+} to bind to transferrin. This can cause the hypochromic anemia that occurs in iron deficiency.

Menke's disease is a genetic disorder that results in copper deficiency. It is believed that individuals with this disease have a mutation in ATP7A that prevents copper from leaving the enterocyte, thus preventing absorption\textsuperscript{1}.

Copper toxicity is also rare in humans, but acute toxicity results in the following symptoms\textsuperscript{1,2}:

- Nausea
- Vomiting
- Diarrhea
- Abdominal pain

Chronic symptoms include\textsuperscript{1,2}:

- Brain, liver, & kidney damage
- Neurological damage

Wilson's disease is a genetic disorder where a mutation in ATP7B prevents copper excretion, resulting in copper toxicity. One notable symptom is that individuals with this disease have golden to greenish-brown Kayser-Fleischer rings around the edges of the cornea, as shown in the link below\textsuperscript{1,2}.

\textbf{Web Link}
Kayser-Fleischer ring

\textbf{References & Links}

\textbf{Link}