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Toenail and serum measures as biomarkers of iron levels

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Background

Iron – an essential metal – is toxic at high levels. Studies of health effects of iron typically use serum, but toenails offer a convenient alternate because they are easy to collect and store. No study has compared serum and toenail measures for iron.

Aim: To compare serum and toenail iron measures both cross-sectionally and longitudinally.

Methods, Sample

Study population

- Women in the US-wide prospective Sister Study cohort, ages 35-74 years at enrollment (2003-2009)
- We studied the participants who donated serum and toenails at baseline (n=146) and a subsample (59%, n=86) that provided specimens again about 8 (IQR: 7,9) years later

Methods, Analyses

Cross-sectional analyses: Spearman's correlation coefficients, coefficient of variation

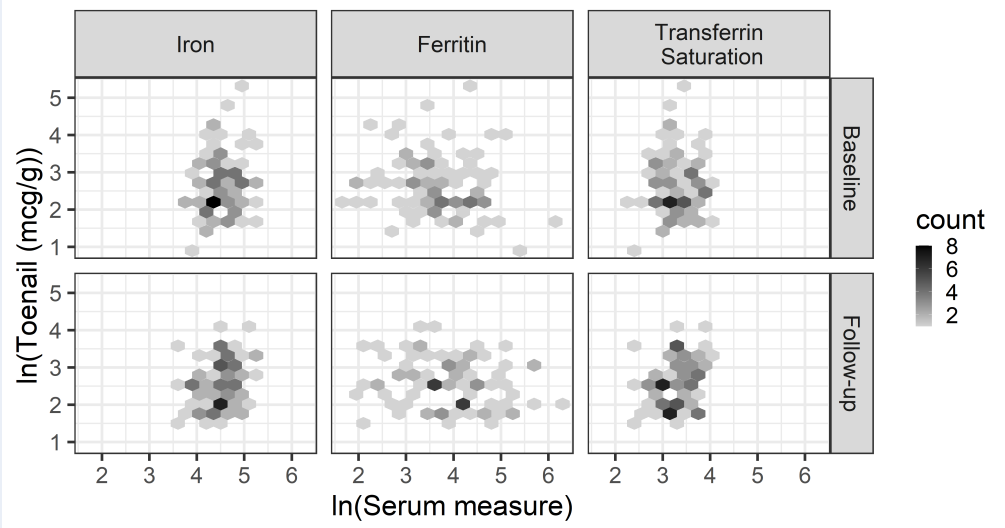
Longitudinal analyses: Spearman's correlation coefficients, mixed effects models

Serum measures: Continuous iron (mg/dL), ferritin (mg/dL), and transferrin saturation $= \frac{Iron}{Iron+UIBC} \cdot 100\,(\%)$

Nails: Self-collected toenail clippings (mcg/g)

Results, Cross-sectional

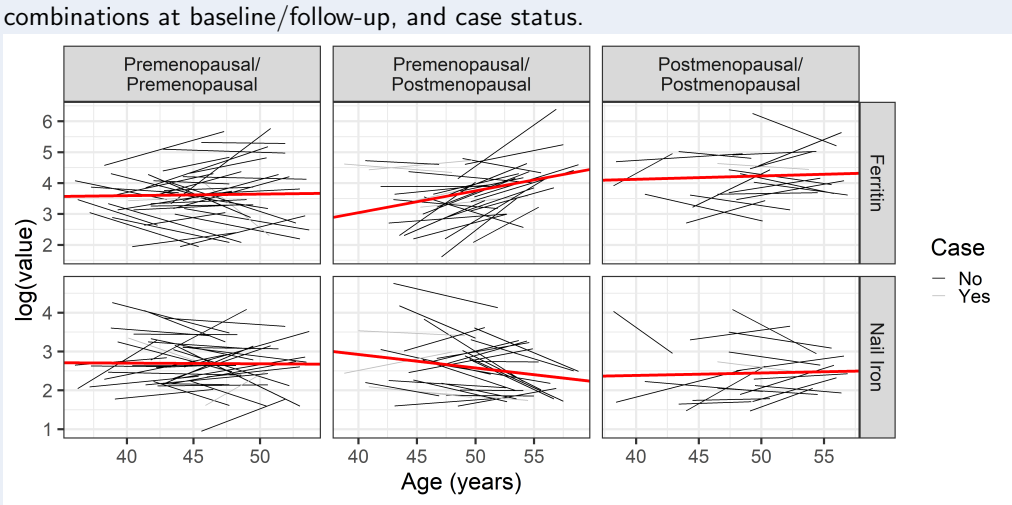
Figure 1: Scatter plots of nail versus serum iron measures by time of collection.



⇒ Spearman correlations at baseline (follow-up) between toenail and serum levels were 0.08 (0.09) for serum iron, 0.08 (0.07) for transferrin saturation, and -0.09 (-0.17) for ferritin.

Results, Longitudinal

Figure 2: Nail and serum values over time by type of iron measure, menopause status combinations at baseline/follow-up, and case status.



⇒ We found little evidence of systematic change in iron measures over time. Serum ferritin was one exception, capturing the expected increase in iron stores for women who transition into menopause and cease menstruation.

Summary

We did not find evidence to support similarities in serum and nail iron measures in this sample, and each type of measure may represent different mechanisms of iron storage.