

Association Between Laboratory Surrogates of Renal Osteodystrophy and ESA Responsiveness in Maintenance Hemodialysis Patients

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Background

- Though elevated serum intact PTH is known to be associated with diminished responsiveness to erythropoietin stimulating agents (ESA) in maintenance hemodialysis (MHD) patients, the mechanism of the effect is uncertain.
- Specifically, no information is available to shed light on the relationship between PTH, its potential target marrow effect (ESA dose requirements), and a serum marker of target bone effect, i.e., alkaline phosphatase (AlkPhos).

Methods

- We examined Hb response to ESA treatment in a 12-month (July 2001-June 2002) cohort of 38,328 MHD patients across the USA.
- All patients had received ESA for at least 3 consecutive calendar quarters.
- Using repeated measure models, the ESA response coefficient at individual level was separated from the population responsiveness.

- Cross-sectional (conventional) model:

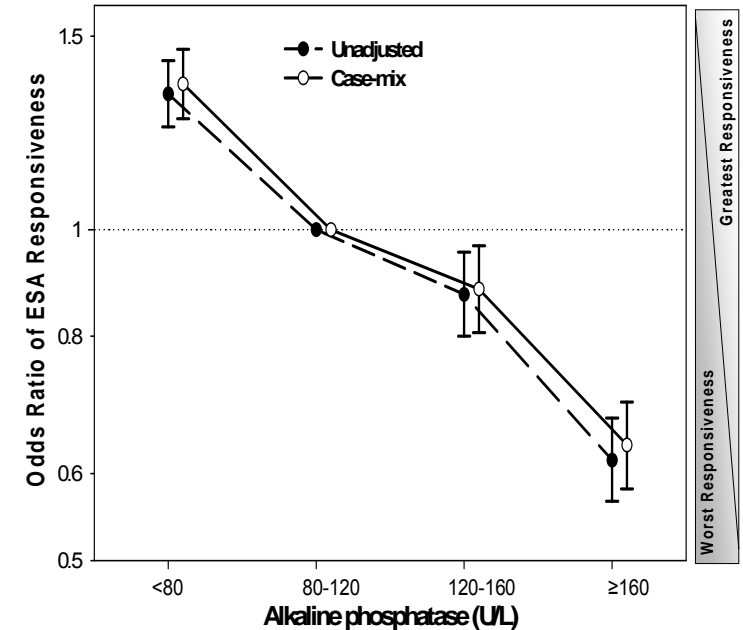
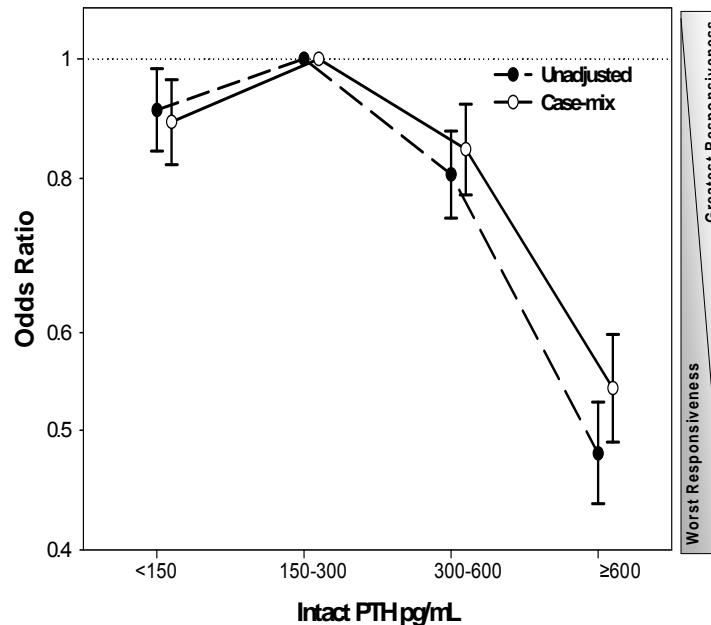
$$\text{Hemoglobin}_i = \beta \cdot \text{rHuEPO}_i + \varepsilon_i$$

- Longitudinal (repeated measure) model:

$$\text{Hemoglobin}_{ij} = \beta_c \cdot \text{rHuEPO}_{ij} + \beta_L \cdot (\text{rHuEPO}_{ij} - \text{rHuEPO}_{i,j-1}) + \varepsilon_{ij}$$

- In both unadjusted and case-mix adjusted (for age, gender, race, comorbidity, vintage, and dialysis dose) logistic regression models showed that the greatest ESA responsiveness was associated with mid-range iPTH (150-300 pg/mL) and low-normal AlkPhos (<80 U/L).

Results



Conclusions

- Both low and high levels of iPTH appear associated with ESA hyporesponsiveness, but this association is the strongest for iPTH above 600 pg/mL. AlkPhos appears to have a more monotonic association with hemoglobin response to ESA administration. Limitations of observational data should be considered in interpreting these findings.

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