

# Comparison between intravenous iron and oral iron preparations for the treatment of anemia of chronic kidney disease - a systematic review and meta-analysis Intravenous versus oral iron



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## Background and Objectives

- Anemia is a very common complication of chronic kidney disease (CKD) and is associated with increased morbidity and mortality.
- Treatment with erythropoiesis stimulating agents (ESA) is effective and is an essential part of the treatment of CKD patients.
- Iron deficiency is the major cause for ESA resistance or incomplete response and is very common in the CKD population. Iron supplementation is pivotal for optimal treatment of anemia of CKD.
- There are confounding data regarding the best method of iron supplementation in CKD patients, without a consistent approach in clinical practice.
- We undertook a systematic review and meta-analysis to evaluate the efficacy and safety of treatment with intravenous (IV) iron versus oral iron in patients treated for anemia of CKD.

## Results

Our search yielded 11 trials which compared IV iron preparations (iron sucrose, iron gluconate or iron dextran) to oral iron. Five included pre-dialysis patients and 6 included dialysis patients.

### Hb level:

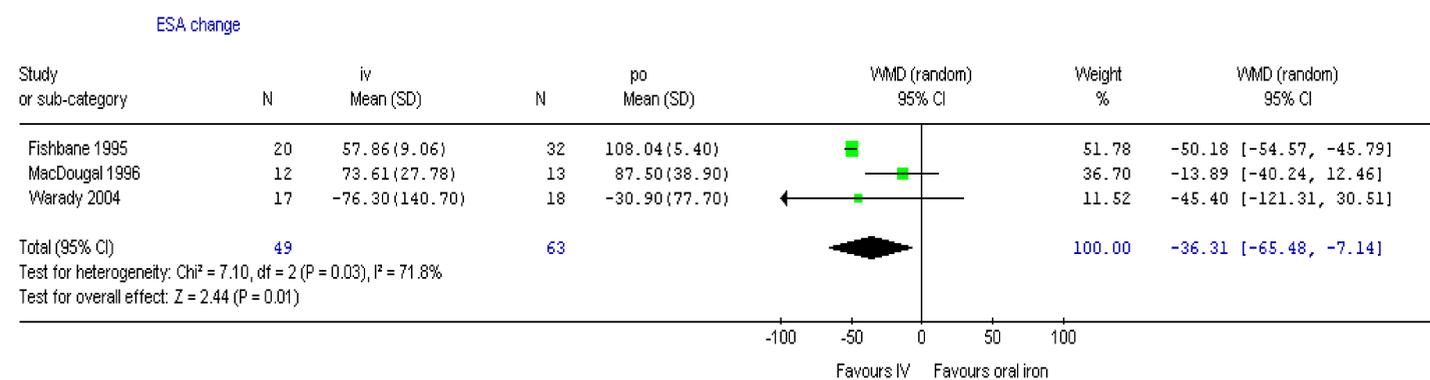
**Dialysis patients:** Compared to oral iron, there was a significant rise in Hb level in the IV iron treated hemodialysis patients (WMD 1.17; 95%CI 0.19-2.15, fig 1). Significant heterogeneity was observed due to different baseline Hb values, baseline iron status, different dosages of oral iron and different dosages of ESA.

**Pre-dialysis patients:** There was a small but significant difference in the Hb level favoring the IV iron group (WMD 0.28; 95% CI 0.15-0.4, fig1)

For both groups effect estimates were not influenced by ESA administration.

### ESA dose change:

**Dialysis patients:** The ESA dose reported as unit per kilogram per week was significantly reduced in the IV iron treated patients (WMD, -36.3 [95% CI -65.4, -7.1]) with significant heterogeneity ( $p=0.03$ ,  $I^2=71.8\%$ ).



### Adverse Events:

- In predialysis patients, there was no significant difference in the risk for requiring RRT during the trial between the different groups (RR 0.63; 95%CI 0.25-1.65, 3 trials).
- For analysis of all-cause mortality and adverse events we combined trials of predialysis and dialysis patients.
- Data on all-cause mortality were sparse (RR 0.54; 95%CI 0.09-3.13, 3 trials).
- There was no difference in adverse events (RR 0.9; 95%CI 0.65-1.24, 8 trials) between the IV and oral treated patients. Most adverse events were gastrointestinal and mild allergic reactions.

## Conclusion

- Our review demonstrates that dialysis patients treated with IV iron have better Hb response than patients treated with oral iron.
- For predialysis patients, this effect is very small.
- IV iron should be preferred in the treatment of anemia in dialysis patients.
- In predialysis patients the slight advantage in Hb response should be weighed against the inconvenience and cost of IV iron treatment.

## Methods

- Search strategy:** We searched The Cochrane Library, MEDLINE and conference proceedings. Search conducted until 2007.
- Inclusion Criteria:** randomized controlled trials comparing IV iron preparation with oral iron preparation for the treatment of anemia in patients with CKD (stage III- V)
- Outcomes assessed:** Primary outcomes: absolute hemoglobin (Hb) level or change in Hb level from baseline at two months or end of study, all-cause mortality. Secondary outcomes: ESA dose reduction, beginning of renal replacement therapy (RRT) in predialysis patients and adverse events.
- Data analysis:** Weighted mean differences (WMD) for outcomes with continuous variables and relative risks (RR) for dichotomous outcomes with 95% confidence intervals (CI) were estimated and pooled.

