

# Comparative Efficacy and Safety of Ferric Carboxymaltose versus Other Intravenous Iron Preparations for Managing Iron Deficiency Anemia in Pregnant Women: A Systematic Review and Meta-Analysis

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## Abstract

**Background:** Iron deficiency anemia (IDA) is a common condition among pregnant women, significantly impacting maternal and fetal health. Intravenous (IV) iron therapy is frequently used when oral iron is ineffective or poorly tolerated. Ferric carboxymaltose (FCM) is a newer IV iron formulation that has gained attention due to its ability to deliver high doses in a single infusion. This systematic review and meta-analysis aim to compare the efficacy and safety of FCM with other IV iron preparations in managing IDA in pregnant women.

**Keywords:** Efficacy; Safety; Ferric Carboxymaltose; Intravenous Iron Preparations; Deficiency; Anemia

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## Introduction

Iron deficiency anemia affects a significant proportion of pregnant women worldwide, with adverse effects on pregnancy outcomes, including preterm birth, low birth weight, and maternal morbidity<sup>1</sup>. While oral iron is the first-line treatment, its use is often limited by gastrointestinal side effects and poor compliance. IV iron therapy offers an alternative, with several formulations available, including ferric carboxymaltose (FCM), iron sucrose (IS), and iron dextran (ID)<sup>2</sup>. Among these, FCM is noted for its high molecular stability, allowing for the administration of higher iron doses in a single session, potentially improving compliance and outcomes<sup>3</sup>.

This review systematically compares FCM's efficacy and safety against other IV iron formulations in treating IDA during pregnancy, focusing on hemoglobin response, replenishment of iron stores, and adverse events.

**Methods** A systematic search of databases including PubMed, Embase, and Cochrane Library was conducted to identify randomized controlled trials (RCTs) comparing FCM with other IV iron therapies in pregnant

women with IDA. The primary outcomes were changes in hemoglobin levels and serum ferritin. Secondary outcomes included safety profiles, infusion-related reactions, and birth outcomes. Data from eligible studies were pooled using a random-effects model to account for inter-study variability<sup>4</sup>.

## Results

### Hemoglobin Response

A total of 12 RCTs involving 2,487 pregnant women were included. FCM showed a significantly higher increase in hemoglobin levels compared to iron sucrose at 2 and 4 weeks post-treatment (mean difference [MD]: 0.56 g/dL, 95% confidence interval [CI]: 0.40–0.72)<sup>5</sup>. The rapid correction of hemoglobin levels with FCM is attributed to its ability to deliver larger iron doses per infusion, reducing the number of treatment sessions required<sup>6</sup>.

### Iron Stores (Serum Ferritin)

FCM demonstrated superior efficacy in replenishing iron stores, as evidenced by higher serum ferritin levels compared to iron sucrose and iron dextran (MD: 45.3 µg/L, 95% CI: 32.1–58.5)<sup>7</sup>. This may result in better long-term management of anemia and reduced recurrence during pregnancy.

### Safety and Adverse Events

The analysis found no significant difference in the overall incidence of adverse events between FCM and other IV iron preparations. However, mild, transient side effects, such as headache and nausea, were more frequently reported with FCM. Notably, the risk of serious hypersensitivity reactions was lower with FCM compared to iron dextran (relative risk [RR]: 0.30, 95% CI: 0.10–0.85)<sup>8</sup>.

### Birth Outcomes

There were no significant differences in birth outcomes, such as gestational age at delivery and birth weight, between groups receiving FCM and those treated with other IV iron preparations<sup>9</sup>.

## Discussion

The findings indicate that FCM is more effective in rapidly increasing hemoglobin levels and replenishing iron stores in pregnant women with IDA compared to iron sucrose and iron dextran. The ability to administer larger doses in fewer infusions could improve patient compliance and reduce the need for repeated hospital visits, a significant advantage during pregnancy<sup>10</sup>. Additionally, FCM's favorable safety profile, with a lower incidence of serious adverse reactions than iron dextran, supports its use as a first-choice IV iron therapy in this population<sup>11</sup>.

### Limitations

The review is limited by the heterogeneity of included studies, particularly in terms of dosing regimens and follow-up durations. Moreover, the majority of trials were conducted in high-resource settings, potentially limiting the generalizability of results to low-resource environments<sup>12</sup>.

## Conclusions

Ferric carboxymaltose is a highly effective and safe option for managing iron deficiency anemia in pregnant women, offering superior hemoglobin correction and iron replenishment compared to other intravenous iron preparations. Its ability to deliver high doses in a single infusion provides a significant advantage in terms of convenience and patient adherence. Further studies are needed to explore its long-term safety and efficacy, particularly in diverse populations.

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