FORGING A NEW FRONTIER

Revolutionizing Iron Deficiency Therapy in Patients with Inflammatory Bowel Disease

Supported by an educational grant from American Regent, Inc. • This program is not affiliated with Digestive Disease Week®

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LEARNING OBJECTIVE

1

Incorporate comprehensive screening tests for iron deficiency in patients with IBD based on principles of iron deficiency pathophysiology and the prevalence of iron deficiency anemia in patients with IBD

LEARNING OBJECTIVE

2

Evaluate the distinctions among IV iron products including current and emerging clinical trial data on efficacy, safety, and AEs such as hypersensitivity for patients with IBD

LEARNING OBJECTIVE

3

Assess the use of IV iron in the pediatric IBD setting

LEARNING OBJECTIVE

4

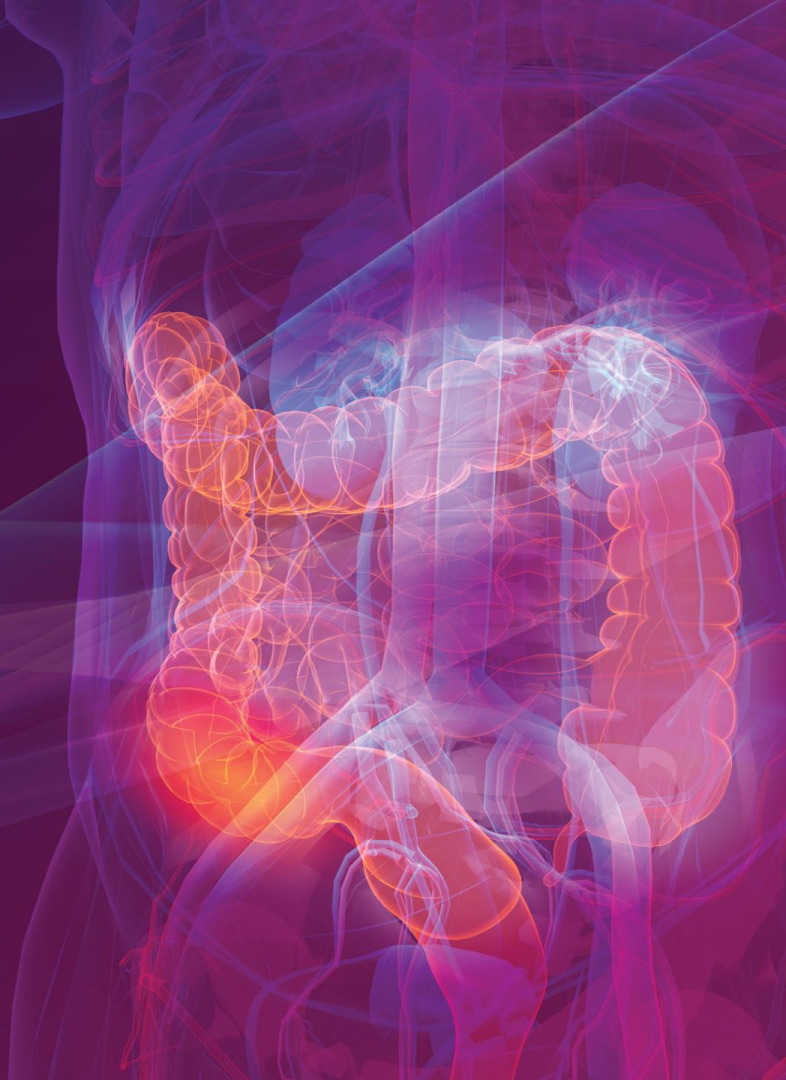
Develop patient-centered care plans with the use of shared decision-making with patients with iron deficiency and IBD, factoring in individual patient preferences and characteristics to optimize adherence and outcomes

Audience Response

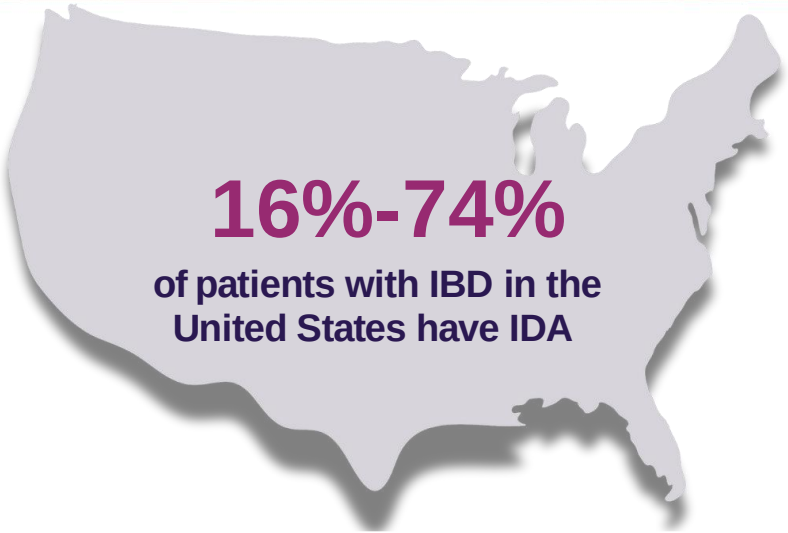
How confident do you feel in your ability to identify a patient with IBD in need of iron treatment for iron deficiency or iron deficiency anemia?

A. Not confident at all
B. Somewhat confident
C. Confident
D. Extremely confident

Pathophysiology and Diagnosis



Anemia Is the Most Common Extraintestinal Manifestation of IBD

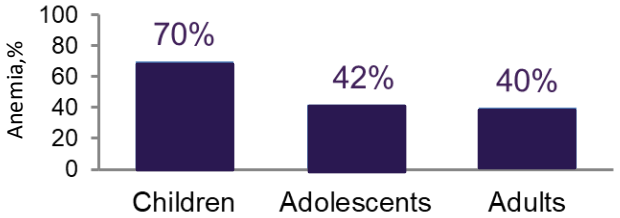


Symptoms: fatigue, headaches, dizziness, reduced exercise tolerance, palpitations

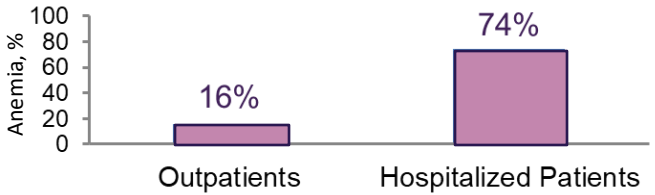
Additional pediatric symptoms: irritability, impaired school performance, anorexia, pica

Prevalence of Iron Deficiency Anemia in Patients with IBD

By Age Group



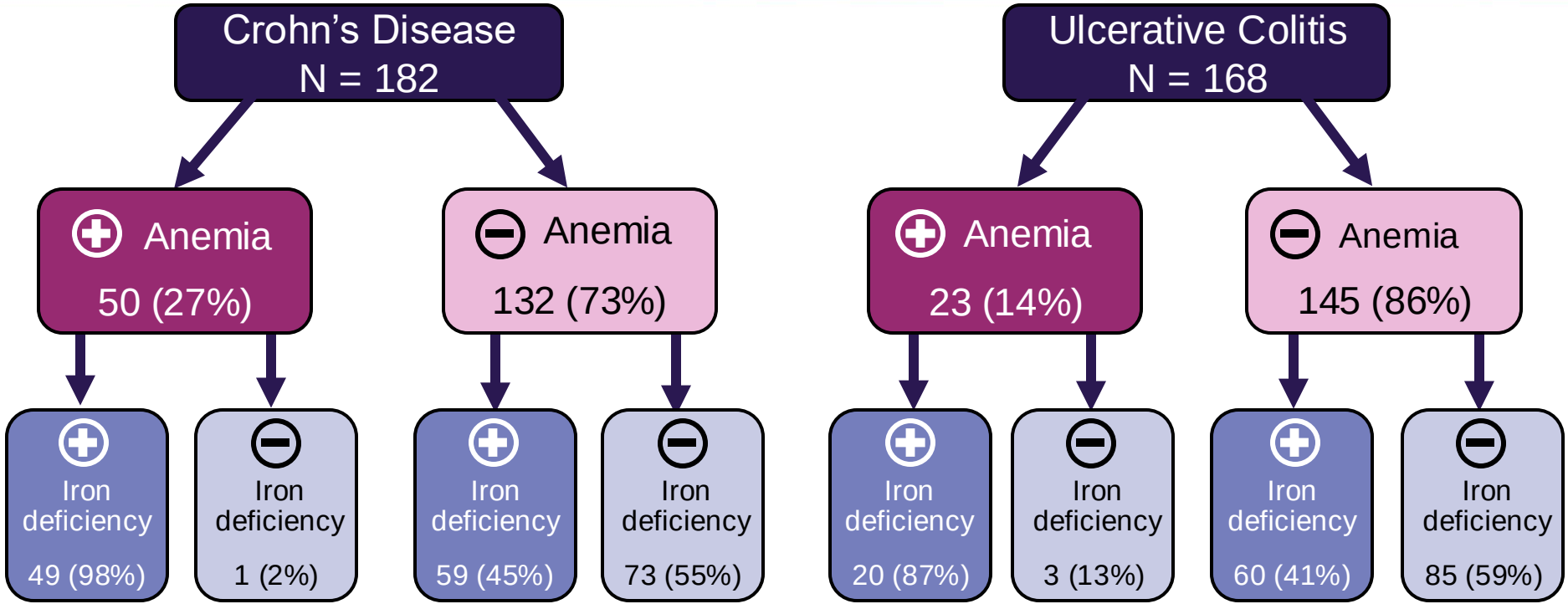
By Hospitalization Status (Adults)



IBD = inflammatory bowel disease; IDA = iron deficiency anemia.

Gisbert JP, et al. *Am J Gastroenterol*. 2008;103(5):1299-1307. Goodhand JR, et al. *Inflamm Bowel Dis*. 2012;18(3):513-519. Koutroubakis IE, et al. *Clin Gastroenterol Hepatol*. 2015;13(10):1760-1766. Patel D, et al. *Curr Treat Options Gastroenterol*. 2018;16(1):112-128.

Iron Deficiency and Iron Deficiency Anemia Are Common at IBD Onset



*Note the loss of two patients from the UC cohort, who were anemic but did not have iron indices available

**In the non-IBD cohort, 13 (6%) were anemic, with iron deficiency in 11 of these

Rimmer P, et al. *J Crohns Colitis.* 2024;18(Suppl 1):i820–i821.

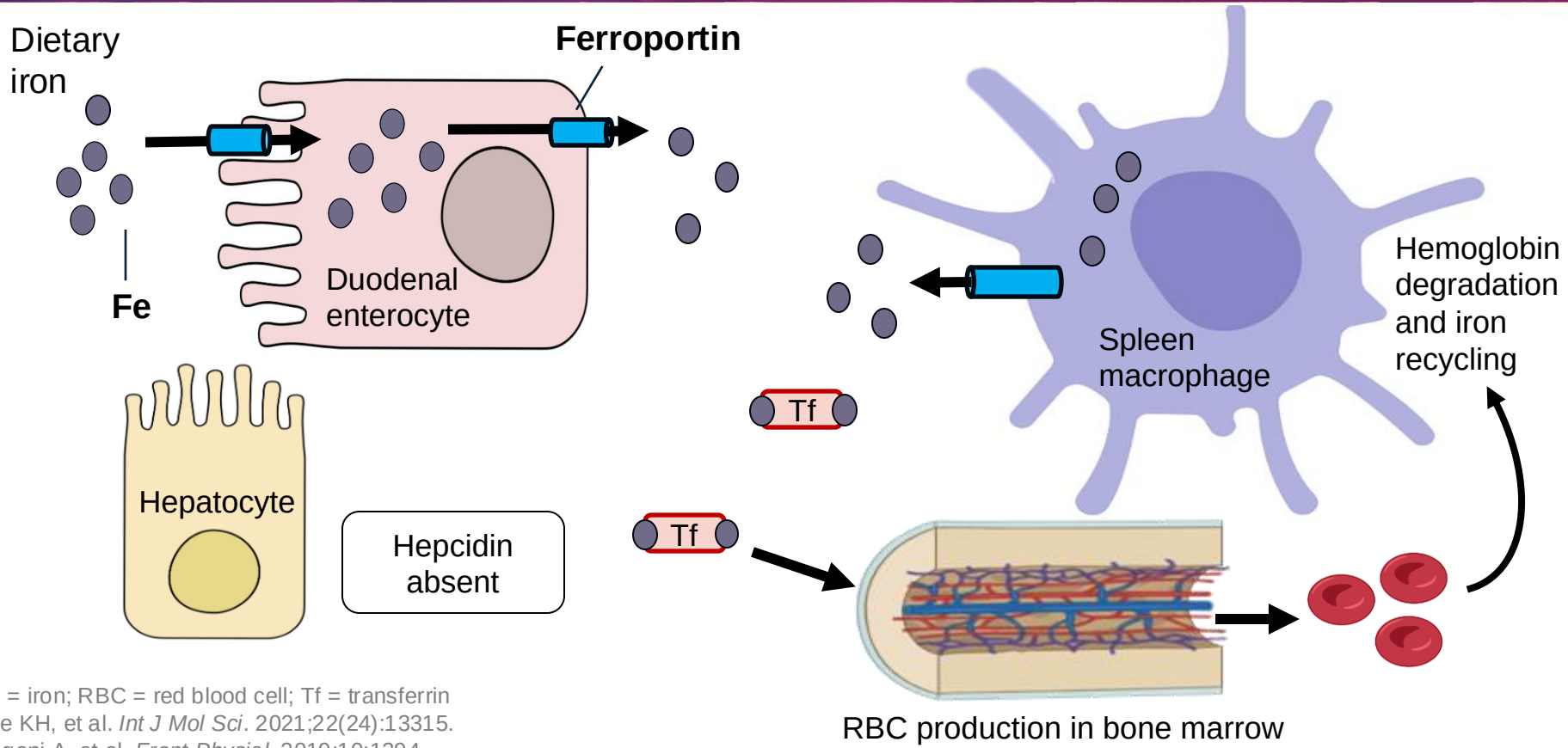
World Health Organization (WHO) Definitions of Anemia by Hgb Level, Stratified by Age and Sex

Age		Healthy Hgb, g/dL	Mild Anemia Hgb, g/dL	Moderate Anemia Hgb, g/dL	Severe Anemia Hgb, g/dL
Pediatric	0.5 – < 5 years	≥ 11	10–10.9	7–9.9	< 7
	5-11 years	≥ 11.5	11–11.4	8–10.9	< 8
	12-14 years	≥ 12.0	11–11.9	8–10.9	< 8
Adult males, ≥ 15 years		≥ 13	11–12.9	8–10.9	< 8
Adult females, nonpregnant (≥ 15 years)		≥ 12	11–11.9	8–10.9	< 8
Pregnant women		≥ 11	10–10.9	7–9.9	< 7

Hgb = hemoglobin

Forbes A, et al. *Clin Nutr.* 2017;36(2):321-347. Goyal A, et al. *J Pediatr Gastroenterol Nutr.* 2020;71(4):563-582.

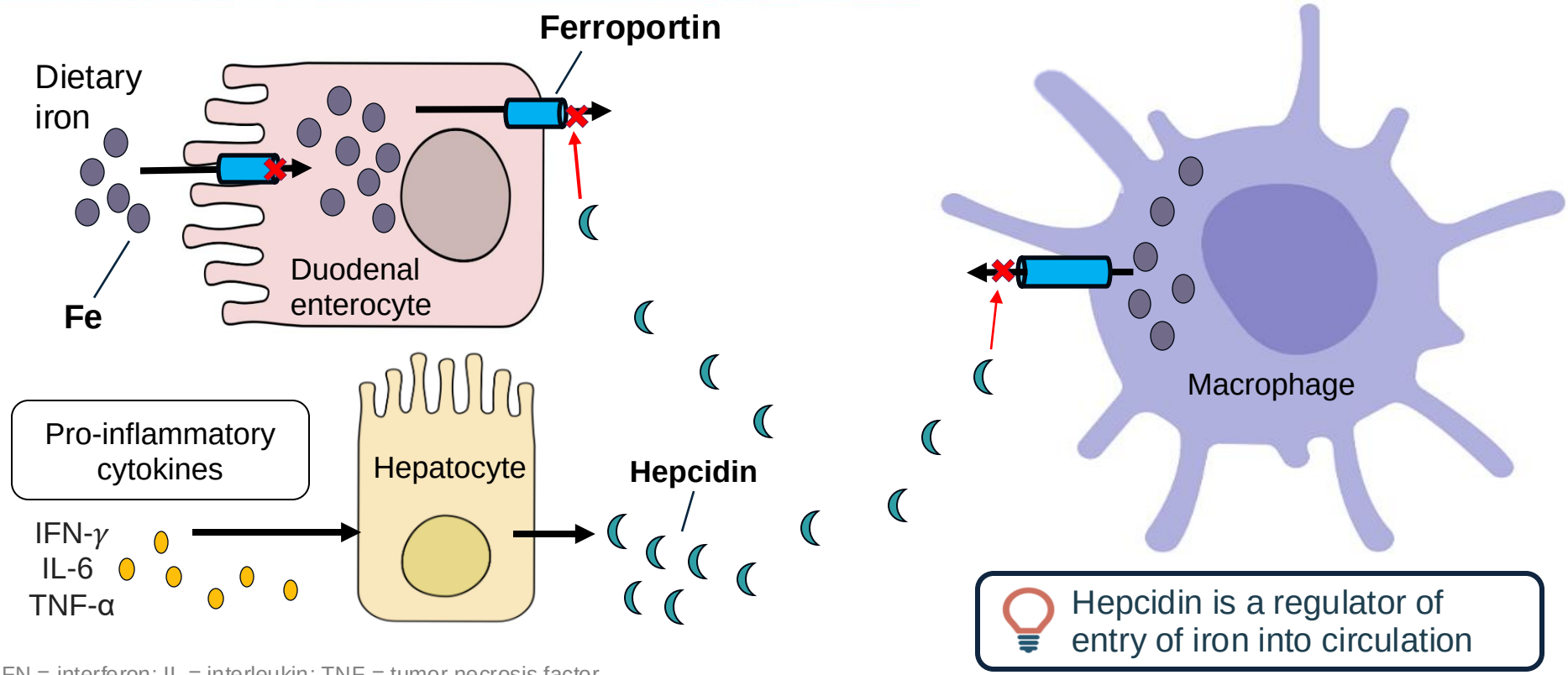
Normal Iron Metabolism and Transport



Fe = iron; RBC = red blood cell; Tf = transferrin

Lee KH, et al. *Int J Mol Sci*. 2021;22(24):13315.
Pagani A, et al. *Front Physiol*. 2019;10:1294.

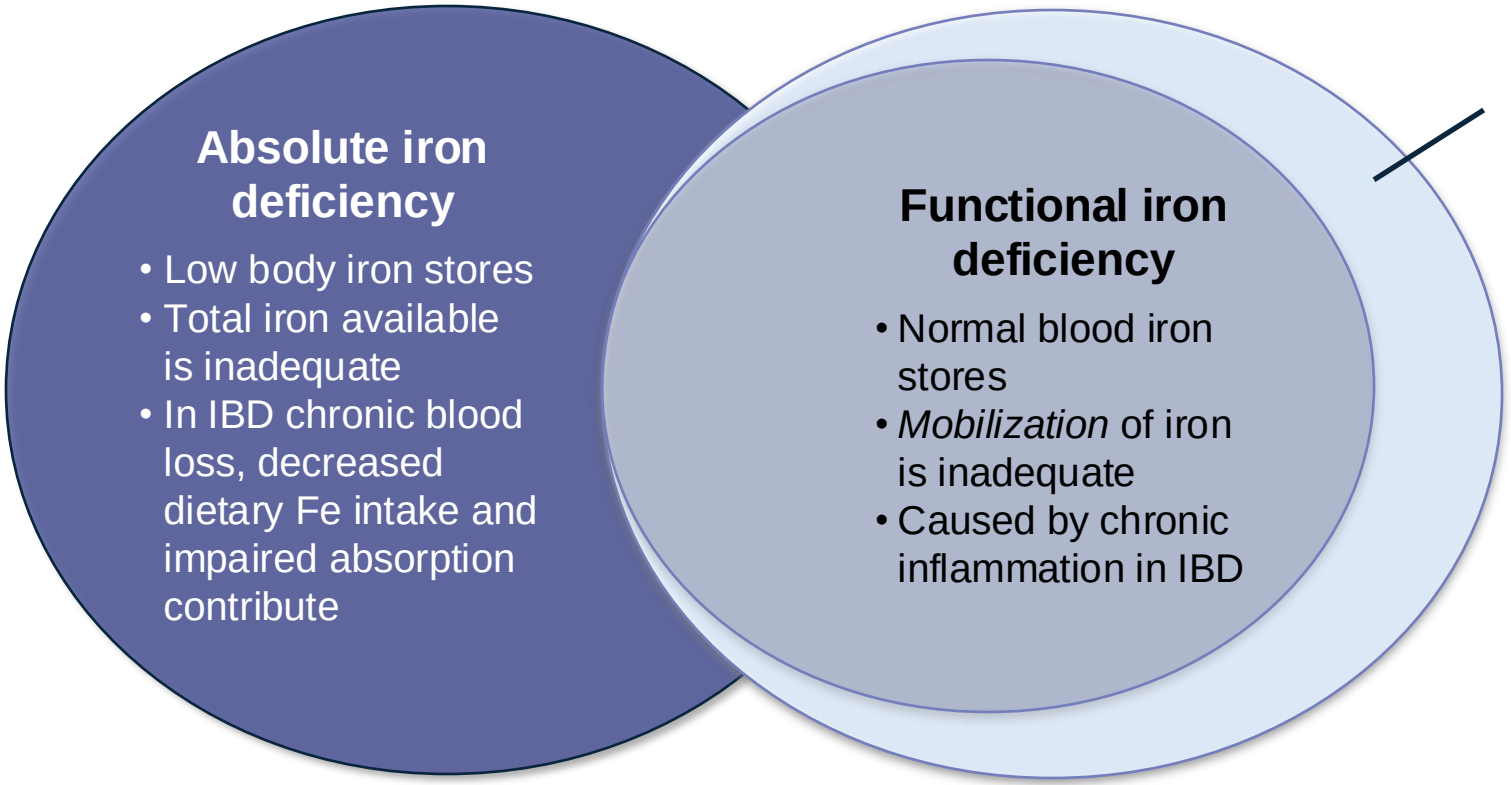
Inflammation Reduces Iron Availability



IFN = interferon; IL = interleukin; TNF = tumor necrosis factor.

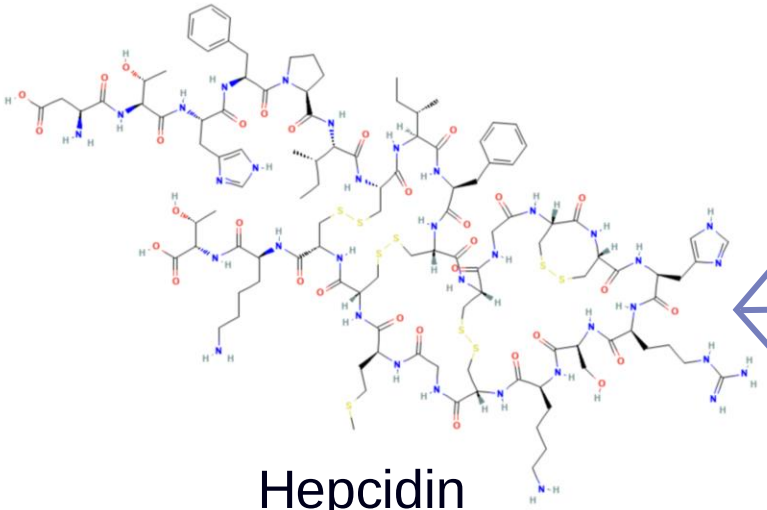
Ganz T, et al. *Biochim Biophys Acta*. 2012;1823(9):1434-1443. Lee KH, et al. *Int J Mol Sci*. 2021;22(24):13315. Pagani A, et al. *Front Physiol*. 2019;10:1294.

Iron Deficiency Anemia in IBD Is Multifactorial

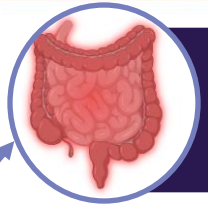


Pasricha SR, et al. *Lancet.* 2021;397(10270):233-248.

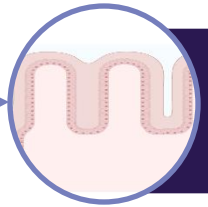
Hepcidin is Elevated in Chronic Inflammatory Conditions



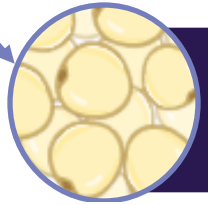
Hepcidin



Active inflammatory bowel disease



Celiac disease

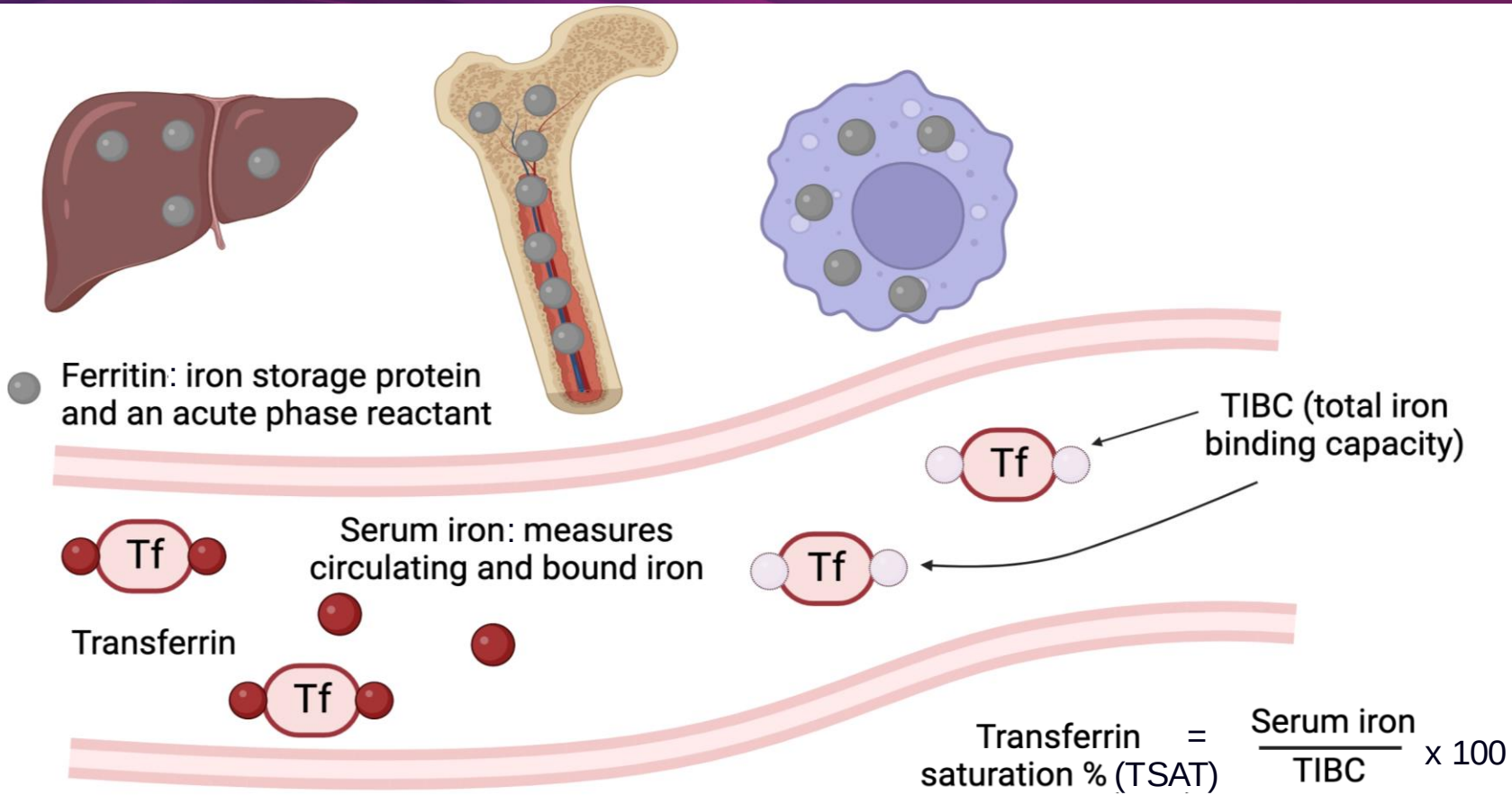


Obesity

Elevated hepcidin levels have been observed in patients with active IBD, celiac disease, and obesity

Alshwaiyat NM, et al. *Exp Ther Med*. 2021;22(5):1268. Montoro-Huguet MA. *Nutrients*. 2021;13(10):3437.

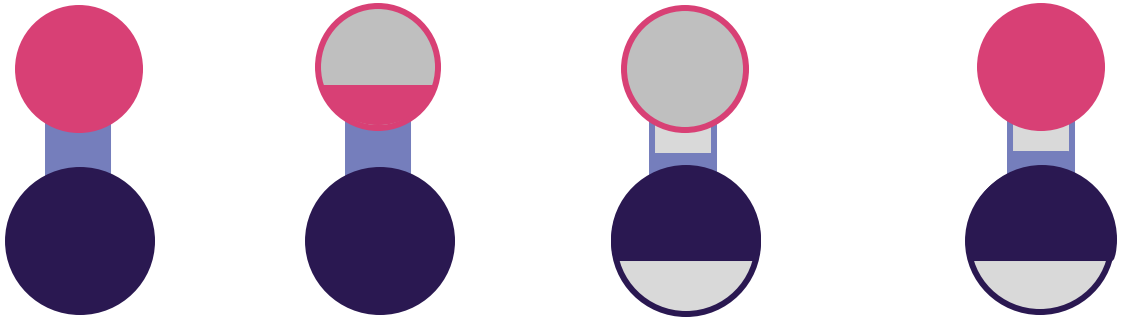
Interpreting Iron Studies



Adapted from Patel D, et al. *Curr Treat Options Gastroenterol*. 2018;16(1):112-128.

Total Body Iron Status With and Without Inflammation

Comparative Effects on Serum Ferritin, TSAT, and Hgb

	Inflammation			
	Normal	**Iron Depletion**	**Absolute Iron Deficiency**	**Functional Iron Deficiency**
***Ferritin* → Storage iron** ***TSAT* → Transport iron** **Hgb → Erythron iron**				
Ferritin, ng/dL	100 ± 60	< 25*	< 10*	> 100
TSAT, %	35 ± 15	< 30	< 20	< 20
Hemoglobin, g/dL	Normal	Normal	Low	Low

*American Gastroenterological Association (AGA) 2020 Guidelines Management of IDA in IBD recommend use of ferritin 45 ng/mL as the cutoff value in the *absence* of active inflammation.

**Inflammatory states permit higher ferritin to qualify as iron deficiency

Adapted from Crichton RR, et al. *Iron Therapy with Special Emphasis on Intravenous Administration*. 4th ed. 2008. Ko CW, et al. *Gastroenterology*. 2020;159(3):1096.

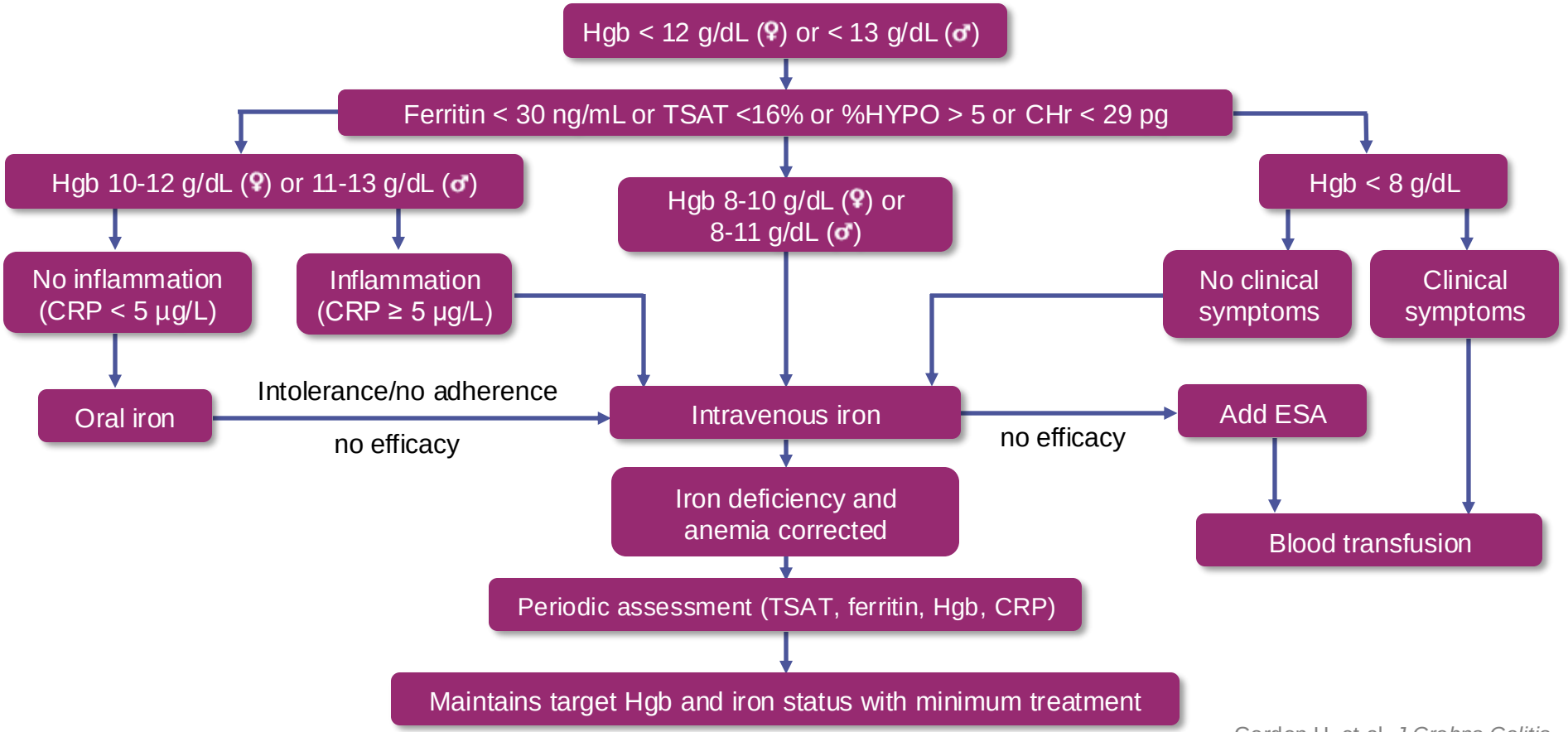
ECCO 2023 Guidelines on EIM Management: Anemia in IBD

- Patients with IBD should be regularly assessed for anemia
  - Every 3 months in active disease
  - Every 6-12 months in remission or mild disease
- Diagnostic criteria
  - Ferritin > 100 µg/L and TSAT < 16%
  - If serum ferritin level is between 30 and 100 µg/L, combination of true iron deficiency and ACD is likely

ACD = anemia of chronic disease = iron loss + inflammation; ECCO = European Crohn's and Colitis Organisation; EIM = extraintestinal manifestation.

Gordon H, et al. *J Crohns Colitis.* 2024;18(1):1-37.

ECCO Guidelines: Workup for the management of iron deficiency anemia in patients with IBD



CHr= reticulocyte Hgb content; CRP = C-reactive protein; ESA = erythropoiesis-stimulating agent; HYPO= hypochromic.

Gordon H, et al. *J Crohns Colitis.* 2024;18(1):1-37.

Diagnosis and Treatment Planning

Initial testing in patients with symptoms of anemia

- CBC, ferritin, CRP, TSAT, reticulocyte count

Timing of re-evaluation once iron treatment is started

- Assess response in 4 weeks

Treatment target with oral or IV iron replacement

- Normalization of iron indices
- For iron deficiency anemia increase of Hgb by at least 2 g/dL from baseline

If target not met after 4 weeks

- Escalate therapy (i.e., change oral iron to IV) or refer to hematology, consider patient non-adherence in oral (PO) treatment or if patient unable to tolerate PO iron

Underlying causes should be treated

- Active inflammation in IBD, poor dietary intake, etc.

CBC = complete blood count; IV = intravenous; PO = by mouth.

Hou JK, et al. *Inflamm Bowel Dis*. 2017;23(1):35-43.

Treatment Options

Oral Iron: Advantages and Disadvantages

- Indicated in **inactive IBD** and mild anemia
- No strong evidence that any of the available OTC oral formulations are more effective or better tolerated than the others (ferric maltol may have fewer GI side effects)

Benefits: inexpensive, accessible, low risk of *serious* AEs

- AEs: gastric irritation, nausea, flatulence, epigastric discomfort, and constipation
  - Up to 70% of patients report GI side effects
  - AEs lower actual adherence rates to 10%-32%

Limitations: high rate of AEs (potential adherence issues), effectiveness impacted by inflammation

AEs = adverse events; GI = gastrointestinal; OTC = over-the-counter.

Goldberg ND. *Clin Exp Gastroenterol*. 2013;6:61-70. Patel D, et al. *Curr Treat Options Gastroenterol*. 2018;16(1):112-128. Tolkien Z, et al. *PLoS One*. 2015;10(2):e0117383.

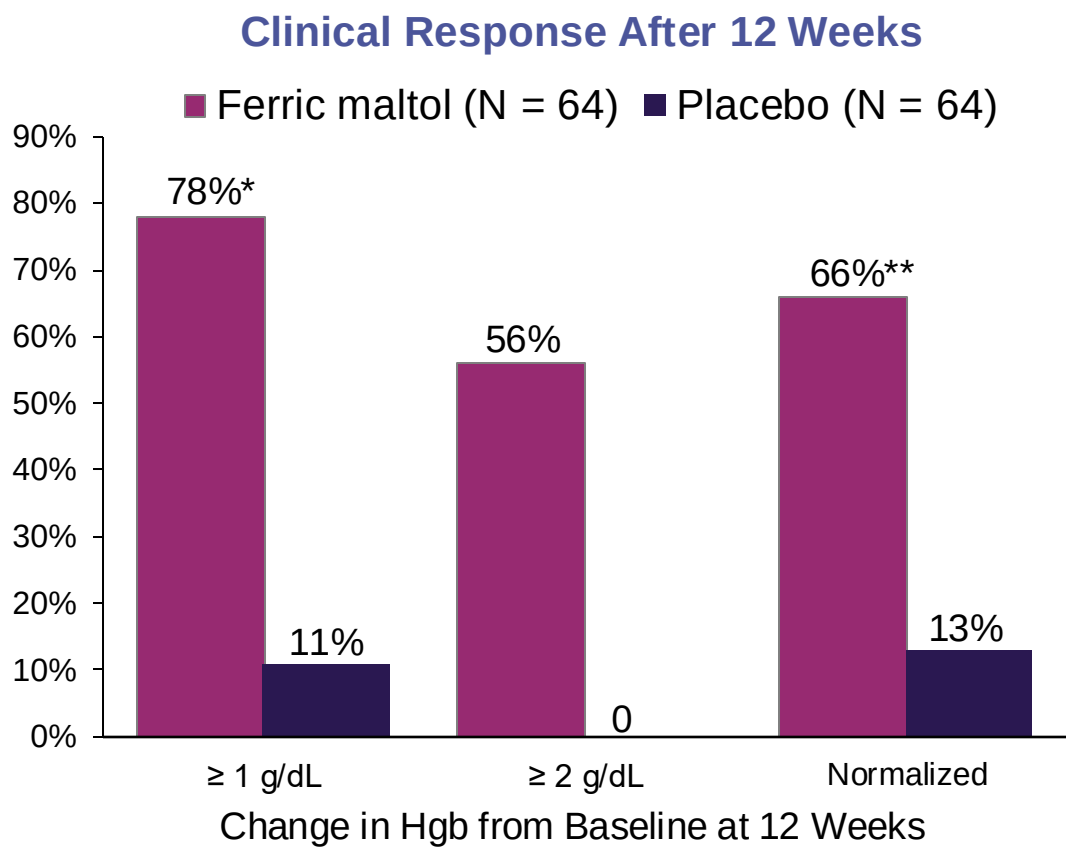
Oral Iron Preparations

Formulation	Dosage Form	Dose
Ferrous fumarate	324/325 mg tab = 106 mg elemental Fe	100-200 mg/day
Ferrous gluconate	240 mg tab = 27 mg elemental Fe 300 mg tab = 36 mg elemental Fe 324/325 mg tab = 39 mg elemental Fe	2-3 mg/kg elemental Fe/day
Ferrous sulfate	324/325 mg tab = 65 mg elemental Fe 160 mg (extended release) = 50 mg elemental Fe 220 mg/5 mL oral elixir = contains 44 mg elemental iron per 5 mL 75 mg/mL oral solution = contains 15 mg elemental iron per mL	150-750 mg/day
Polysaccharide iron complex	150 mg tab = 150 mg elemental Fe	150-300 mg/day
Ferric maltol	30 mg tablet = 30 mg elemental Fe	30 mg 2 times/day

Auerbach M, et al. *Am J Hematol.* 2016;91(1):31-38.

Ferric Maltol Efficacy and Tolerability Compared to Placebo

- Newer oral iron preparation created from a stable complex of ferric iron (Fe3+) with trimaltol
- Patients with quiescent or mild/moderate IBD and mild/moderate IDA
- Adverse events
  - Placebo: 72%
  - Ferric maltol: 58%

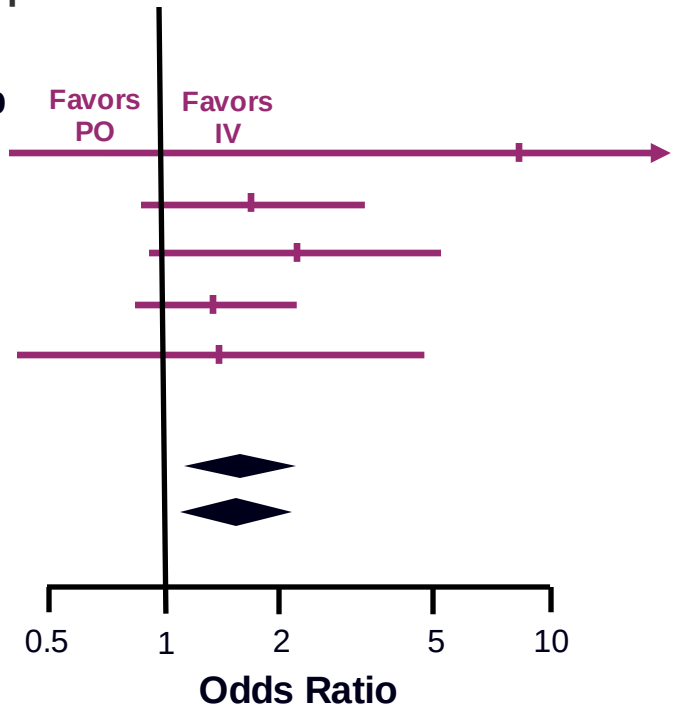


*41.8 (95% CI: 13.5–129.9)
**OR: 15.3 (95% CI: 5.9–39.3)
CI = confidence interval; OR = odds ratio
Gasche C, et al. *Inflamm Bowel Dis*. 2015;21(3):579-588.

IV Iron Demonstrates Higher Efficacy in Achieving Hemoglobin Rise of ≥ 2.0 g/dL

Hemoglobin response results from individual studies and meta-analysis

Randomized Controlled Trials	Oral Iron n	Oral Iron N	IV Iron n	IV Iron N	Follow-up (wks)	OR	(95% CI)
Erichsen, et al. 2005	0	19	3	19	2	8.27	(0.40, 172.0)
Kulnigg, et al. 2008	41	63	104	137	12	1.69	(0.88, 3.24)
Lindgren, et al. 2009	22	46	30	45	20	2.18	(0.93, 5.09)
Reinisch, et al. 2013	66	113	147	225	8	1.34	(0.84, 2.13)
Schröder, et al. 2005	9	24	10	22	6	1.39	(0.43, 4.51)
		265		**448**			
Fixed effect model						**1.59**	**(1.15, 2.20)**
Random effects model						**1.57**	**(1.13, 2.18)**



Heterogeneity: I-squared = 0%, tau-squared = 0, *p* = .6868

Response defined as Hgb rise of ≥ 2.0 g/dL

Bonovas S, et al. *Medicine (Baltimore)*. 2016;95(2):e2308.

Lower Rates of Discontinuation Due to Adverse Events Seen with IV Iron

- Treatment discontinuation rate was lower in the IV iron groups (2.5%) overall compared to the oral iron groups (10.9%) overall

Randomized Controlled Trials	Oral Iron n	Oral Iron N	IV Iron n	IV Iron N	Follow-up (wks)
Erichsen, et al. 2005	2	19	0	19	2
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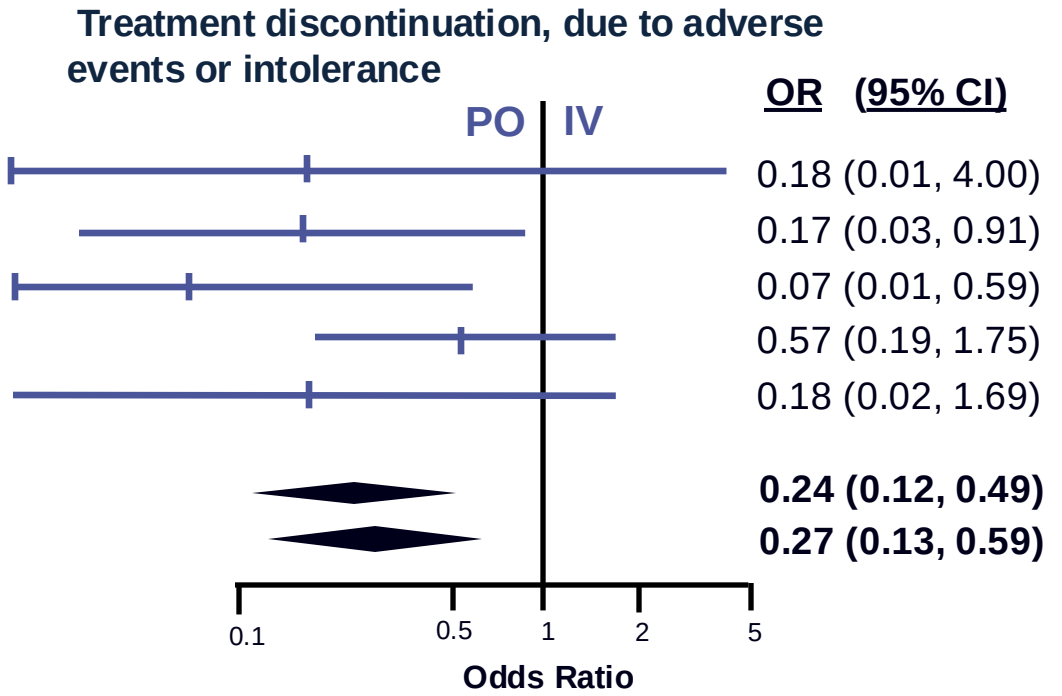
Schröder, et al. 2005	5	24	1	22	6
		265		**448**	

Fixed effect model
Random effects model
Heterogeneity: I-squared = 0%, tau-squared = 0, *p* = .4244



Bonovas S, et al. *Medicine (Baltimore)*. 2016;95(2):e2308.

IV Iron: Advantages and Disadvantages

Advantages

- More effective than oral iron in setting of inflammation due to ability to overcome hepcidin block
- More rapid correction of anemia with associated symptomatic resolution
- Able to administer high doses in a single infusion
- Can be administered during scheduled biologics
- Minimal GI intolerance

Disadvantages

- Initial costs may be higher than oral iron
- Mandates an IV infusion
- Associated with rare cases of allergic or infusion reactions
- May require repeat IV infusions with certain IV formulations
- Hypophosphatemia may be increased with ferric carboxymaltose, ferric derisomaltose

Goldberg N. *Clin Exp Gastroenterol*. 2013;6:61-70. Patel D, et al. *Curr Treat Options Gastroenterol*. 2018;16(1):112-128. Hou JK, et al. *Inflamm Bowel Dis.* 2016;22(9):2200-2205. Akhuemonkhan E, et al. *Inflamm Bowel Dis*. 2018;24(8):1801-1807.

IV Iron Product	Dosing and Administration	FDA-approved in Pediatrics?
Iron dextran	• 100 mg IV push daily or as total dose infusion* • Minimum 1-hour infusion time	✔ Age ≥ 4 months
Ferric gluconate	• 125 mg or 250 mg (adults) or 1.5 mg/kg in pediatric patients • 1-hour infusion weekly for up to 8 weeks	✔ Age ≥ 6 years
Iron sucrose	• 100-400 mg; dose may be repeated based on clinical response and iron indices • Slow IV injection or as a 15-minute infusion	✔ Age ≥ 2 years
Ferric carboxymaltose	• Weight ≥ 50 kg: 1,000 mg (single dose) or 750 mg infusion x 2 doses (total 1,500 mg) at least 7 days apart • Weight < 50 kg: 15 mg/kg x 2 doses at least 7 days apart • 15-minute infusion	✔ Age ≥ 1 year
Ferumoxytol	• 510 mg with a second 510 mg dose 3-8 days later • 15-minute infusion	**Not approved**
Ferric derisomaltose	• 1,000 mg, given over at least 20 minutes	**Not approved**

*Doses up to 2,000 mg have been reported in patients with IBD

FDA = U.S. Food and Drug Administration.

Anand IS, et al. *Circulation.* 2018;138(1):80-98. Bohm N. *Am J Manag Care*. 2021;27(Suppl 11):S211-S218. Injectafer® (ferric carboxymaltose injection) [package insert]. Shirley, NY: American Regent, Inc. Revised 2018. https://www.accessdata.fda.gov/drugsatfda_docs/label/2018/203565s005lbl.pdf. Koutroubakis IE, et al. *Dig Dis Sci*. 2010;55(8):2327-2331. Monoferric (ferric derisomaltose injection) [package insert]. Holbaek, Denmark: Pharmacosmos A/S. Revised 2020. https://www.accessdata.fda.gov/drugsatfda_docs/label/2020/208171s000lbl.pdf. Venofer (iron sucrose) [package insert]. Shirley, NY: American Regent, Inc. Revised 2020. https://www.accessdata.fda.gov/drugsatfda_docs/label/2021/021135Orig1s037lbl.pdf.

IV Iron Product	Common Adverse Drug Effects	Warnings
Iron dextran	Pruritis, abdominal pain, nausea, vomiting, diarrhea	Black box: fatal and serious hypersensitivity reactions, including anaphylaxis
Ferric gluconate	Chest pain, leg cramps, dizziness, dyspnea, nausea, vomiting, diarrhea	Hypersensitivity reactions, hypotension, benzyl alcohol toxicity
Iron sucrose	Diarrhea, nausea, vomiting, headache, hypotension, pruritus	Hypersensitivity reactions, hypotension
Ferric carboxymaltose	Nausea, hypertension, hypophosphatemia, flushing	Hypersensitivity reactions, symptomatic hypophosphatemia, hypertension
Ferumoxytol	Dizziness, hypotension, constipation, nausea	Black box: fatal and serious hypersensitivity reactions, including anaphylaxis Can mimic iron overload on cross sectional imaging
Ferric derisomaltose	Nausea, injection site reactions, rash, hypotension, hypophosphatemia	Hypersensitivity reactions

*At-risk populations for hypophosphatemia: elderly, pre-existing vitamin D deficiency, hyperparathyroidism, lower body weight, normal renal function

Anand IS, et al. *Circulation.* 2018;138(1):80-98. Monoferric (ferric derisomaltose injection) [package insert]. Holbaek, Denmark: Pharmacosmos A/S. Revised 2020. https://www.accessdata.fda.gov/drugsatfda_docs/label/2020/208171s000lbl.pdf.

Improved Safety With Next-Generation IV Iron Products

- Misconception that IV iron is unsafe, largely predicated on data from older, high-molecular-weight, dextran iron formulations that are no longer available
- Third-/next-generation IV iron products not associated with same risk as older formulations

	Rate of Anaphylaxis/ Anaphylactoid Reactions
Low molecular weight iron dextran	0.6%
Third-Gen IV Iron Products	
Ferric carboxymaltose	0.1%
Ferumoxytol	0.2%
Ferric derisomaltose	0.3%

Akheumonkhan E, et al. *BMJ Open Gastroenterol*. 2017;4(1):e000155. Avni T, et al. *Mayo Clin Proc*. 2015;90(1):12-23. DeLoughery TG. *Acta Haematol*. 2019;142(1):8-12. Injectafer® (ferric carboxymaltose injection) [package insert]. Shirley, NY: American Regent, Inc. Revised 2018. https://www.accessdata.fda.gov/drugsatfda_docs/label/2018/203565s005lbl.pdf. Feraheme® (ferumoxytol injection) [package insert]. Lexington, MA: AMAG Pharmaceuticals, Inc. Revised 2022. https://www.accessdata.fda.gov/drugsatfda_docs/label/2022/022180s025lbl.pdf. Monoferric (ferric derisomaltose injection) [package insert]. Holbaek, Denmark: Pharmacosmos A/S. Revised 2020. https://www.accessdata.fda.gov/drugsatfda_docs/label/2020/208171s000lbl.pdf. Nikravesh N, et al. *Nanomedicine*. 2020;26:102178. Wang C, et al. *JAMA*. 2015;314(19):2062-2068.

Third Generation Iron Products Less Frequently Cause Serious Infusion Reactions

	Total	Iron Sucrose	LMW iron dextran*	Ferumoxytol	FCM	*p* value
Iron Reactions	1,389 / 35,737 (3.9%)	970 / 22,309 (4.3%)	345 / 9,067 (3.8%)	57 / 3,147 (1.8%)	17 / 1,214 (1.4%)	< .001

	Total doses, N	Infusion Reactions, N (%)	No Infusion reaction N (%)	*p* value
Rates of infusion reaction by premedication status				
Premedication given	2,157	833 (38.6)	1,324 (61.4)	< .001
No premedication given	33,580	556 (1.7)	33,024 (98.3)	
Rates of infusion reaction in iron dextran group by test-dose status				
Full dose only	7,296	279 (3.8)	7,017 (96.2)	.90
Test and full dose intended	1,771	66 (3.7)	1,705 (96.3)	
Test dose only**	56	29 (51.8)	27 (48.2)	NA

Iron reaction defined as use of epinephrine, diphenhydramine, famotidine, and/or hydrocortisone within 24 hours post infusion.

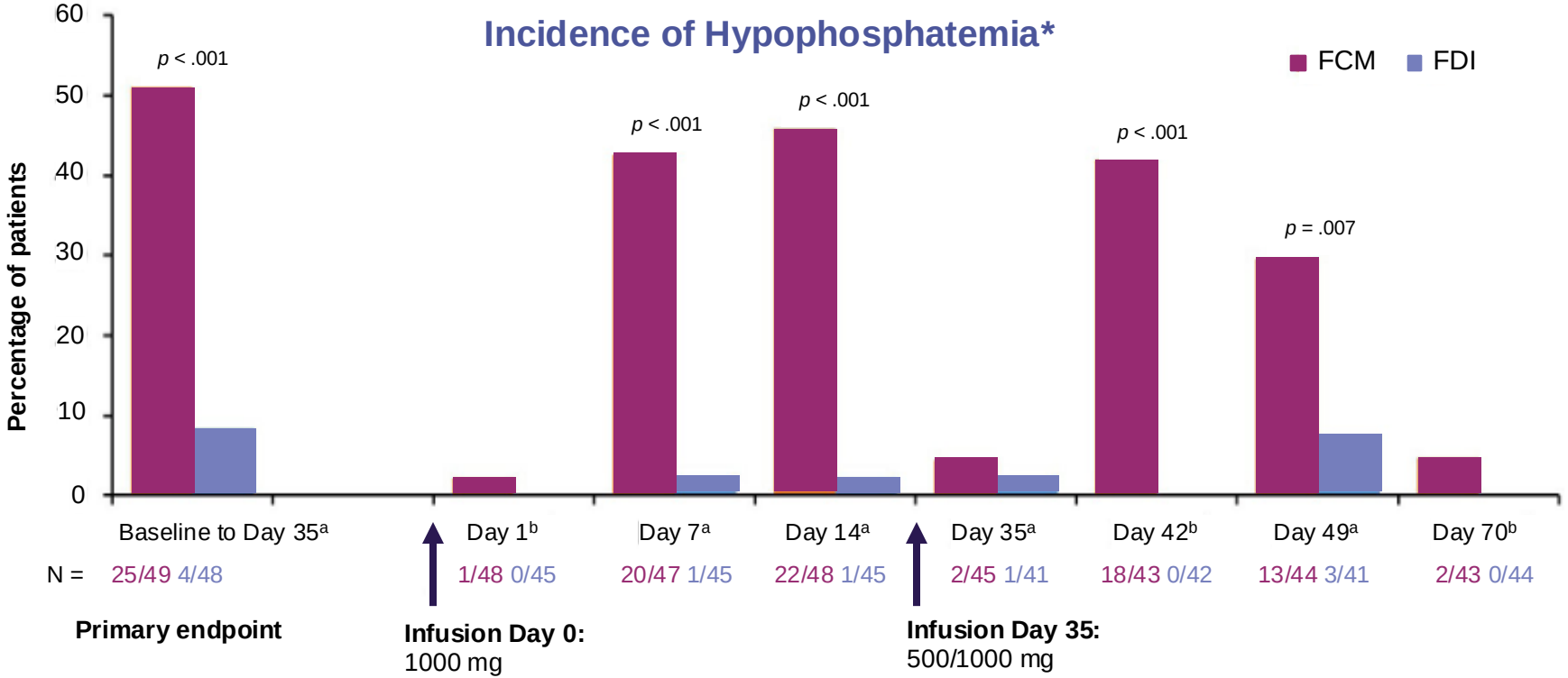
*Includes combined test and full, full dose alone, and test dose alone.

**Test dose–only patients are included in the test and full dose intended category above. Twenty-seven patients did not have infusion reactions but also did not go on to receive the intended full dose within 24 hours.

FCM= ferric carboxymaltose; LMW = low-molecular weight.

Arastu AH, et al. *JAMA Netw Open*. 2022;5(3):e224488.

Hypophosphatemia Following Ferric Derisomaltose and Ferric Carboxymaltose

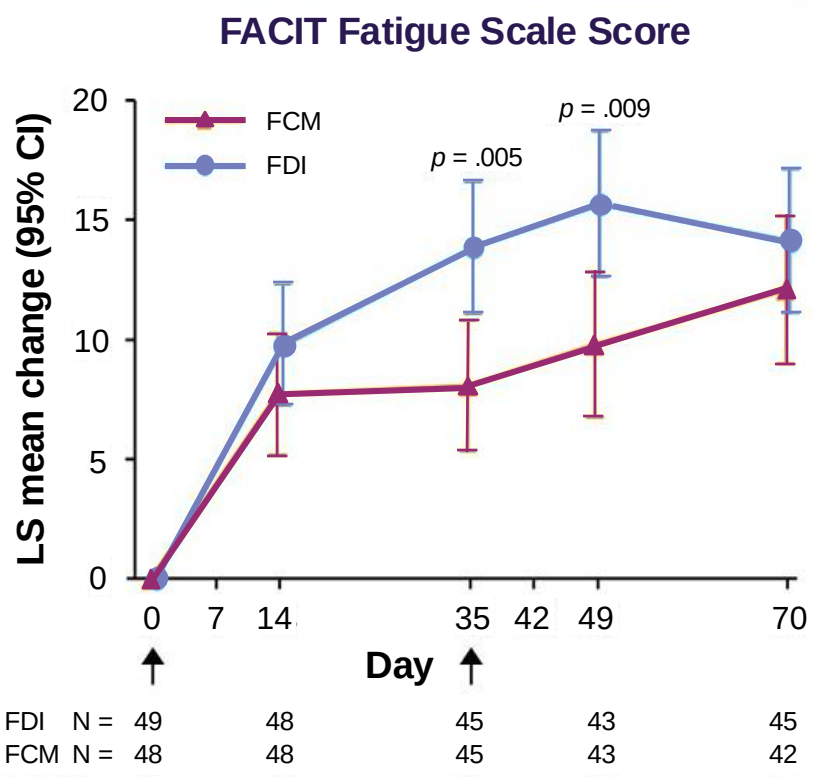


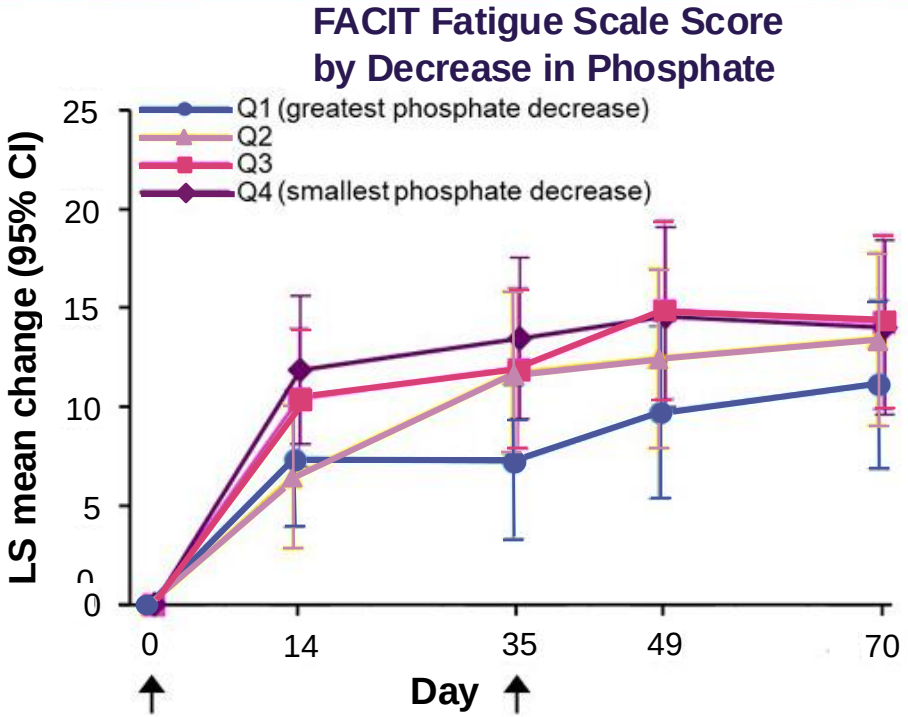
*Hypophosphatemia defined as phosphate < 2.0 mg/dl at any time after 1st dose to day 35

FDI = ferric derisomaltose.

Zoller H, et al. *Gut.* 2023;72(4):644-653.

FACIT Fatigue Scale Scores and by Decrease in Phosphate Rates with FCM vs. FDI





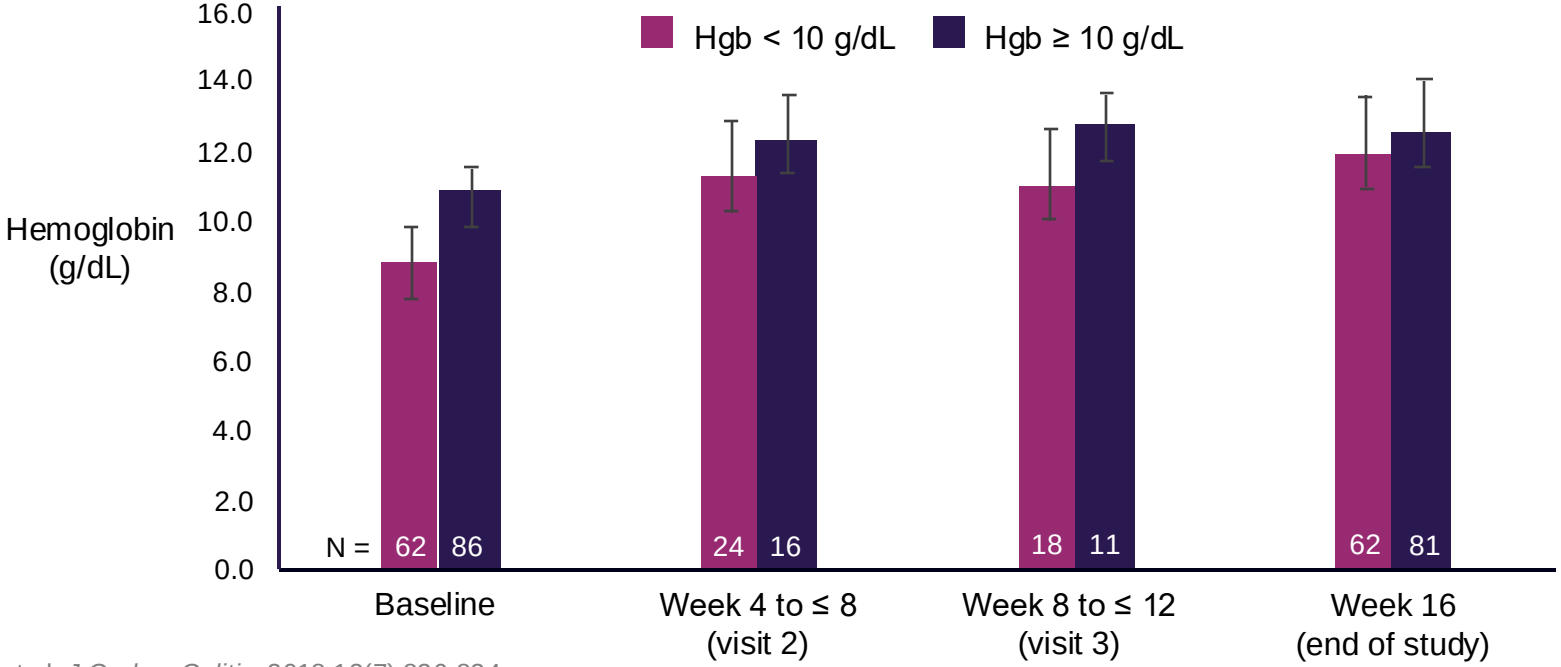
FACIT= Functional Assessment of Chronic Illness Therapy; LS= least square.

Zoller H, et al. *Gut.* 2023;72(4):644-653.

Treatment with Ferric Carboxymaltose is Effective with Higher and Lower Baseline HgB

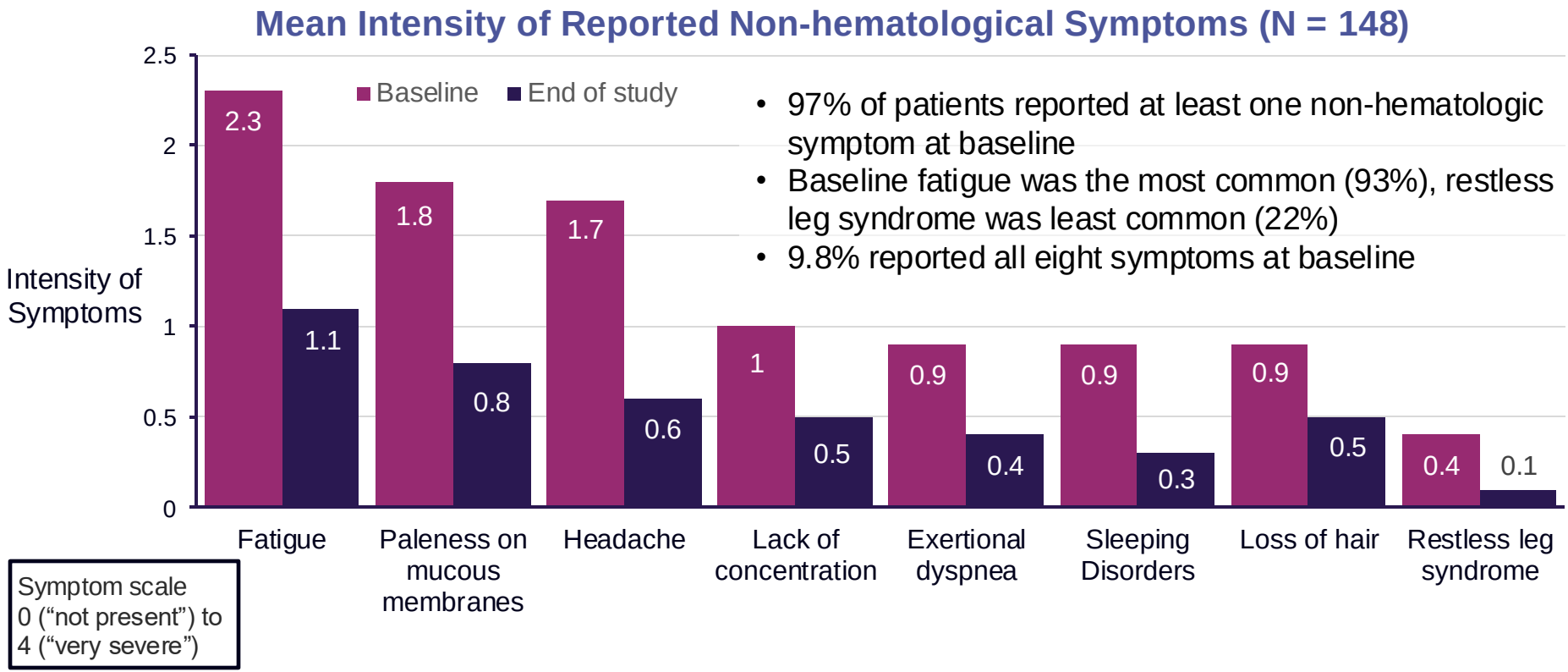
- In all subgroups, the mean increase in Hgb was statistically significant

Visit-by-Visit Changes in Hemoglobin Levels from Baseline to End of Study (N = 148)



Stein J, et al. *J Crohns Colitis*. 2018;12(7):826-834.

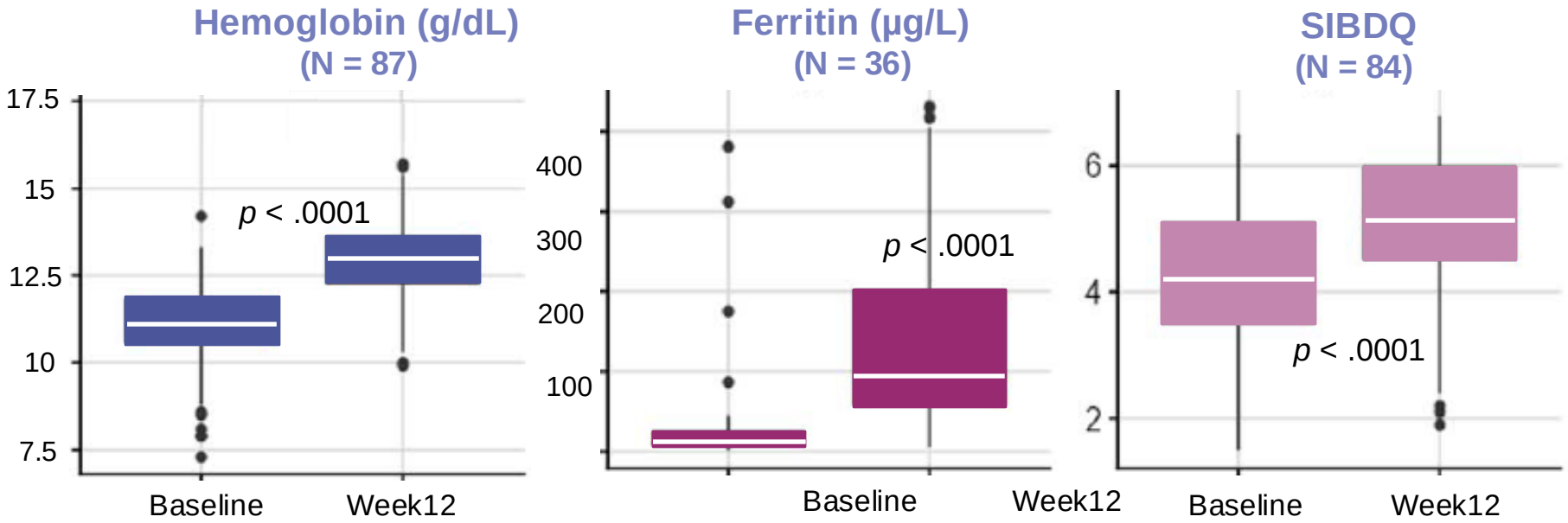
FCM Treatment Improved Non-Hematologic Symptoms of IDA in Patients with IBD



p values for change in symptoms between baseline and end of study not reported.

Stein J, et al. *J Crohns Colitis*. 2018;12(7):826-834.

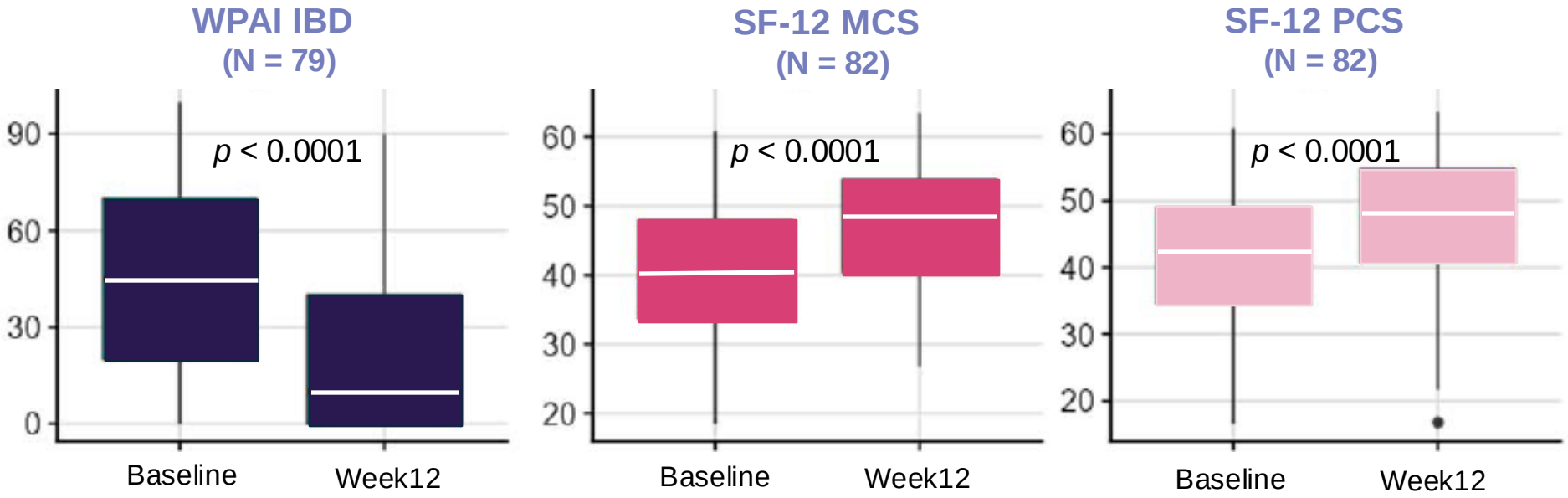
Treatment with Ferric Derisomaltose in Patients with IBD and IDA Improved Hematologic and QoL Parameters



SIBDQ = Short Inflammatory Bowel Disease Questionnaire.

Goodhand JR, et al. *J Crohns Colitis*. 2024;18(Suppl 1):i1131-i1132.

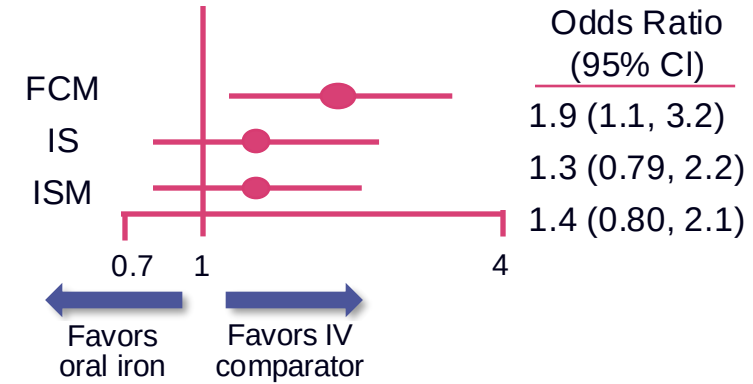
Treatment with Ferric Derisomaltose in Patients with IBD and IDA Associated with Improved QoL and Work Productivity Measures



SF-12 = short form survey 12 item; MCS = mental component scores; PCS = physical component scores; WPAI = Work Productivity and Activity Impairment.
Goodhand JR, et al. *J Crohns Colitis*. 2024;18(Suppl 1):i1131-i1132.

Systematic Review and Network Meta-analysis

Comparative Efficacy of IV Iron Formulations



Conclusions

FCM was the most effective IV iron formulation, followed by iron sucrose. In addition, FCM tended to be better tolerated. Thus, nanocolloidal IV iron products exhibit unique therapeutic and safety characteristics and are not interchangeable.

- 5 randomized controlled trials (N = 1,143)
- Agents studied
  - Ferric carboxymaltose (FCM)
  - Iron sucrose (IS)
  - Iron isomaltoside (ISM, i.e., derisomaltose)
  - Did not include dextran, ferumoxytol, or sodium ferric gluconate
- Only ferric carboxymaltose was significantly more effective than oral iron in achieving Hgb normalization (OR: 1.9; 95% CI: 1.1–3.2)
- Rank probabilities showed FCM to be most effective, followed by iron sucrose, iron isomaltoside, and oral iron

*Primary outcome was therapy response, defined as Hb normalization or increase ≥ 2 g/dL.
IS = iron sucrose; ISM = iron isomaltoside.

Aksan A, et al. *Aliment Pharmacol Ther.* 2017;45(10):1303-1318.

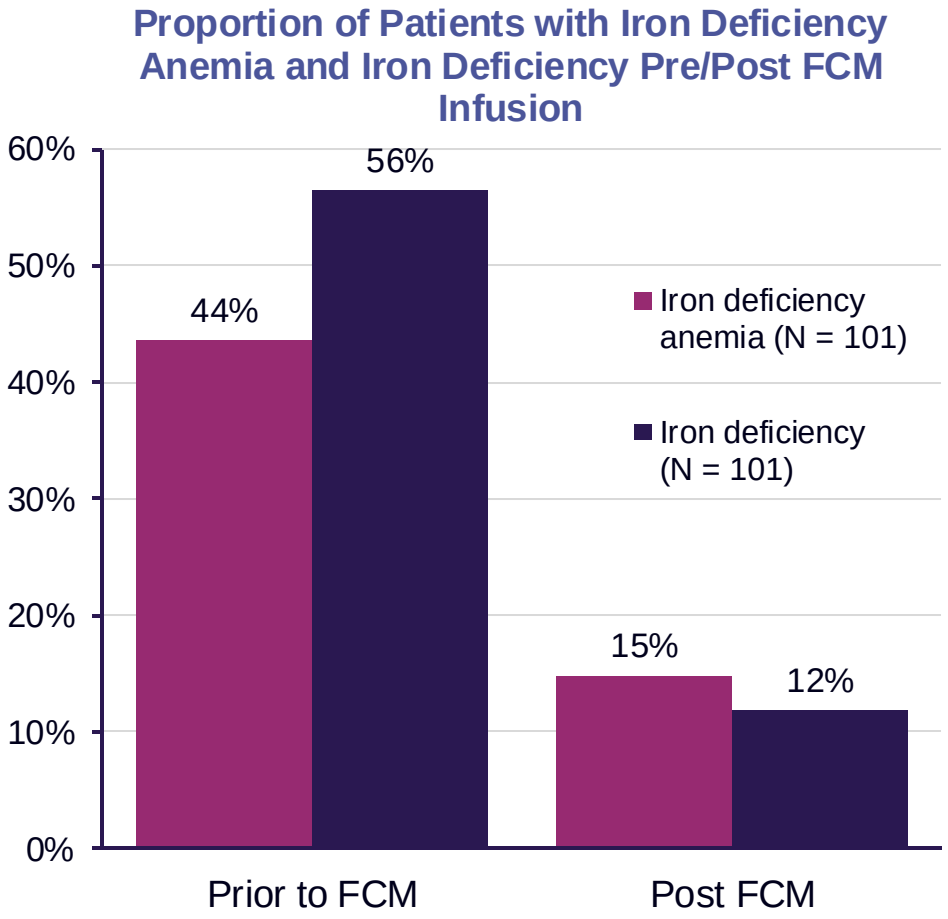
NASPGHAN 2020: Treatment of Anemia in Pediatric Patients with IBD

- Iron deficiency anemia should be treated via iron supplementation, optimizing dietary intake, *and* controlling the disease activity
- Trial of oral iron recommended for *mild* anemia (Hgb ≥ 10 g/dL) and/or quiescent disease
- IV iron if oral iron is ineffective or poorly tolerated, if moderate-severe anemia, and/or with active inflammation
- No specific IV formulation specified over another
  - FCM is the only third-generation product FDA approved for pediatric patients
- Monitoring and treatment targets
  - Repeat Hgb 2-4 weeks after initiation
  - Increase in Hgb level of 1 g/dL in 2 weeks or 2 g/dL in 4 weeks = success
  - Target serum ferritin of up to 400 µg/L and typically target Hgb = 12 g/dL

Goyal A. *J Pediatr Gastroenterol Nutr.* 2020;71(4):563-582.

Ferric Carboxymaltose in Pediatric IBD and Iron Deficiency Anemia

- Population: patient age 6-18 years
- Single center, uncontrolled prospective cohort
- Iron formulation: FCM given 15 mg/kg in a single dose
- Resolution of prespecified endpoints
  - Iron deficiency anemia: 64%
  - Iron deficiency: 81%
- Elevation of baseline CRP did not influence outcome of iron deficiency anemia resolution
- Patients with quiescent disease were more likely to have resolution of iron deficiency



Carman N, et al. *Transl Pediatr*. 2019;8(1):28-34.

Personalizing Care in Iron Deficiency Anemia With IBD

- Consider patient resources and ability to access treatment when choosing between IV or oral iron
- Coordinate IV iron administration with other IBD treatments
- Consider patient-specific circumstances
  - Impact of symptoms on disability: work/home life and symptom duration
  - If transportation/work schedule issues, consider number of infusions needed when choosing an IV product
  - Ask about subtle symptoms of iron deficiency (e.g., fatigue, cognitive impairment, restless leg syndrome, dyspnea on exertion, etc.)

Reddy S, et al. *J Clin Gastroenterol*. 2022;56(9):e318-e322.

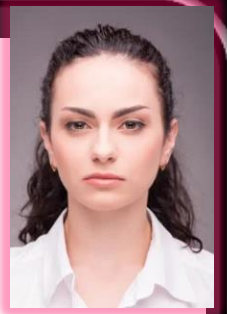
Same-Day Infusion of Iron and Biologic Therapy in Patients With IBD

	Patients Receiving Same-Day Biologic Infusion	Patients Receiving Biologic Infusion on a Different Day Than Iron Infusion
	N = 129 (%)	**N = 45 (%)**
Patients who experienced any infusion reaction	6 (5%)	3 (7%)
Reaction Type		
Anaphylaxis	2	1
Dyspnea	1	0
Flushing or lightheadedness	2	2
Nausea/vomiting	1	0

Reddy S, et al. *J Clin Gastroenterol*. 2022;56(9):e318-e322.

Patient Case

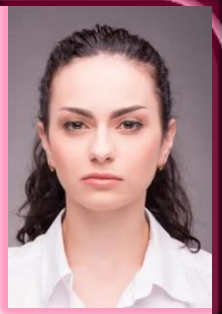
Patient Case: Charla M. (27 y/o woman)



- 5-year history of left-sided UC
- Current RX: mesalamine 2.4 gm/day
- 6-week history of daily diarrhea and tenesmus attributed by the patient to increased lactose ingestion. No rectal bleeding reported.
- Reports DOE climbing stairs, difficulty sleeping at night the past few months (spouse notes constant leg movement when asleep), fatigue with swimming and jogging
- Visit with OB-GYN 2 months ago, prescribed ferrous sulfate 325 mg PO daily after report of fatigue attributed to “heavy menses”
  - PO ferrous sulfate associated with nausea and constipation

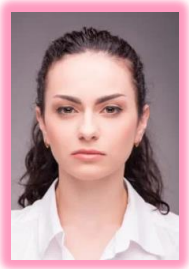
DOE = dyspnea on exertion; OB-GYN = obstetrics-gynecology; RX = prescription.

Patient Case (continued): Next steps



- Patient instructions
  - Limit lactose ingestion, take lactase enzyme supplements if needed
  - Stop PO iron supplement
- Laboratory and stool studies
  - FCP, CRP
  - CBC, CMP
  - Iron studies
  - Consider infectious workup (enteric pathogens, *Clostridioides difficile*, ova/parasite testing)

CBC = complete blood count; CMP = complete metabolic panel ; FCP = fecal calprotectin test.



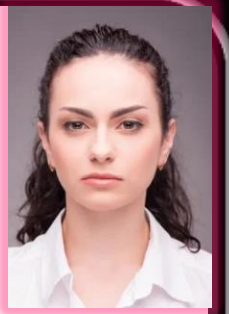
Patient Case: Lab Results

Lab (normal range)	Patient Values
Hgb (12.0-16.0 g/dL)	12.1 g/dL
Hematocrit (36%-48%)	37%
MCV (80-100 fL)	83.4 fL
RDW (12.2%-16.1%)	14%
Reticulocyte count (0.5% to 2.5%)	1.2%
WBC (4.5-11 x 10^9/L)	8.0
Platelets (150-450k/µL)	450k/µL

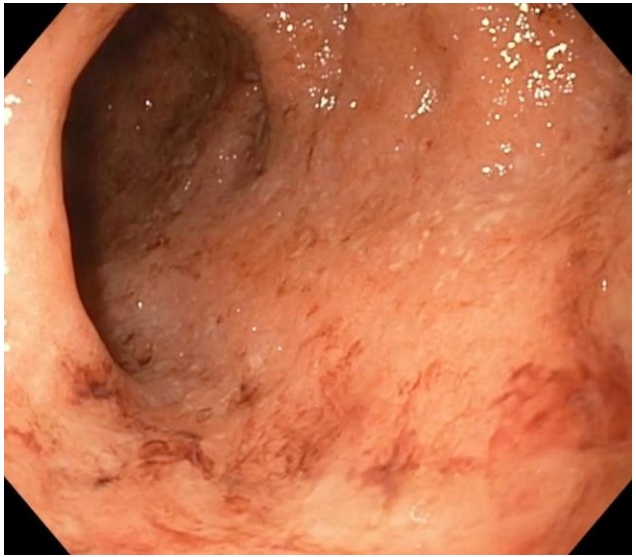
MCV = mean corpuscular volume; RDW = red cell distribution width; TIBC = total iron-binding capacity; WBC = white blood cells.

Lab (normal range)	Patient Values
Serum iron (60-170 µg/dL)	45 µg/dL
Transferrin (215-380 ng/mL)	320 ng/mL
TIBC (250-450 mg/dL)	460 mg/dL
TSAT (20%-50%)	10%
Ferritin (12-150 ng/mL)	42 ng/mL
CRP (< 5 mg/L)	4 mg/L
Fecal calprotectin (50-200 µg/mg)	45 µg/mg
Stool culture, enteric pathogens	Negative
Clostridioides difficile	Negative
Ova and parasite negative	None seen

Patient Case (continued): Charla M.



- Scope results: moderate-severe active disease, rectal sparing, biopsy of sigmoid abnormal, ulcerations in sigmoid colon, erosions, MAYO-2



Treatment Options for UC

Anti-TNF
- Infliximab
- Adalimumab
- Golimumab

Anti–IL-12/23
- Ustekinumab

Anti–IL-23
- Mirikizumab

S1P receptor modulator
- Ozanimod
- Etrasimod

JAK inhibitor
- Tofacitinib
- Upadacitinib

Anti-integrin
- Vedolizumab

IL = interleukin; JAK = Janus kinase.

Das R, et al. *J Can Assoc Gastroenterol*. 2023;7(1):9-21. Shirley M. *Drugs*. 2024;84(2):247-254.

Intravenous Iron Dosing

- Ganzoni calculation not used in clinical practice
- More common practice is to utilize labeled or weight-based doses or dose per local protocols
- Dosing can be guided by severity of anemia and clinical situation
- Any patient getting an RBC transfusion needs iron supplementation; packed RBCs contain little iron

Patel D, et al. *Curr Treat Options Gastroenterol*. 2018;16(1):112-128.

Selecting an IV Iron Product

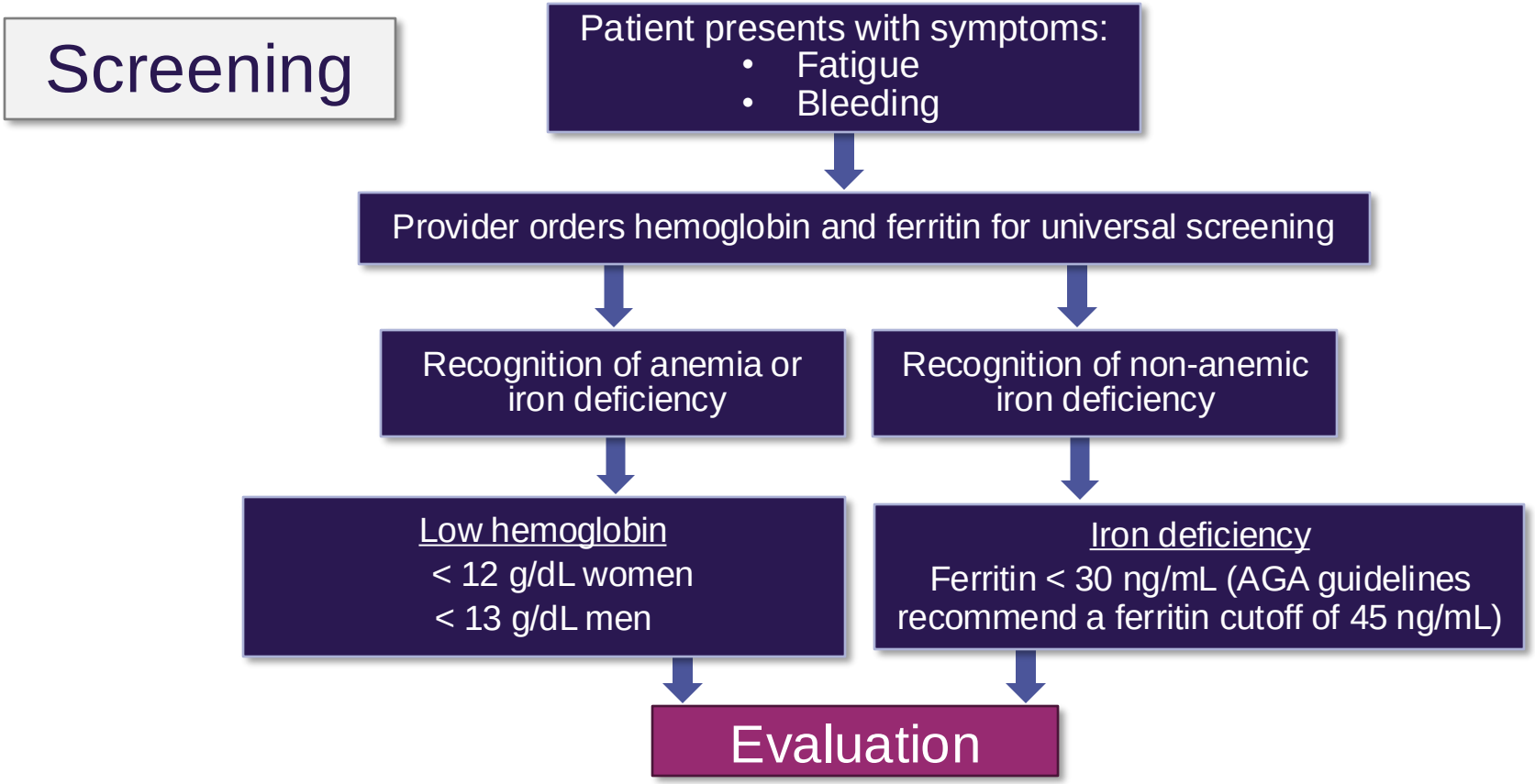
IV Iron Product	Dosing and Administration
Iron dextran	• 100 mg IV push daily or as total dose infusion* • Minimum 1-hour infusion time
Ferric gluconate	• 125 mg or 250 mg (adults) or 1.5 mg/kg in pediatric patients • 1-hour infusion weekly for up to 8 weeks
Iron sucrose	• 100-400 mg; dose may be repeated based on clinical response and iron indices, slow IV injection or as a 15-minute infusion
Ferric carboxymaltose	• Weight ≥ 50 kg: 1,000 mg (single dose) or 750 mg infusion x 2 doses (total 1,500 mg) at least 7 days apart • Weight < 50 kg: 15 mg/kg x 2 doses at least 7 days apart • 15-minute infusion
Ferumoxytol	• 510 mg with a second 510 mg dose 3-8 days later • 15-minute infusion
Ferric derisomaltose	• 1,000 mg, given over at least 20 minutes

*Doses up to 2,000 mg have been reported in patients with IBD

Anand IS, et al. *Circulation*. 2018;138(1):80-98. Bohm N. *Am J Manag Care*. 2021;27(suppl 11):S211-S218. Injectafer® (ferric carboxymaltose injection) [package insert]. Shirley, NY: American Regent, Inc. Revised 2018. https://www.accessdata.fda.gov/drugsatfda_docs/label/2018/203565s005lbl.pdf. Koutroubakis IE, et al. *Dig Dis Sci*. 2010;55(8):2327-2331. Monoferric (ferric derisomaltose injection) [package insert]. Holbaek, Denmark: Pharmacosmos A/S. Revised 2020. https://www.accessdata.fda.gov/drugsatfda_docs/label/2020/208171s000lbl.pdf. Venofer (iron sucrose) [package insert]. Shirley, NY: American Regent, Inc. Revised 2020. https://www.accessdata.fda.gov/drugsatfda_docs/label/2021/021135Orig1s037lbl.pdf.

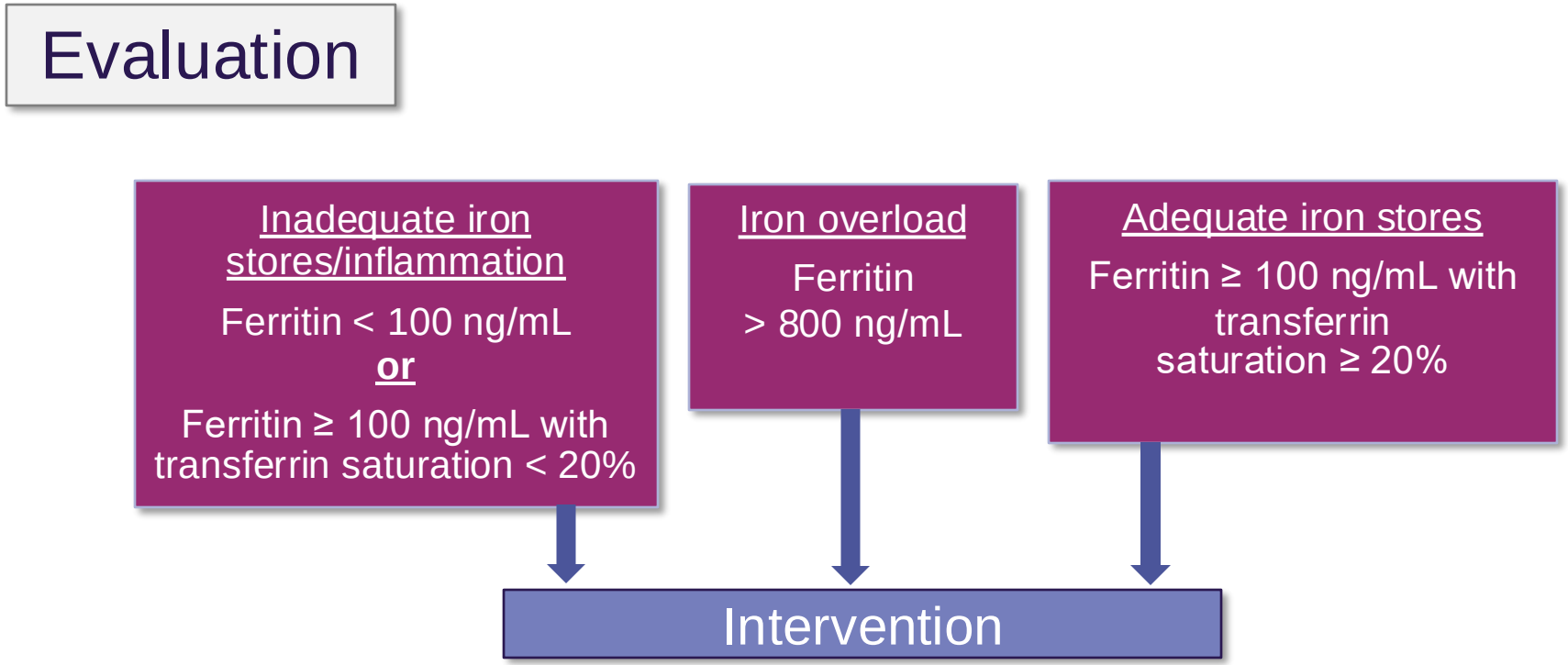
Management of Iron Deficiency Anemia in Patients with IBD

QORUS CCF Iron Deficiency Anemia Treatment Pathway



IBD Qorus IDA treatment pathway. Hou JK, et al. *Inflamm Bowel Dis*. 2016;22(9):2200-2205. Patel D, et al. *Curr Treat Options Gastroenterol.* 2018;16(1):112-128.

Management of Iron Deficiency Anemia in Patients with IBD
QORUS CCF Iron Deficiency Anemia Treatment Pathway



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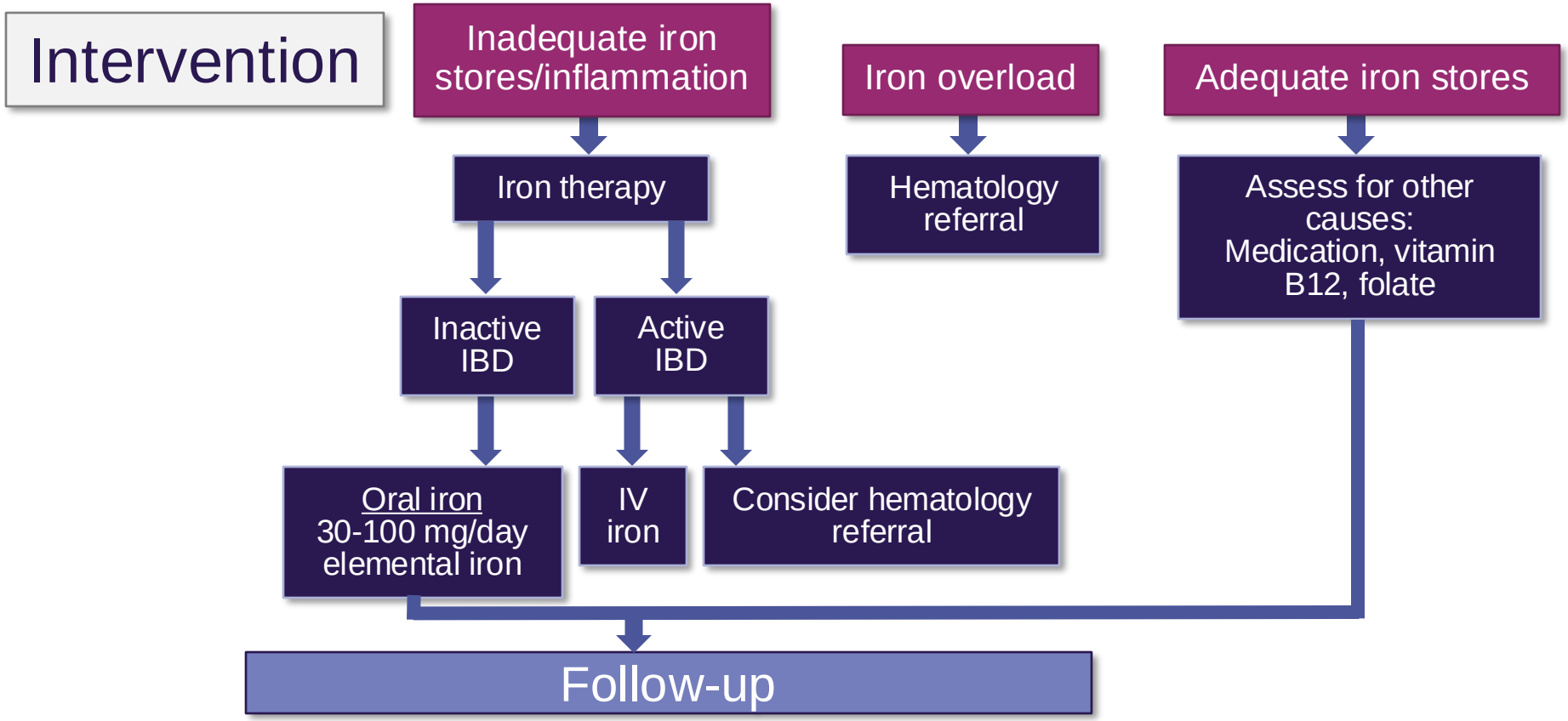
Management of Iron Deficiency Anemia in Patients with IBD

QORUS CCF Iron Deficiency Anemia Treatment Pathway

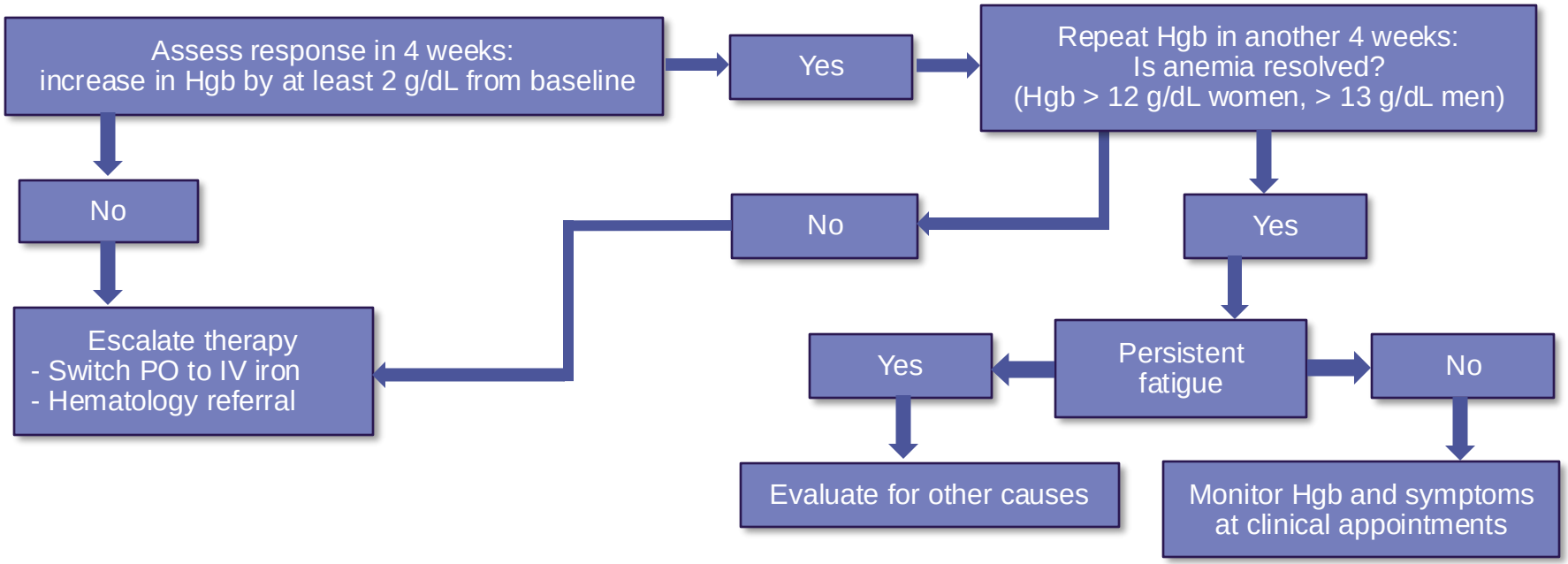


IBD Qorus IDA treatment pathway. Hou JK, et al. *Inflamm Bowel Dis*. 2016;22(9):2200-2205. Patel D, et al. *Curr Treat Options Gastroenterol.* 2018;16(1):112-128.

Management of Iron Deficiency Anemia in Patients with IBD

QORUS CCF Iron Deficiency Anemia Treatment Pathway

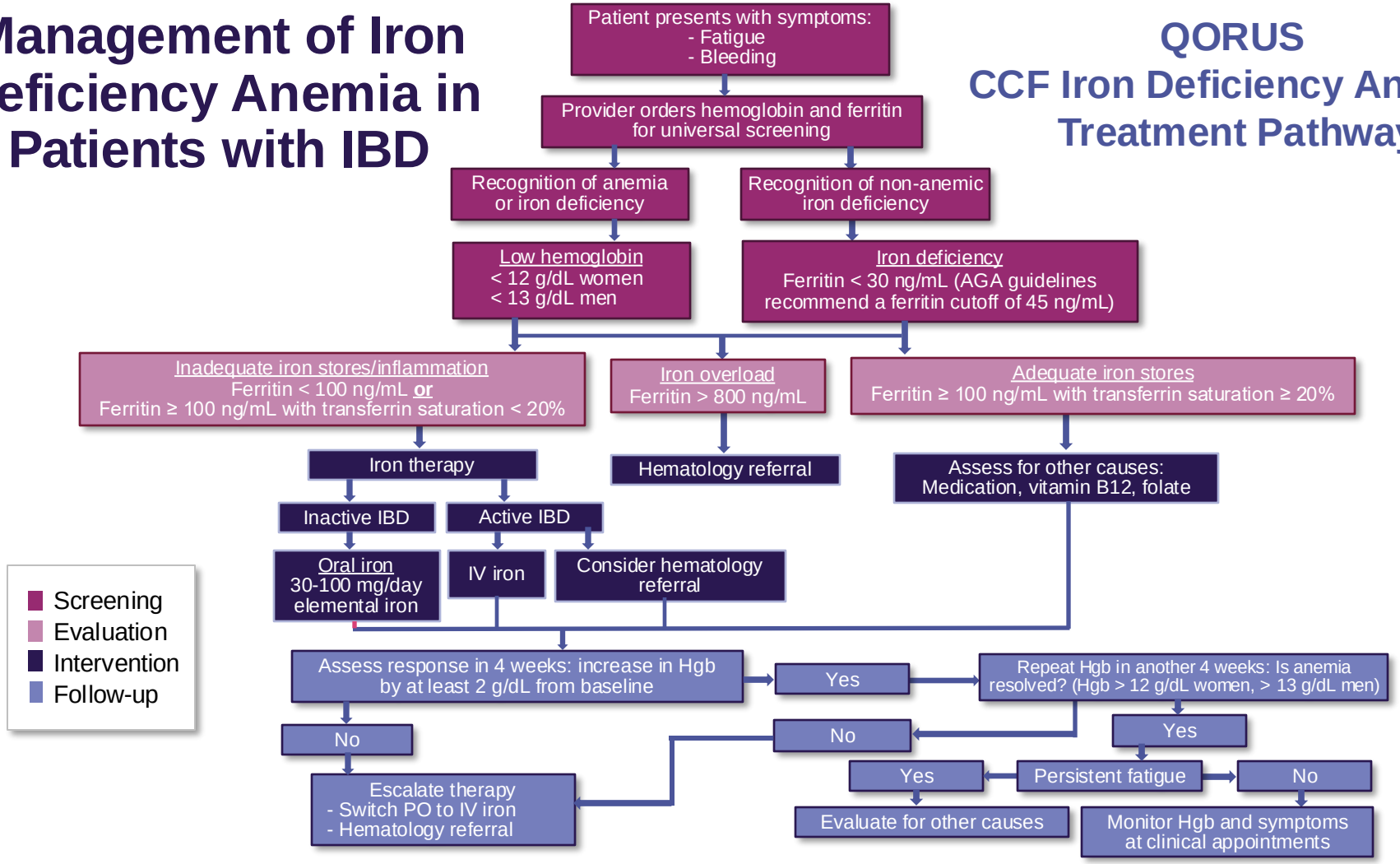
Follow-up



IBD Qorus IDA treatment pathway. Hou JK, et al. *Inflamm Bowel Dis*. 2016;22(9):2200-2205. Patel D, et al. *Curr Treat Options Gastroenterol.* 2018;16(1):112-128.

Management of Iron Deficiency Anemia in Patients with IBD

QORUS
CCF Iron Deficiency Anemia Treatment Pathway

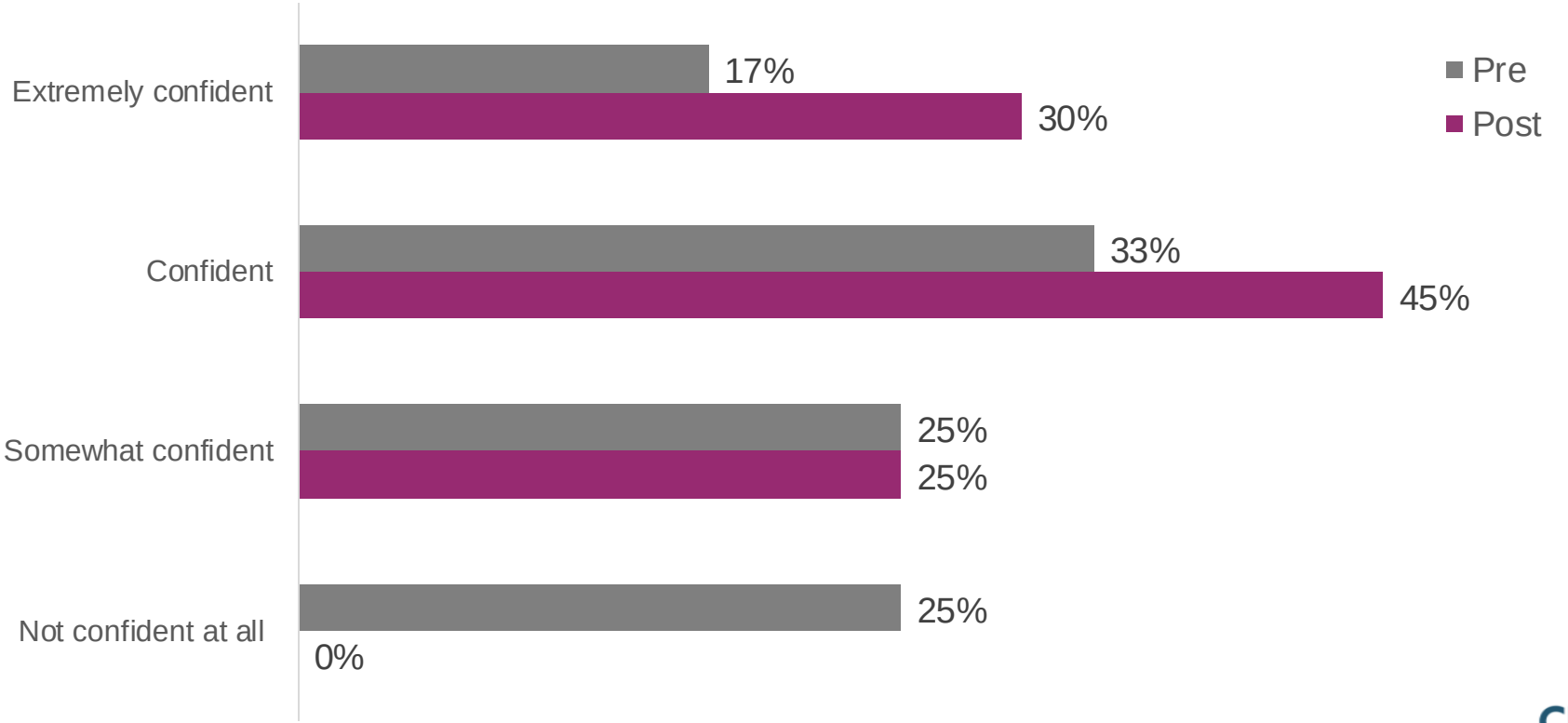


Audience Response

Now, how confident do you feel in your ability to identify a patient with IBD in need of iron treatment for iron deficiency or iron deficiency anemia?

A. Not confident at all
B. Somewhat confident
C. Confident
D. Extremely confident

Now, how confident do you feel in your ability to identify a patient with IBD in need of iron treatment for iron deficiency or iron deficiency anemia?



Results recorded on May 20, 2024.

SMART Goals

Specific, Measurable, Attainable, Relevant, Timely

- Utilize oral iron only in patients with inactive IBD
- Interpreting ferritin - for the presence of iron deficiency
  - Quiescent IBD: ferritin up to 45 ng/L
  - Active IBD: ferritin up to 100 ng/L
- Re-evaluate patients with IBD and iron deficiency anemia ~ 4 weeks after initiation of oral or IV iron supplementation to determine treatment efficacy

QUESTIONS & ANSWERS

Thank you for joining us.
Don’t forget to collect your credit.

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FORGING A NEW FRONTIER

Revolutionizing Iron Deficiency Therapy in Patients with Inflammatory Bowel Disease

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