Ferric Citrate Under Investigation for the Treatment of Iron Deficiency Anemia (IDA) in Adults with Non-Dialysis Dependent Chronic Kidney Disease: Keryx Biopharmaceuticals Clinical Trial Backgrounder

About Ferric Citrate in Iron Deficiency Anemia

Ferric citrate is in development for the treatment of iron-deficiency anemia (IDA) in adults with stage 3 – 5 chronic kidney disease who are not yet on dialysis -- often referred to as pre-dialysis patients or patients with non-dialysis dependent chronic kidney disease (NDD-CKD). IDA is one of the most common complications of chronic kidney disease and its severity increases as chronic kidney disease progresses.

Ferric citrate has been studied for the treatment of IDA in two clinical trials: Results from the Phase 2 trial were announced in November 2013 and results from the Phase 3 trial were announced in March 2016 (see table for details). The objective of each trial was to evaluate the effectiveness and safety of ferric citrate in the treatment of IDA. Across both trials, patients were administered 1-g ferric citrate containing 210 mg of ferric iron.

Study	Type of patients enrolled	No. of people Enrolled	Duration of Ferric Citrate Treatment	Primary Endpoint(s)	Secondary Endpoints	Results
Phase 2	NDD*-CKD with elevated serum phosphorus and IDA**	149 at 20 sites	12-weeks	*Co-primary endpoints* Mean changes in serum phosphorus and transferrin saturation (TSAT) from baseline to the end of 12-week treatment period versus placebo	Mean changes in ferritin (iron), hemoglobin and FGF-23 from baseline to the end of the 12-week treatment period versus placebo	Met all primary and pre-specified secondary endpoints[1]
Phase 3[2]	NDD*, stage 3-5 CKD with IDA	234*** at 32 sites	16-weeks	Proportion of patients achieving a 1 g/dL or greater increase in hemoglobin at any point during the 16-week randomized period	From baseline to end of 16-week randomized efficacy period: - Mean change in hemoglobin (carries blood through the body) - Mean change in TSAT (bloods ability to bind iron) - Mean change in ferritin (stores iron until use) - Proportion of patients with a durable response on hgb (during 16-week efficacy period) - Mean change in serum phosphate	Met all primary and pre-specified secondary endpoints

*NDD is non-dialysis dependent, or pre-dialysis

** IDA or iron deficiency anemia is one of the most common complications of CKD. Approximately 1.6M adults in the U.S. with CKD suffer from IDA

***Patients enrolled had not adequately responded to or tolerated treatment with current oral iron supplements

[1] Results published December 2014 American Journal of Kidney Disease (Am J Kidney Dis. 2015;65(5):728-736)

[2] Keryx Phase 3 IDA study initiation announcement; September 2014; JPMorgan 2016 presentation deck, Phase 3 topline results release, March 2016

Ferric Citrate Under Investigation for the Treatment of Iron Deficiency Anemia (IDA) in Adults with Non-Dialysis Dependent Chronic Kidney Disease: Keryx Biopharmaceuticals Clinical Trial Backgrounder

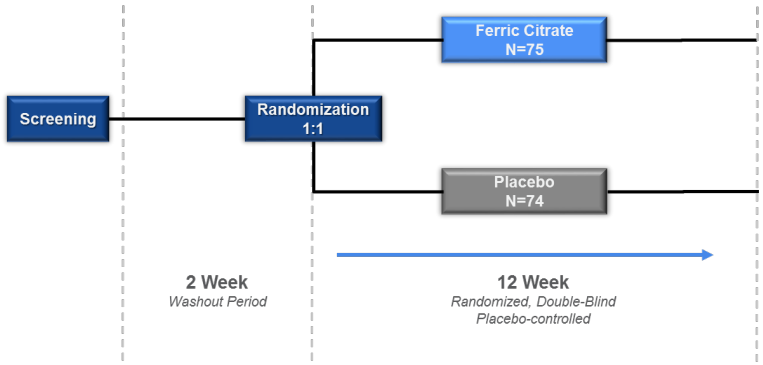
About the Ferric Citrate IDA Label Expansion Studies

Phase 2:

The Phase 2 trial evaluated the safety and efficacy of ferric citrate for the treatment of iron deficiency anemia and reduction of serum phosphate levels in patients with pre-dialysis stage 3-5 CKD.

Study design:

As shown below, the trial was a multi-center, randomized, double-blind, placebo-controlled study that enrolled 149 patients over a 12-week period. Eligible patients were randomly assigned 1:1 to ferric citrate or placebo. No intravenous (IV) iron or erythropoiesis-stimulating agents (ESAs)—medicines injected into the body to increase red blood cell production – were permitted during the trial, with a washout from both agents preceding the study.



Block et al. *Am J Kid Dis.* 2015;65(5):728-736.

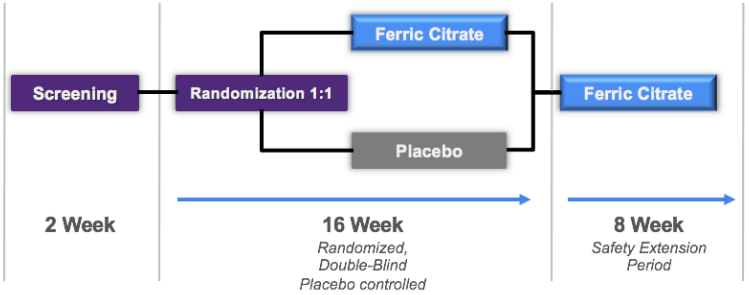
Phase 3:

Based on the encouraging proof-of-concept Phase 2 results, the Phase 3 trial was designed to evaluate ferric citrate for the treatment of IDA in adults with NDD-CKD (stage 3-5) CKD.

Study design:

As shown in the diagram below, the study was a multi-center clinical trial, comprised of a 16-week, randomized, double-blind, placebo-controlled period (randomized efficacy period), followed by an 8-week open-label safety extension period in which all patients remaining in the study received ferric citrate. Patients were randomized into the randomized efficacy period in a 1:1 ratio to receive either ferric citrate or placebo. Similar to the Phase 2 study, IV iron and ESA use was prohibited during and leading up to study initiation.

Ferric Citrate Under Investigation for the Treatment of Iron Deficiency Anemia (IDA) in Adults with Non-Dialysis Dependent Chronic Kidney Disease: Keryx Biopharmaceuticals Clinical Trial Backgrounder



Ferric citrate is approved in the U.S. and indicated for the treatment of elevated serum phosphorus levels in patients with chronic kidney disease on dialysis and marketed under the brand name, Auryxia™

Auryxia™ (ferric citrate) Important Safety Information
Contraindication: Patients with iron overload syndrome, e.g. hemochromatosis, should not take Auryxia™ (ferric citrate).

Iron Overload: Iron absorption from Auryxia may lead to increased iron in storage sites. Iron parameters should be monitored prior to and while on Auryxia. Patients receiving IV iron may require a reduction in dose or discontinuation of IV iron therapy.

Auryxia™ (ferric citrate) Important Safety Information (cont'd)

Accidental Overdose of Iron: Accidental overdose of iron containing products is a leading cause of fatal poisoning in children under 6 years of age. Keep Auryxia away from children as it contains iron. Call a poison control center or your physician in case of an accidental overdose in a child.

Patients with Gastrointestinal Bleeding or Inflammation: Safety has not been established for these patients.

Adverse Events: The most common adverse events with Auryxia were diarrhea (21%), nausea (11%), constipation (8%), vomiting (7%) and cough (6%). Gastrointestinal adverse reactions were the most common reason for discontinuing Auryxia (14%). Auryxia contains iron and may cause dark stools, which is considered normal with oral medications containing iron.

Drug Interactions: Doxycycline should be taken at least 1 hour before Auryxia. Ciprofloxacin should be taken at least 2 hours before or after Auryxia.

Ferric Citrate Under Investigation for the Treatment of Iron Deficiency Anemia (IDA) in Adults with Non-Dialysis Dependent Chronic Kidney Disease: Keryx Biopharmaceuticals Clinical Trial Backgrounder

For Full Prescribing Information for Auryxia, please visit http://auryxia.com/important-safety-information/

Keryx Media Contacts:

Amy Sullivan
VP, Corporate Development
Keryx Biopharmaceuticals, Inc.
T: (617) 466-3519
E: amy.sullivan@keryx.com

Lora Pike
Senior Director, Investor Relations
Keryx Biopharmaceuticals, Inc.
T: (617) 466-3511
E: lora.pike@keryx.com