EDISON

Shield Therapeutics

Initiation of coverage

Fortified for growth

Pharma & biotech

Shield Therapeutics is focused on the development and commercialisation of Feraccru, a CHMP-approved oral formulation of iron positioned for the treatment of iron deficiency (ID) with or without anaemia. In 2018, out-licensing Feraccru to Norgine re-established an active salesforce in core EU5 territories and provided Shield with a cash injection of £11m. Additional near-term revenue (royalties and milestones) is expected as Norgine continues rollout of Feraccru across Europe in 2020. In the US, we expect Feraccru approval in 2019. We value Shield at £178m or 153p/share.

Year end	Revenue (£m)	PBT* (£m)	EPS* (p)	DPS (p)	P/E (x)	Yield (%)
12/16	0.30	(13.5)	(12.7)	0.0	N/A	N/A
12/17	0.64	(18.4)	(15.2)	0.0	N/A	N/A
12/18e	11.90	(5.9)	(3.6)	0.0	N/A	N/A
12/19e	3.04	(9.3)	(6.7)	0.0	N/A	N/A

Note: *PBT and EPS are normalised, excluding amortisation of acquired intangibles and exceptional items.

ID & IDA presents a significant market opportunity

Iron deficiency anaemia (IDA) is large market globally; the 2015 Global Burden of Disease study estimated prevalence of c 1.5bn worldwide. Treatment discontinuation rates are high (30–60%) with first-line treatment utilising salt-based oral iron products (intolerable side effects) – the alternative is IV iron (requires hospital admission, higher costs, risk of anaphylaxis). Feraccru is non-salt-based oral iron with a preferential side effect profile (comparable to placebo), uniquely positioning it as an oral alternative to IV iron that aims to capture a portion of the IV iron market (c $1.1bn in 2017), which is forecast to grow (5.6% CAGR to 2024).

Partners key to Europe and US Feraccru sales

Norgine is re-establishing Feraccru sales in core markets (re-launching in the UK and Germany in December 2018) and will roll out into additional markets in Europe (as covered by the licensing deal) from 2020. Shield will be eligible for royalties on sales (25–40%) and milestone payments (up to €54.5m) for sales in Europe. Partnering strategies enhance economic returns and de-risk the investment case. Cost reductions enacted in 2018 have effectively lengthened Shield's cash reach into 2020; we forecast sustainable profitability from 2022. Key inflections in 2019–20 include potential regulatory approval in the US (and partnering deal); top-line data from the head-to-head study, which could drive uptake in clinical adoption; sales growth across Europe and the US; and outcomes from patent objections from Teva.

Valuation: £178m or 153p/share

Our valuation of Shield, at £178m or 153p/share, is based on a risk-adjusted NPV model of Feraccru for IDA in Europe and for CKD/IBD-related IDA in the US market. Our NPV calculation is based on Feraccru achieving 2029 peak sales of £334m from Europe (€133m) and the US ($251m). Should a broader US label be granted, our fair value increases to 203p/share. A successful patent challenge from Teva will reduce the duration of exclusivity from 2035 to 2029 (provided by a manufacturing patent) and decreases our valuation to 92p/share. Given its commercial availability, we have utilised a 10% discount rate and risk-adjusted the US opportunity accordingly (75%).

19 February 2019

Price	**48.5p**
Market cap	**£57m**
	US$/£0.76, €/£0.87, US$/€0.87
Net cash (£m) at 31 December 2018	9.8
Shares in issue	116.4m
Free float	28%
Code	STX
Primary exchange	AIM
Secondary exchange	N/A

Share price performance

%	1m	3m	12m
Abs	33.2	43.5	70.2
Rel (local)	29.0	39.5	72.8
52-week high/low		57.5p	15.5p

Business description

Shield Therapeutics is a commercial-stage pharmaceutical company. Its proprietary product, Feraccru, is approved by the EMA for iron deficiency and is undergoing review with the US FDA. Feraccru is currently marketed through partners Norgine, AOP Orphan and Ewopharma.

Next events

AEGIS-H2H vs IV iron	Q119
Feraccru US PDUFA date	27 July 2019
Feraccru launches in additional European countries	2020

Analysts

Dr Susie Jana	+44 (0)20 3077 5700
Dr Daniel Wilkinson	+44 (0)20 3077 5734
Dr Sean Conroy	+44 (0)20 3681 2534

healthcare@edisongroup.com

Edison profile page

Investment summary

Company description: Partner execution is key

Shield Therapeutics is a commercial-stage speciality pharmaceutical company based in the United Kingdom. Its primary focus is commercialisation of Feraccru, approved by the EMA for the treatment of iron deficiency, which is associated with many chronic illnesses and nutritional deficiencies. Feraccru (ferric maltol) is an oral formulation of iron, developed to overcome the side effect profile of salt-based oral iron therapies (which leads to drug discontinuation) and provides an alternative treatment to intravenously (IV) administered iron. Commercialisation of Feraccru in key markets (ex US) is in the hands of distribution partners Norgine, AOP Orphan and Ewopharma; effective sales execution by Norgine is critical to Feraccru's success, given it has the rights to distribute Feraccru in Europe (ex Scandinavia, Austria and Switzerland), Australia and New Zealand. Shield retains the marketing rights to the US market and will seek a partner once a decision on regulatory approval is reached by the US FDA (PDUFA date of 27 July 2019, although this could be delayed by the US government shutdown). The company was co-founded in 2008, by CEO Carl Sterritt and listed on AIM in 2016, raising £32.5m gross.

Valuation: £178m or 153p/share

Our valuation of Shield Therapeutics, at £178m or 153p/share, is exclusively based on a risk-adjusted NPV model of Feraccru for treatment of iron deficiency anaemia (IDA) in Europe and for CKD/IBD-related IDA in the US market. We are conservative on the US label; the FDA could grant a broader label in the US, which would provide upside to our numbers. Positive data from the AEGIS-H2H study could lead to higher penetration rates in the long term, but this will also be dependent on sales execution by Norgine and a yet to be announced US partner. Our forecasts model Feraccru sales out to 2035, based on the protection currently provided by Shield's patents. Our NPV calculation incorporates end-December 2018 net cash of £9.8m (unaudited); we utilise a 10% discount rate given the commercially available status of the product and have risk-adjusted the US opportunity (75%).

Sensitivities: Dependent on one asset

Shield Therapeutics is subject to various sensitivities common to speciality pharmaceutical companies. The key sensitivities relate to sales execution risk; our forecasts and valuation are dependent on the successful commercialisation of Feraccru by partners. In Europe Teva has filed patent objections, which Shield will defend, but this could weigh on the stock. In the US, the 27 July PDUFA date may be at risk, with the US government shut down affecting resources at the FDA. Furthermore, with the focus on one asset in the short term, Shield's strategy and our valuation are dependent on the successful commercialisation of Feraccru.

Financials: Cash runway into 2020

In 2018 Shield received an £11m upfront licence payment from Norgine and with operating costs significantly reduced following the restructuring of the company in 2018, this implies a cash runway into 2020. We forecast 2019 annual cash burn of £5.1m. Shield is dependent in the near term on royalty and milestone income from partners; a US partnering deal in 2019 should enable an upfront licensing payment. To fund operations beyond 2020, we forecast that an additional c £8m will need to be raised in 2020. We note that, for simplicity, in our model we currently illustrate this as a debt raise. However, an upfront licence payment from a potential US partner (2020) would alleviate the need for a fund-raise. Operating costs (R&D, G&A) will reduce from 2021; we forecast sustainable profitability from 2022 driven by the higher economic value retained by Shield through its partnering activities and reduction in cost base plus contributions from royalties on US Feraccru sales.

Positioned to take advantage of growing IV iron market

Shield's economic value hinges on its sole commercial asset, Feraccru, a treatment for ID and IDA. Feraccru has demonstrated efficacy (consistent improvement in both haemoglobin levels and iron indices), with a side effect profile comparable to placebo, positioning it as a highly tolerable oral iron replacement therapy. Feraccru's positioning is as an oral second-line therapy given to patients intolerant of conventional salt-based oral iron who would otherwise require treatment with intravenously (IV) administered iron and aims to capture a portion of the IV iron market (c $1.1bn in 2017). A critical factor to Feraccru's success will be sales and marketing execution by established partners (Norgine in Europe) and a yet to be announced US partner. Initially, the drug's prospects focus on inflammatory bowel disease (IBD) and chronic kidney disease (CKD) related IDA (specialist physician setting), but could be used more broadly to treat ID with or without anaemia from any cause (primary care physician setting). An ongoing head-to-head study (against market-leading IV iron – Vifor's Ferinject) is expected to complete in Q119.

We forecast peak sales of £334m in 2029 across Europe and US, however given Feraccru's profile our expectations could be conservative. We note that Vifor's Ferinject (Injectafer in the US) dominates this IV iron market, accounting for c 60% of the global market in 2017 with $659m in sales, and is forecast to reach $1.3bn in 2024 (9% CAGR) (source: EvaluatePharma). IV iron is still likely to be the dominant treatment in the acute care setting however, a non-inferiority claim would drive uptake and enable Feraccru to outperform our conservative sales forecasts. We provide an in-depth scenario analysis in our valuation section on how differing assumptions to our base could have a large impact on our valuation of the company.

Furthermore, Shield believes that Feraccru's long-term economic potential resides in treatment of iron deficiency (with or without anaemia). The estimated number of ID patients (with or without anaemia) is huge (management estimates 40m in Europe). However, Feraccru's ability to capture this broader opportunity will be determined on a paradigm shift in physicians diagnosing ID (tested through ferritin, transferrin saturation levels) and prescribing Feraccru to prevent anaemia.

2018 share price underperformance overdone, catalysts are ahead

In early 2018, Shield's share price was heavily affected by the release of top-line data from the pivotal Phase III study AEGIS-CKD. Initial assessment of the blinded top-line data indicated that the trial failed to meet its primary endpoint and show a statistically significant in change of haemoglobin levels. Analysis of the intention-to-treat (ITT) patient population revealed events/factors had occurred to patients in both arms of the study that confounded the primary endpoint; subsequent analysis of this data, as per the protocol's statistical analysis plan (SAP), showed that in this modified ITT (mITT) population the primary endpoint had been met, with a statistically significant increase in haemoglobin levels observed in patients on Feraccru compared to those on placebo. Importantly, the US FDA has accepted the full analysis of the AEGIS-CKD data as part of the NDA submission.

The following events provide key inflections that will define a potentially transformative period in 2019–21:

- Top-line data from AEGIS-H2H (Q119) – positive data would fortify Feraccru's position as a 2L oral alternative to IV iron (prescribing, pricing and reimbursement implications).
- Sales uptake of Feraccru (2019–2021) will be indicative of Norgine's marketing efforts and launches into new markets (and the revenue streams to Shield).
- US FDA decision on Feraccru (PDUFDA date 27 July 2019) – the breadth of the label, and a potential partnering deal for the US marketing rights, will further define the US opportunity.

Norgine marketing efforts key to EU5 sales

In September 2018 Shield announced a partnering deal with Netherlands-based Norgine, to market Feraccru in Europe (excluding those countries covered by pre-existing AOP Orphan and Ewopharma agreements), Australia and New Zealand. Importantly the deal enabled a cash injection of £11m to Shield (upfront payment). As of January 2019, Norgine has re-launched selling and marketing activities in the UK and Germany (80 reps), further launches (eg Spain, France, Italy) will be dependent on reimbursement decisions (expected in 2020) following AEGIS-H2H data in Q219.

Streamlined strategy to enhance long-term shareholder returns

Following the initial readout of the AEGIS-CKD study, Shield enacted a prudent cost reduction program to extend its cash runway. Primarily, this involved cessation of its Feraccru salesforce (18 reps) and moving the commercialisation strategy to out-licensing. Streamlining the company has resulted in a lean organisation, with the operating cost base now relating to R&D spend (associated with clinical studies for Feraccru, which are part of the CHMP requirement) and G&A. Operating costs will start to reduce from 2021. We expect investors to increasingly recognise the higher economic value retained by Shield through its lower-risk partnering activities and forecast sustainable profitability from 2022 with long-term margins of 56% (2024).

Feraccru: Uniquely positioned to treat iron deficiency

Feraccru is a differentiated treatment for iron deficiency (ID) and iron deficiency anaemia (IDA); it is a unique oral (non-salt) formulation which, unlike salt-based oral irons, does not release free iron in the intestine, mitigating the gastrointestinal side effects caused by oral iron salts. Iron levels in the body are regulated at this point of absorption; as such Feraccru cannot circumvent this regulated process that maintains iron homeostasis. IV iron circumvents this process by being administered directly into systemic circulation, carrying a risk of iron overload and allergic reaction (anaphylaxis) requiring hospital admission and close monitoring. As such, Feraccru has been positioned (and is being marketed in Europe) as a second-line (2L) treatment option (twice daily for a minimum of 12 weeks) to treat ID in patients who are intolerant of 1L salt-based oral irons, and require treatment with intravenous (IV) iron therapy to restore both blood haemoglobin (Hb) levels and iron stores. Exhibit 1 highlights Feraccru's positioning to IV iron (Vifor Pharma's Ferinject) and salt-based oral irons and its key differentiating features to its competitors. Feraccru will not replace the need for IV iron; rather it provides an alternative option for patients intolerant of salt-based oral irons.

Exhibit 1: Treatment options for iron deficiency anaemia

	Salt-based oral iron (ie ferrous sulphate)	Feraccru (ferric maltol)	IV iron (ie Ferinject)
Intervention	**1L** – mild to moderate iron deficiency anaemia	**2L** – mild to severe iron deficiency anaemia	**2L** – moderate to severe iron deficiency anaemia
Dosage	**Oral** – 200–300mg thrice daily, recommended to be taken with food	**Oral** – 30mg twice daily, on an empty stomach	**Intravenous** – multiple infusions administered in an acute care setting
Efficacy	**Efficacious** – when intestinal absorption is not impaired	**Efficacious** – improves both haemoglobin levels and iron stores, clinical evidence established in CKD and IBD patient populations	**Efficacious** – fast repletion of iron stores and particularly effective when intestinal absorption is impaired
Safety & tolerability	**Safe but poorly tolerated** in certain patients due to gastrointestinal side-effects (particularly in patients with IBD) leading to poor-compliance and worsening of condition	**Safe and well tolerated** with placebo-like side-effects. Formulation enables individuals to absorb as much iron as needed; unrequired drug is excreted and with no concerns of iron overload	**Safe – but has an associated risk with iron overload** (haemochromatosis), hypophosphatemia and anaphylaxis
Cost effectiveness	**~£5–10 per 12-week course** Cheap and broadly prescribed	**~£150 per 12-week course** Priced in-line with IV iron but mitigates cost of acute care	**~£100–300 per treatment course** Additional costs incurred due to administration inpatient hospital care setting

Source: Edison Investment Research. Note: CKD – chronic kidney disease, IBD – inflammatory bowel disease.

Iron is critical for life

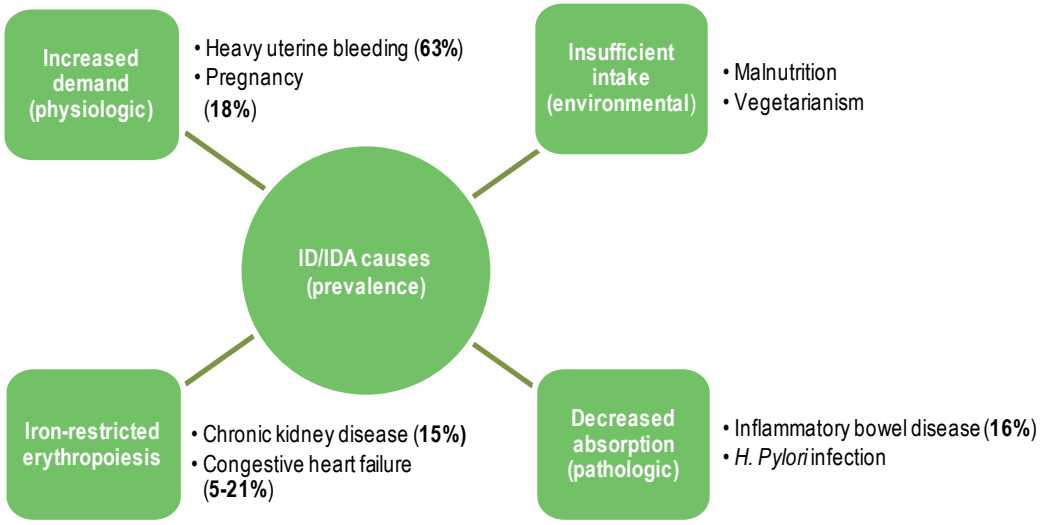
Iron plays an essential role as a co-factor in various enzymes, with its ability to readily cycle (redox) between two states ferric (Fe^{3+}) and ferrous (Fe^{2+}) underpinning its utility. It is the critical component of haemoglobin (Hb), a protein found in red blood cells (RBC), which transport oxygen throughout the body. Haemoglobin represents approximately two-thirds of the body's iron. RBCs have finite lives (100–120 days) and the body constantly makes new RBCs, as the body's need for iron is on a continual basis. The human body is dependent on its iron stores and daily intake of iron. Lack of or low iron levels (iron deficiency) in the body causes defective production of red blood cells (erythropoiesis) leading to anaemia, and is characterised by RBCs containing lower haemoglobin levels. The consequent reduction in oxygen supply to tissues (caused by anaemia) leads to a multitude of symptoms including weakness, fatigue and cognitive impairment; this clinical condition is defined as iron deficiency anaemia (IDA).

Iron deficiency is diagnosed by a biochemical test for low ferritin levels, whereas IDA is diagnosed by a biochemical test for Hb levels; both are done by venepuncture (blood sampling). According to the World Health Organization (WHO), adult males and females with blood Hb concentrations below 13 and 12g/dL, respectively, are considered anaemic (<11g/dL during pregnancy). We focus on IDA versus ID as the majority of initial blood tests conducted focus on full blood count, which includes Hb levels. Doctors must specifically request iron studies (to test for ferritin) to identify ID, which although more routine in inflammatory bowel disease (IBD) and chronic kidney disease (CKD) is not routine for all patients.

Iron deficiency anaemia: A global health problem

Iron deficiency anaemia (IDA) is the most common cause of anaemia globally (c 50%); the Global Burden of Disease Study 2015 estimating IDA was prevalent in c 1.5 billion people globally and was the fourth leading cause of years lived with a disability. IDA is the most common nutritional disorder globally, yet it remains underdiagnosed and under treated across all countries. The prevalence of IDA is generally higher in countries with chronic malnutrition, but is poorly controlled in developed countries where diet is not the underlying cause. The prevalence of IDA can vary by country, but it is estimated that c 3% of the population across Europe and the US are diagnosed with IDA; in the UK alone an estimated four million people are believed to have the condition; the launch of the Anaemia Manifesto by UK Parliament in 2016 highlights the need for improvement in diagnosis rates and adequate treatment options.

Exhibit 2: Causes of ID/IDA and patient prevalence numbers



Source: Edison Investment Research

IDA can be caused by insufficient uptake (poor dietary intake), inadequate absorption (eg IBD) and increased need for iron by the body (pregnancy, acute or chronic blood loss, stomach ulcers, and cancers). This initiation note focuses on iron deficiency and IDA associated with IBD and CKD given the pivotal Phase III clinical trials were conducted in these patient subsets. Lifecycle management of Feraccru could involve conducting post-marketing studies targeting large primary care groups (eg women's health, pregnancy, menstrual blood loss) to expand the prescriber base beyond hospital care.

Treatment dependent on severity and cause

Treatment of ID or IDA is usually in the form of iron supplements in addition to treatment of the underlying cause. Iron can be administered orally as a ferrous or a ferric salt, oral ferrous salts (OFP – oral ferrous products) are the most commonly prescribed iron replacement therapy. Many of these OFPs are available as generics and are typically needed to be taken daily for up to six months in order to adequately restore the body's iron stores. While these products are utilised widely, a significant proportion (c 30%) of patients suffer from gastro-intestinal adverse events (eg nausea, pain, constipation, diarrhoea, black stools) that lead to discontinuation of treatment. IBD patients with active disease (Crohn's disease and ulcerative colitis) report higher discontinuous rates (c 60%) as these side effects can present more of a burden as the gastro-intestinal tract is already inflamed. For patients who require therapy following failure of OFPs or severely anaemic patients, the alternative is intravenous (IV) iron administration. IV iron is highly effective at restoring the body's iron levels; however, it must be administered in a hospital setting and can be associated with risk iron overload and anaphylaxis.

Feraccru's development and patent exclusivity period

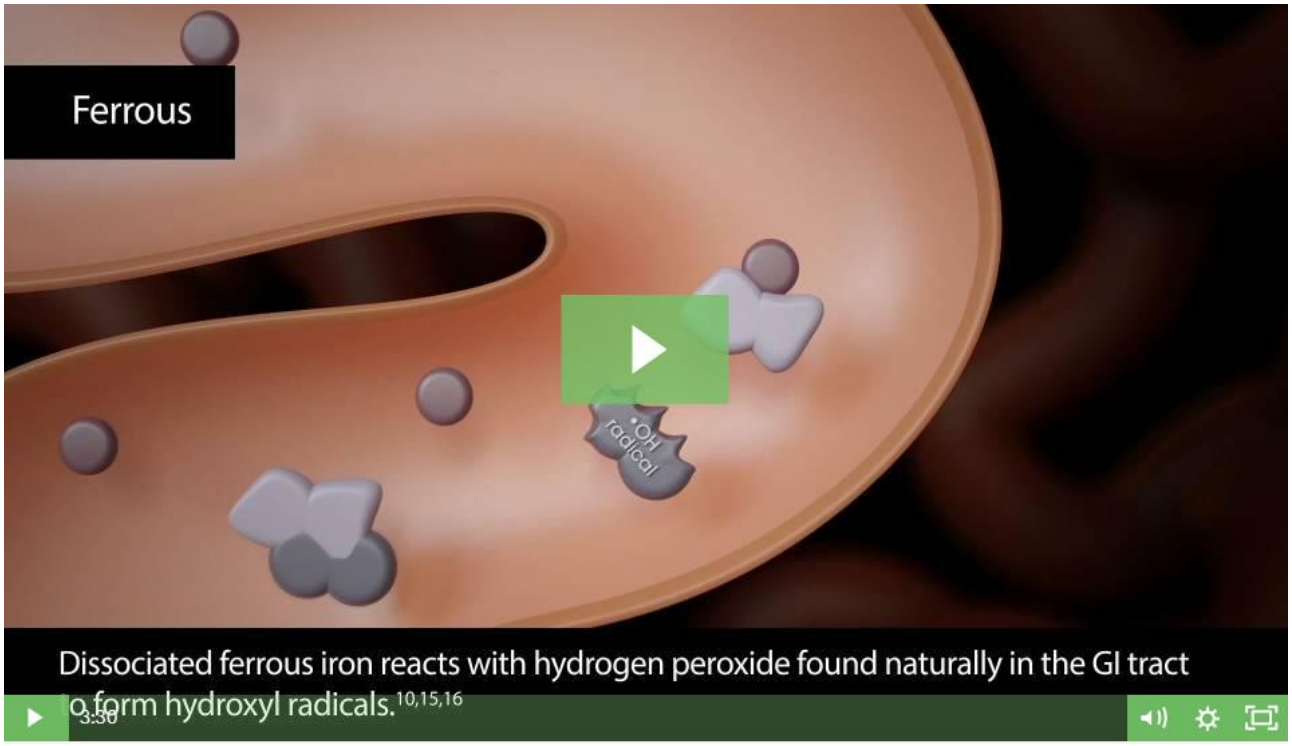
Feraccru was developed originally by BTG in conjunction with gastroenterologists at St Thomas' Hospital London, UK, who identified an unmet need for an oral iron formulation to treat patients with IBD. Development was hampered by an expensive manufacturing process, until Vitra Pharmaceuticals acquired the IP from BTG and patented a commercially viable production process in 2003 that provided patent protection until 2023. Shield Therapeutics acquired the rights from Vitra in February 2010 for a mid-single-digit royalty rate on sales (c 5%). Since then Shield has filed a range of patents covering the composition, use and production of Feraccru. Importantly a key patent protecting the composition of matter (crystalline form) was granted in 2015, extending Shield's protection out until 2035 across key markets in Europe and the US. At its FY18 trading update, Shield announced that objections against two of Feraccru's patents have been raised with the European Patent Office (EPO) by Teva Pharmaceuticals; our base case assumes the patents hold and provide marketing exclusivity until 2035, we have provided a sensitivity analysis on differing scenarios to our base case in the valuation section.

A uniquely positioned oral iron supplement

Feraccru (ferric maltol) is an orally administered source of iron that is shielded by three maltol molecules. Unlike salt-based oral irons, the iron in Feraccru's complex remains shielded until it is absorbed, mitigating side-effects caused by aggregation and oxidative stress of unbound, un-complexed iron salts in the small intestine. As the Feraccru complex is absorbed into intestinal wall the complex disassociates and iron is stored within the intestinal cells (enterocytes) bound to a storage protein (ferritin). On demand for new red blood cells, a hormone secreted from the kidneys (erythropoietin) enables iron to be transferred into systemic circulation (bound to transferrin) where it can be incorporated into haemoglobin production or stored in other organs. Feraccru is not known to circumvent this regulated process and is therefore unlikely to cause a toxic effect to organs through iron overload, a known risk with IV iron administration. Feraccru has proven clinical efficacy in treating IDA, and received regulatory approval from the European Medicines Agency (EMA),

initially for the treatment of IDA in IBD patients (in February 2016) and then, more broadly, for the treatment of iron deficiency in general (in February 2018). A regulatory filing has been submitted (and accepted) to the US FDA (PDUFA date 27 July 2019).

Exhibit 3: Hypothesised mechanism of absorption for Feraccru



Source: Shield Therapeutics

Clinical development highlights

Exhibit 4 highlights the Phase III clinical trial programme initiated by Shield for Feraccru. The product was initially trialled in IBD patients as initial development of the drug was undertaken by gastroenterologists at St Thomas' Hospital, London, who realised there was an unmet need in iron replacement therapy: an oral tolerable iron formulation as an alternative to IV iron. We focus below on data generated to date in IBD and CKD. A paediatric trial will initiate H219 (EMA requirement) and further post-marketing clinical trials could be undertaken (eg in women's health) to ensure lifecycle management of the brand and expand use into primary care. IBD/CKD patients are typically hospital based so the initial commercial focus is on specialist physicians (gastroenterologists and nephrologists). In the nearer term, Shield may formulate a once a day tablet of Feraccru to increase compliance rates.

Exhibit 4: Feraccru Phase III clinical development

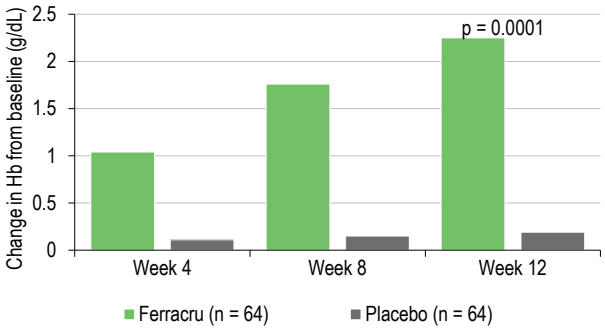
Study	Details/indication	Phase	ClinicalTrials.gov identifier	Study centres	Dose/ comparator	Primary outcome	Est. completion
AEGIS-1	Treat Iron Deficiency Anaemia in Quiescent Ulcerative Colitis (UC)	III	NCT01340872	Multi centre Europe	30mg bid/ placebo	Change in Hb concentration from baseline to week 12	Reported
AEGIS-2	Treat Iron Deficiency Anaemia in Quiescent Crohn's Disease (CD)	III	NCT01352221	Multi centre Europe	30mg bid/ placebo	Change in Hb concentration from baseline to week 12	Reported
AEGIS-CKD	Treatment of Iron Deficiency Anemia in Subjects With Chronic Kidney Disease	III	NCT02968368	Multi centre US	30mg bid/ placebo	Change in Hb concentration from baseline to week 16	Reported
AEGIS-H2H	Head to Head vs Intravenous Iron To Treat Iron Deficiency Anaemia in IBD (UC & CD)	III	NCT02680756	Multi centre US and Europe	30mg bid/ IV Ferric Carboxy Maltose	Number of subjects achieving either a 2g/dL increase in Hb OR normalisation of Hb (>12g/dL women, >13g/dL men) at week 12	March 2019

Source: ClinicalTrials.gov

AEGIS-1/2 data established efficacy in IBD patients

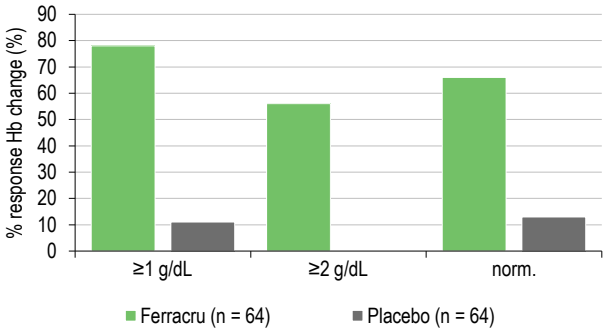
Feraccru's regulatory approval by the EMA was based on the efficacy and safety data from the AEGIS-1/2 study, which showed Feraccru, could provide a clinically meaningful benefit to IBD patients with moderate to mild IDA. Data was combined from two IBD patient populations – ulcerative colitis (AEGIS-1) and Crohn's disease (AEGIS-2) – totalling 128 patients in a randomised, 12-week, double-blind, placebo-controlled study across multiple European centres (UK, Germany, Austria and Hungary) with a 52-week open-label extension.

Exhibit 5: AEGIS-1/2 top-line data (ITT FAS)



Source: www.ncbi.nlm.nih.gov/pmc/articles/PMC4342319/pdf/ibd-21-579.pdf

Exhibit 6: AEGIS-1/2 top-line data (ITT FAS)



Source: www.ncbi.nlm.nih.gov/pmc/articles/PMC4342319/pdf/ibd-21-579.pdf

As highlighted in Exhibit 5, the primary endpoint of the study was met, with a significant improvement in mean Hb levels (2.25g/dL, $p < 0.0001$) after 12 weeks on Feraccru (30mg bid) compared to placebo. A clinically relevant improvement in Hb levels (≥1g/dL) was observed in 78% of patients, with 66% of patients achieving normal levels of Hb after 12 weeks. Furthermore, iron indices were also improved throughout the study; notably an increase was observed in serum ferritin levels after 12 weeks (17.4µg/L), which continued to rise over the 52-week open-label extension (60.3µg/L). The safety and tolerability of Feraccru was broadly in line with placebo: predominately mild-moderate side-effects (58% on Feraccru vs 72% on placebo) with gastrointestinal (GI) related side-effects having the highest incidence (38% on Feraccru vs 40% on placebo). GI side-effects are the primary cause of poor compliance in IDA patients treated with OFPs (particularly IBD patients). Having a side effect profile in line with placebo demonstrates Feraccru's tolerability; importantly, compliance was >97% across both arms of the study. AEGIS-1/2 data shows Feraccru provides a safe, tolerable and efficacious alternative for IBD patients. On the basis of these data, the EMA approved Feraccru for the treatment of IDA in adult patients with IBD

in February 2016 and the label was extended to the treatment of iron deficiency in adults in February 2018.

Exhibit 7: IDA in patients with inflammatory bowel disease (IBD)

Overview	IBD is group of inflammatory conditions affecting the colon and small intestine; principally this covers two inflammatory chronic conditions: Crohn's disease (CD) and ulcerative colitis (UC). Iron deficiency anaemia (IDA) is a frequent comorbidity; its pathogenesis is multifactorial but results mainly from blood loss in inflamed mucosa and impaired dietary iron absorption.
Epidemiology	IBD is estimated to be prevalent in 0.3% of the European population. In the US between 2010 and 2014, it was estimated that 0.5% of the population had IBD (comprised of 0.24% with CD and 0.26% with UC) of which 16.3% of patients were diagnosed with IDA (17.4% in CD and 15.3% in UC).
Severity	According to the World Health Organization (WHO), adult males and females with a blood haemoglobin (Hb) concentrations below 13 and 12g/dL, respectively, are considered anaemic (<11g/dL during pregnancy). Patients are considered mild with Hb levels >11 g/dL, moderate >9.5 g/dL, severe >8g/dL and very severe <8 g/dL. Determining whether iron deficiency is the underlying cause of the anaemia can be achieved through measuring iron indices including transferrin saturation (TSAT) levels (ID >16%, IDA <16%) and ferritin levels (ID <30 µg/dL, IDA < 10 µg/dL).
Treatment	In the majority of cases where patients are not severely anaemic, iron supplementation to compensate for reduced dietary iron intake is the primary treatment option for IDA. Low-cost iron supplementation with oral ferrous products (OFPs) such as ferrous sulphate is widely prescribed as a 1L treatment. Gastrointestinal side effects are a common side effect leading to poor compliance, particularly in patients with IBD; a study by gastroenterologists in the UK highlighted that only 42% of IBD patients receiving OFPs completed their treatment course without experiencing side effects. Patients who are intolerant or unresponsive to OFPs progress to receiving 2L treatment with intravenous iron.

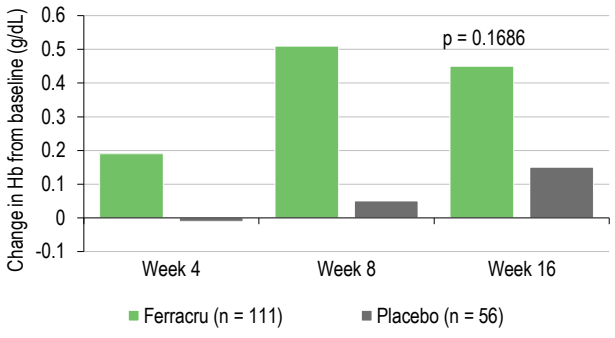
Source: Edison Investment Research

AEGIS-CKD data pivotal for FDA approval

Although the safety data generated in AEGIS-1/2 was compelling, following guidance received from the US FDA in 2013, safety across a broader cohort is necessary to obtain US marketing approval. The pivotal Phase III study (AEGIS-CKD) investigating Feraccru patients with chronic kidney disease (CKD) with IDA has been accepted as part of the submission package by the FDA. AEGIS-CKD is a16-week double-blind, placebo-controlled study across multiple centres in the US with a 36-week open label extension.

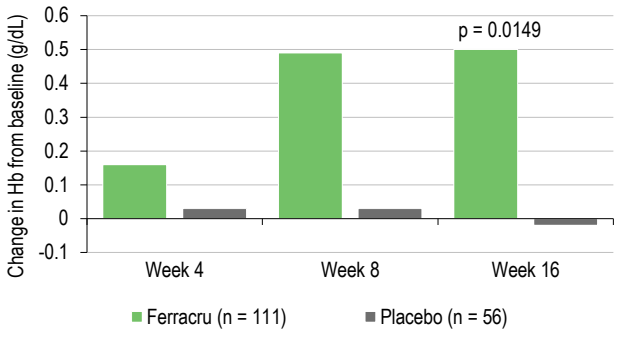
In February 2018, analysis of the top-line blinded data for the study suggested that Feraccru had failed to show statistical significance improvement in Hb levels (p = 0.1686) as highlighted in Exhibit 8. Analysis of the data revealed that in the intention-to-treat (ITT) patient population, confounding events had occurred on both arms of the study: namely, 13 pts on Feraccru and 8 pts on placebo had received intervention with a concomitant treatment (IV or intramuscular iron injections, oral iron supplementation, erythropoietin stimulating agents, blood transfusions or donations) or had initiated dialysis, had a blood transfusion or donation for any cause, had major surgery.

Exhibit 8: AEGIS-CKD top-line data (ITT population)



Source: Company presentation 06APR2018

Exhibit 9: AEGIS-CKD top-line data (mITT population)



Source: Company presentation 06APR2018

Analysis of the unblinded data, as per the protocol's statistical analysis plan, showed in the mITT population (last observation carried forward) there was a significant increase in Hb levels (0.52 g/dL, p = 0.015) for patients on Feraccru (Exhibit 9). Although the mean improvement in Hb levels did not provide as significant an increase as the AEGIS-1/2 study (2.25 g/dL, p < 0.0001), this can be expected in CKD patients. A significant improvement in iron indices (vs. placebo) was also observed after 16-weeks, included improved ferritin (25.49 µg/dL, p = 0.0004) and TSAT (4.47%, p

< 0.0001). In the subsequent 36-week open-label extension, similar improvements were seen with patients that switched from placebo; importantly, 73.5% of patients that enrolled into the extension completed the study, highlighting the scope for Feraccru to be prescribed year-round to maintain iron levels and prevent anaemia.

Exhibit 10: IDA in patients with chronic kidney disease (CKD)

Overview	CKD is the gradual loss of kidney function over time and is driven by a variety of underlying diseases including diabetes. The kidneys function as filters of the blood removing waste products and controlling the balance of fluid and electrolytes. This occurs through a bundle of capillaries called glomeruli. Kidneys are responsible for the production of erythropoietin, a hormone responsible for stimulating the production of red blood cells, which also stimulates the uptake of iron from the small intestine into systemic circulation. Declining kidney function disrupts this hormonally regulated process and can result in the manifestation of IDA.
Epidemiology	In the US between 2007 and 2010, it was estimated that CKD was prevalent in 14.0% of the population (Stage 3–4: 7.4%) of which 15.4% of patients were diagnosed with IDA (Stage 3–4: 19.0%).
Severity	The progression and severity of CKD is measured by declining glomerular filtration rate (GFR, mL/min/1.73 m^2): Stage 1 > 90, Stage 2 > 60, Stage 3 > 30, Stage 4 > 15, Stage 5 < 15. The severity of IDA is diagnosed through the same blood tests outlined in Exhibit 7, measuring Hb, TSAT and ferritin levels.
Treatment	Treatment of IDA in patients with CKD typically follows the same progression as those with IBD (as highlighted in Exhibit 7) with 1L treatment using OFPs followed by 2L intervention with IV iron. A study of the US veteran database highlighted c 30% of CKD patients with anaemia received OFPs. Unlike in IBD patients, OFPs are more tolerated in patients with CKD; gastro-intestinal side effects in patients without IBD occur in c 30% of patients. Erythropoietin stimulating agents (ESA) can also administered in patients to stimulate uptake of iron and production of red blood cells.

Source: Edison Investment Research

AEGIS-H2H data could define market penetration

Top-line data from the ongoing head-to-head study (AEGIS-H2H) comparing Feraccru to the market leading IV iron therapy (Vifor's Ferinject) are expected in Q119. Although AEGIS-H2H is not required for regulatory approval, we believe positive data could drive a higher percentage of market share captured by Feraccru versus our expectations. AEGIS-H2H is a 52-week, open-label Phase-III study in 242 IBD patients with mild-severe IDA, randomised (1:1) onto either Feraccru or ferric carboxymaltose (Ferinject). The trial is a non-inferiority study, with the primary endpoint looking for a non-inferior improvement in Hb levels from baseline after 12 weeks on Feraccru (vs Ferinject), looking at the number of subjects showing a 2g/dL improvement in Hb levels or achieving normalisation.

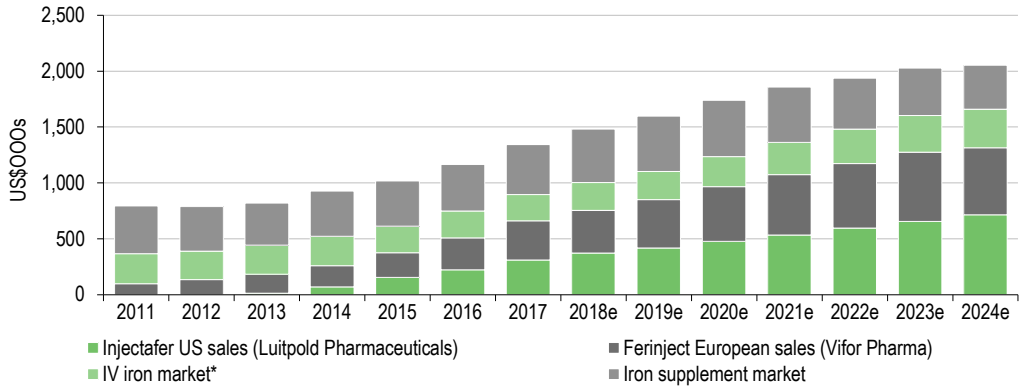
Provided the primary endpoint is reached and the same number of IBD patients with IDA achieve the same increase in Hb levels (2g/dL) or normalization of Hb (>12g/dL women, >13g/dL men) at week 12, then there would be clear clinical evidence for Shield's partners to market Feraccru as an alternative treatment option to Injectafer/Ferinject. From a safety perspective, the two main side effects associated with Injectafer/Ferinject are hypophosphatemia, apparent soon after infusion and lasting up to two weeks, and hypersensitivity. Should non-inferiority be established, the data will provide evidence that Feraccru is a suitable alternative to IV iron in the non-acute setting. The H2H data will not enable replacement of IV iron in all patients, but positive H2H data could enable higher uptake of Feraccru prescriptions and provide the foundations for pricing and reimbursement negotiations.

Commercial opportunity determined by IV iron market

Feraccru has been positioned, and is being marketed, as a second-line (2L) treatment option to ID patients who are intolerant to 1L oral ferrous supplements and would normally progress to requiring treatment with intravenous (IV) iron therapy. The market for iron products in 2017 was estimated to be c $1.3bn globally, of which was IV iron constituted $1.1bn (c 82%); consensus forecasts suggest the IV iron market will grow to $1.7bn in 2024 (source: EvaluatePharma), largely driven by increased uptake of higher-priced branded IV iron and favourable demographic changes (eg ageing population, growing incidence of chronic diseases rising diabetic population and patients with chronic kidney disease). The global IV iron market is fragmented with multiple IV market players operating within it; some operate on a domestic level, while others (eg Vifor Pharma, Sanofi,

Daiichi) operate on local and international levels. The different brands of IV iron vary by primary iron formulation, dosage and indication.

Exhibit 11: Consensus sales forecast for Ferinject/Injectafer across the US and Europe



Source: EvaluatePharma. Note: *Combined sales of Ferinject, Injectafer, Venofer, Monofer and Feraheme.

Vifor Pharma's Ferinject (marketed as Injectafer in the US by Luitpold Pharmaceuticals part of Daichii Sankyo) is the leading product (c 60% of IV iron sales in 2017) and has an improved safety profile to the older generation of IV iron products (which were largely associated with a risk of anaphylaxis). Vifor has grown the market through higher pricing and a strong commercial presence, and has driven clinical adoption and uptake. Ferinject in-market sales grew from CHF16m in 2008 to CHF692m in 2017, a function of growth in Europe where the product was initially launched, US launch in 2013 (under brand name Injectafer) plus data from additional indications such as heart failure as well as new EU oncology and ESC cardiology guidelines published in 2015 and 2016, respectively. Vifor estimates CHF2bn in-market sales potential (c 2025) for Ferinject/Injectafer driven by ROW launches (Japan and China) and extension of use into cardiology indications. The establishment of this market by Vifor is a positive for Feraccru; however, we would expect aggressive counter detailing as Vifor defends its market leading position. That said, Feraccru's clinical data package (efficacy and tolerability) will appeal to a proportion of patients who may be reluctant to be treated by intravenous iron (hospital stay, cost, parental iron infusion side effects).

A pivotal indication as to how much of this market Feraccru can capture will stem from the ongoing Phase III AEGIS-H2H non-inferiority study. Shield has commissioned research that has polled gastroenterologists (n=117) and nephrologists (n=116) on likely use of Feraccru in the event of non-inferiority vs IV iron data; clinicians indicate that 45% of CKD patients and 43% of IBD patients with IDA could be placed on Feraccru.

Norgine partnership key to Feraccru's success in Europe

In September 2018 Norgine licensed the rights to commercialise Feraccru in Europe (excluding countries covered by AOP Orphan and Ewopharma), Australia and New Zealand. Shield Therapeutics received a non-refundable upfront licence payment of £11m and is eligible for up to €54.5m in milestone payments, €4.5m of which relate to development milestones, which could crystallise over the next one to two years (AEGIS-H2H study, which has now fully recruited, and the Phase III paediatric study due to commence in H219). Shield will receive a tiered royalty rate of 25–40% from sales of Feraccru, and sales milestones of up to €50m. Norgine has full responsibility for commercialisation, reimbursement and regulatory affairs in Europe; Shield will be responsible for the manufacture and supply of Feraccru, as well as the initiation and completion of a Phase III paediatric study. Shield will receive reimbursement for manufacture and supply and this amount will be netted against the royalty received during each period. Shield additionally will pay 5% away to Vitra

Norgine is a Netherlands-based private specialist pharmaceutical company established 110 years ago. The company has a direct marketing presence in 12 European counties, Australia and New Zealand, and markets a variety of brands in gastroenterology, hepatology, cancer and supportive care. With over 1,000 employees globally (470 commercial, 160 medical and regulatory), Norgine has already deployed 80 sales reps in Germany and the UK since re-launching in December 2018, a significant uplift in marketing and sales presence compared to what Shield had established in H118 (c 20 reps). Norgine reported net product revenues of €345m in 2017 for its existing portfolio of drugs, including Movicol (€157m), Moviprep (€57m) and Xifaxan (€51m). Feraccru is a complementary addition (in terms of reps detailing to gastroenterologists and nephrologists).

US partnership likely post approval in 2019

Shield retains the marketing rights to the US market and will likely seek a partner once a decision on regulatory approval is reached by the US FDA (although the PDUFA date of 27 July 2019 could be delayed by the US government shutdown). The FDA has not requested additional trial data to form part of the submission package. We believe that the significant efficacy and safety data from both studies will lead to an approval of Feraccru for the US market, but the uncertainty is on whether the FDA will approve Feraccru for all ID patients (as per the EMA label) or could limit it to IDA associated with CKD or IBD; currently we assume the latter in our forecasts. The FDA may request a post marketing study be conducted prior to a line extension to all ID patients, but it is likely that such a study would be the responsibility of the out-licensee.

Beyond the rights to market Feraccru in the core territories in Europe (EU5) and the US, Shield has established partners (AOP Orphan and Ewopharma) to distribute and market Feraccru across 27 non-core markets; combined revenues from AOP Orphan and Ewopharma in 2018 were £0.2m (unaudited). Currently, we do not include these in our valuation, but highlight that growth in these markets and roll out in others could present upside.

Marketing exclusivity currently defined by 2035 patent

Objections against two of Shield's patents for Feraccru have been raised with the European Patent Office (EPO) by Teva Pharmaceuticals, including a key patent protecting the composition of matter (crystalline form), which provides IP protection until 2035, and a patent for an alternative process for manufacturing Feraccru (which is protected until 2032). Management has confidence in the validity of these patents and its ability to defend them; the first set of oral proceedings (for the manufacturing patent) is scheduled for 14 March 2019. We have based our valuation for Feraccru on the underlying assumption that Shield will maintain marketing exclusivity in the US and Europe until 2035 from this patent protection. Should the validity of this composition of matter patent change, the duration of Shield's exclusivity period is likely to shorten and would be provided through a patent covering the process employed in manufacturing Feraccru. This manufacturing patent protects the most effective process for producing Feraccru, preventing competitors from distributing Feraccru (produced by this process) in either the US or EU; Shield anticipates PTE and paediatric extensions will protect this process until early 2029. We highlight that providing Shield's patents aren't infringed, a generic version of ferric maltol could enter the market prior to this, but not until after data and marketing exclusivity periods provided by the US FDA and EMA have passed. Until a decision from the EPO on the validity of Teva's objections is reached, we continue to expect that Shield will have market exclusivity and maintain peak sales for Feraccru until 2035.

Other assets in earlier stages of development: PT20

We believe the investment case for Shield hinges on the successful commercialisation of Feraccru in the EU5 and the US; should this be achieved, Shield could conduct a Phase III registrational study for its second-most advanced clinical asset PT20, a treatment of systemic phosphate

accumulation (hyperphosphatemia). Management has not provided guidance for completing this study in the mid-term, but we highlight that PT20 presents an opportunity (in the long term) for Shield to diversify its portfolio offering beyond Feraccru and out-license an additional asset.

Sensitivities

Shield Therapeutics is subject to various sensitivities common to speciality pharmaceutical companies, including commercialisation (pricing, reimbursement, uptake and competition), manufacturing and financing risks. The key sensitivities for Shield Therapeutics relate to execution risk; our sales forecasts and valuation are dependent on the successful European commercialisation of Feraccru by licensing partner Norgine. In Europe Teva has filed patent objections, which Shield will defend, but this could weigh on the stock. In the US, the 27 July PDUFA date may be at risk, with US government shut down affecting resources at the FDA. Furthermore, with the focus on one asset in the short term, the valuation is skewed to and dependent on Feraccru; failure to meet our peak sales expectations and sales growth trajectory would have a serious and detrimental effect on Shield's long-term strategy and our valuation.

Valuation

Our valuation of Shield Therapeutics, at £178m or 153p/share (Exhibit 12), is based on a risk-adjusted NPV model of Feraccru for treatment of ID in Europe (as covered by Norgine) and for CKD/IBD related ID in the US market. Our NPV calculation is based on Feraccru achieving peak sales of £334m in 2029 across Europe and the US; given its commercial availability, we utilise a 10% discount rate and risk adjust the US opportunity according (75%).

Exhibit 12: Valuation

Product	Indication	Launch	Peak sales	Value (£)	Probability	rNPV (£m)	rNPV/share (£)
Feraccru Europe	IDA	2019	2028	98.5	100%	98.5	0.85
Feraccru US	IBD and CKD	2020	2029	92.4	75%	69.3	0.60
Net cash at 31 Dec 2018				9.8	100%	9.8	0.08
Valuation				**200.7**		**177.6**	**1.53**

Source: Edison Investment Research

Following the re-launch of Feraccru in December 2018, we forecast Feraccru will achieve peak sales in Europe of €130m (£113m) after 10 years in 2028 (and grow 2.5% pa until 2035); in the US we believe peak sales of $251m (£218m) will be achieved in 2029 (and grow 2.5% pa until 2035). Our forecasts have been derived from a bottom-up, epidemiology-based approach for the patient population we believe Feraccru will be marketed in; we rationalised this with a top-down view on the portion of Ferinject/Injectafer sales we believe Feraccru can capture across both Europe and the US based on consensus forecasts of sales in 2024. We believe our forecasts reflect the sales execution risk associated with marketing Feraccru through partners. We have highlighted the basis of our assumptions in Exhibit 13.

Exhibit 13: Feraccru peak sales forecasts

Product	Country (partner)	Indication	Launch year/ Peak sales	% iron supplement market in 2024	Assumptions
Feraccru	EU5 (Norgine)	IDA	2019/2028 €130m (£113m)	Feraccru sales – €80m **4% global market** (€1.78bn) **15% Ferinject** (€529m)	Population covered by Norgine: c 400m; prevalence of IDA: 11.2m (3%); on OFPs: 8.4m (75%); intolerant due to GI side-effects: 2.5m (30%). **IDA population eligible in 2018**: **2.5m (+2.5% growth pa)**. Peak penetration 12.5% after 10 years: 393,000 patients on Feraccru in 2028; flat pricing €55/month (current UK £47.60); three months per treatment course as per label, plus an additional three months to ensure iron stores are replenished and prevent anaemia recurring as per clinical guidelines: €330 per six months treatment duration; **peak sales in 2028: €130m.**
	US (unpartnered)	IDA (IBD and CKD)	2020/2029 $251m (£218m)	Feraccru sales – $129m **6% global market** ($2.05bn) **18% Injectafer** ($716m)	Population of US c 328m; prevalence of IBD: 1.65m (5%); diagnosed with IDA: 0.27m (16%); intolerant due to GI side effects: 0.16m (60%). **IBD population eligible in 2018**: **162,000 (+2.5% growth pa).** Prevalence of stage 3–4 CKD: 24.3m (7.4%); diagnosed with IDA: 4.6m (19%); on OFPs: 1.4m (30%); intolerant due to GI side-effects: 0.42m (30%); **CKD population eligible in 2018: 420, 000 (+2.5% growth pa).** Peak penetration 25% after 10 years: 186,000 patients on Feraccru in 2029; flat pricing $300/month; three months per treatment course as per the EMA label plus three months to ensure iron stores are replenished: $1800 per 6 months treatment duration (w. 25% rebate $1350); **peak sales in 2029: $251m**

Source: Edison Investment Research, EvaluatePharma. Note: FX rate US$/€ – 0.87, US$/£ – 0.76, €/£ – 0.87

From the European market (as covered by Norgine), revenues to Shield comprise a tiered royalty (25–40%) on sales; development milestones (€4.5m) and sales related milestones of (€50m). CoGS comprise the cost of manufacturing Feraccru (c 10% of sales) and a pay-away to Vitra Pharmaceuticals for royalties on Norgine sales (5%). For the US, we have also risk adjusted the US opportunity, assigning a probability of success of 75%, in line with our treatment of assets at registration stage of development. We assume revenues comprise a flat 20% royalty rate on sales and a conservative £15m upfront payment from a potential US partner for valuation purposes. We do not include the potential US upfront payment in our financial forecasts given the uncertainty of the timing and amount. CoGS are comprised of the cost of manufacturing Feraccru (c 3% of sales) and a pay-away to Vitra Pharmaceuticals for royalties on sales (5%). In calculating NPV, we split R&D costs and G&A evenly between the Europe and the US as Shield will utilise data from the paediatric study to extend Feraccru paediatric use in the US and apply for paediatric data exclusivity. We model both US and European sales to composition of matter patent expiry in 2035. Adding in net cash of £9.8m (end-2018) and using a discount rate of 10% we reach our risk-adjusted NPV of £178m or 153p/share.

We note several assumptions could impact our valuation. Importantly, a successful patent challenge from Teva will reduce the duration of exclusivity for Feraccru to 2029 (provided by a manufacturing patent), which decreases our valuation to 92p/share. Should a broader US label be granted, Feraccru could achieve higher peak sales in 2029. Likewise, a non-inferiority claim (AEGIS-H2H) could lead to higher penetration rates. We have performed a sensitivity analysis (see Exhibit 14), which highlights how our forecast peak sales of Feraccru affects our valuation of Shield Therapeutics.

Exhibit 14: Feraccru rNPV sensitivity to changes in peak sales (£/share)

		European peak sales in 2028 (via Norgine)				
		€52m (5% IDA)	**€130m** (12.5% IDA)	**€260m** (25% IDA)	**€520m** (50% IDA)	**€780m** (75% IDA)
US peak sales in 2029 (unpartnered)	**$125m** (12.5%IBD/CKD)	0.56	1.22	2.28	4.32	6.36
	$251m (25%IBD/CKD)	0.87	**1.53**	2.59	4.63	6.67
	$458m (12.5% IDA)	1.38	2.03	3.10	5.14	7.18
	$915m (25% IDA)	2.51	3.16	4.23	6.27	8.30

Source: Edison Investment Research; Note: all NPVs assume exclusivity until 2035.

Financials

Following the £11m upfront licence payment in September 2018, Shield has £9.8m (unaudited) in cash as of 31 December 2018 and zero debt. We forecast 2019 cash burn of c £5.1m implying a cash runway into 2020; we forecast end-2019 cash of £4.7m. Shield is dependent in the near term on the royalty and milestone income from partners; a US partnering deal in 2019 should enable an upfront licensing payment to extend the cash runway further. Our forecasts do not incorporate any upfront or milestone payments from a potential US partner given the unknown timing of a deal and thus exact deal metrics. To fund operations beyond 2020 we forecast that an additional c £8m will need to be raised in 2020. We note that, for simplicity, in our model we currently illustrate this as a debt raise. However, an upfront licence payment from a potential US partner would alleviate the need for a fund-raise.

Shield's revenues remain wholly dependent on the success of Feraccru. Highlights from Shield's 2018 trading statement, published 24 January, are FY18 revenues of c £11.9m included the £11.0m upfront licence payment from Norgine. In 2019, we forecast revenues of £3.0m (this includes £2.2m in development milestone payment from Norgine on completion of the AEGIS-H2H study), £2.7m in 2020 (no milestones) and £14.6m in 2021 (£1.7m milestone payment on completion of paediatric study and sales milestone for exceeding €25m sales). Our 2020 revenue forecasts assume a 20% royalty received on US sales although we do not factor any milestones (upfront or sales milestones) from a US deal into our financial forecasts.

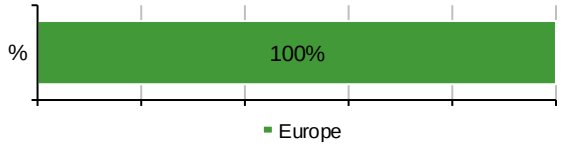
We forecast a significant reduction in selling and marketing expenses from historical levels in 2017 (£9.1m) to £5.0m in 2018 (Shield reps were actively selling until end-H118) to zero from 2019 reflecting the closure of Shield's own marketing efforts. We expect R&D levels to remain similar to 2017 (£4.7m) in 2018 (£5.0m) and reduce slightly in 2019 (£4.5m) as the AEGIS-CKD study wraps up and the paediatric study initiates (H219). R&D costs will reduce over time from 2020 (on completion of the paediatric study) to almost nil in 2022. Currently we do not include any potential R&D costs for a once a day formulation or any other post marketing clinical trials.

We expect that G&A costs will stay steady (2017: £5.1m) at £5.2m in FY18, declining to £5m in FY19 and reduce thereafter as regulatory related admin costs start to fall. Our G&A costs, however, do not include any potential legal costs related to defending IP in light of Teva's filings. Shield reported a net loss of £19.6m in FY17; we forecast a net loss of £4.1m in FY18, £7.5m in FY19 and £9.0m in 2020. Based on the operational and price assumptions outlined above, we forecast that Shield will reach sustainable profitability in 2022 and, in the longer term, operating margins could reach some 50% by 2024.

Exhibit 15: Financial summary

Accounts: IFRS, Year-end: December, £000s	2016	2017	2018e	2019e	2020e	2021e
PROFIT & LOSS						
Revenue	304.0	637.0	11,900.0	3,036.9	2,702.2	14,591.7
Operating revenues	304.0	637.0	11,900.0	3,036.9	2,702.2	14,591.7
Cost of sales	(100.0)	(155.0)	(300.0)	(531.1)	(1,532.2)	(6,170.0)
Gross profit	204.0	482.0	11,600.0	2,505.8	1,170.0	8,421.7
Gross margin %	n/a	n/a	n/a	n/a	0.9	0.9
SG&A (expenses)	(10,675.0)	(16,722.0)	(12,451.0)	(7,326.8)	(6,671.8)	(6,028.4)
R&D costs	(2,029.0)	(4,711.0)	(5,000.0)	(4,500.0)	(4,500.0)	(3,500.0)
Other income/(expense)	40.0	0.0	0.0	0.0	0.0	0.0
EBITDA (reported)	(10,524.0)	(18,514.0)	(3,600.0)	(6,994.2)	(7,830.0)	921.7
Depreciation and amortisation	(1,936.0)	(2,437.0)	(2,251.0)	(2,326.8)	(2,171.8)	(2,028.4)
Reported Operating Income	(12,460.0)	(20,951.0)	(5,851.0)	(9,321.1)	(10,001.9)	(1,106.7)
Exceptionals and adjustments	(2,157.0)	(2,571.0)	0.0	0.0	0.0	0.0
Adjusted Operating Income	(10,303.0)	(18,380.0)	(5,851.0)	(9,321.1)	(10,001.9)	(1,106.7)
Finance income/(expense)	(3,143.0)	(43.0)	(20.0)	0.0	(200.0)	(200.0)
Reported PBT	(15,603.0)	(20,994.0)	(5,871.0)	(9,321.1)	(10,201.9)	(1,306.7)
Adjusted PBT	(13,446.0)	(18,423.0)	(5,871.0)	(9,321.1)	(10,201.9)	(1,306.7)
Income tax expense	587.0	1,406.0	1,800.0	1,800.0	1,200.0	600.0
Reported net income	(15,016.0)	(19,588.0)	(4,071.0)	(7,521.1)	(9,001.9)	(706.7)
Basic average number of shares, m	101.2	112.4	112.4	112.4	112.4	112.4
Year-end number of shares, m	101.2	112.4	112.4	112.4	112.4	112.4
Basic EPS (p)	(14.84)	(17.43)	(3.62)	(6.69)	(8.01)	(0.63)
Adjusted EPS (p)	(12.71)	(15.15)	(3.62)	(6.69)	(8.01)	(0.63)
Dividend per share (p)	0.00	0.00	0.00	0.00	0.00	0.00
BALANCE SHEET						
Property, plant and equipment	19.0	13.0	15.1	16.6	17.6	18.3
Goodwill	0.0	0.0	0.0	0.0	0.0	0.0
Intangible assets	28,984.0	29,961.0	30,963.9	28,891.6	26,974.8	25,201.7
Other non-current assets	0.0	0.0	0.0	0.0	0.0	0.0
Total non-current assets	29,003.0	29,974.0	30,979.0	28,908.2	26,992.4	25,220.0
Cash and equivalents	20,978.0	13,299.0	9,803.6	4,669.8	5,088.8	6,150.8
Inventories	418.0	125.0	329.7	583.6	1,683.8	3,390.1
Trade and other receivables	1,985.0	1,572.0	2,225.3	1,889.9	5,938.8	14,121.0
Other current assets	0.0	0.0	0.0	0.0	0.0	0.0
Total current assets	23,381.0	14,996.0	12,358.6	7,143.3	12,711.4	23,661.9
Non-current loans and borrowings	0.0	0.0	0.0	0.0	8,000.0	8,000.0
Other non-current liabilities	0.0	0.0	0.0	0.0	0.0	0.0
Total non-current liabilities	0.0	0.0	0.0	0.0	8,000.0	8,000.0
Trade and other payables	3,827.0	3,501.0	5,439.6	5,106.6	9,260.7	18,645.5
Current loans and borrowings	0.0	0.0	0.0	0.0	0.0	0.0
Other current liabilities	161.0	262.0	262.0	262.0	262.0	262.0
Total current liabilities	3,988.0	3,763.0	5,701.6	5,368.6	9,522.7	18,907.5
Equity attributable to company	48,396.0	41,207.0	37,636.0	30,683.0	22,181.1	21,974.4
CASH FLOW STATEMENT						
Reported net income	(15,016.0)	(19,588.0)	(4,071.0)	(7,521.1)	(9,001.9)	(706.7)
Depreciation and amortisation	1,936.0	2,437.0	2,251.0	2,326.8	2,171.8	2,028.4
Share based payments	288.0	560.0	500.0	500.0	500.0	500.0
Other adjustments	3,382.0	39.0	0.0	0.5	0.5	0.5
Movements in working capital	(846.0)	(186.0)	1,080.6	(183.6)	(995.0)	(503.7)
Interest paid / received	0.0	0.0	0.0	0.0	0.0	0.0
Income taxes paid / received	0.0	587.0	0.0	0.0	0.0	0.0
Cash from operations (CFO)	(10,256.0)	(16,151.0)	(239.4)	(4,877.8)	(7,325.0)	1,318.0
Capex	(3,175.0)	(3,408.0)	(3,256.0)	(256.0)	(256.0)	(256.0)
Acquisitions & disposals net	0.0	0.0	0.0	0.0	0.0	0.0
Other investing activities	177.0	0.0	0.0	0.0	0.0	0.0
Cash used in investing activities (CFIA)	(2,998.0)	(3,408.0)	(3,256.0)	(256.0)	(256.0)	(256.0)
Net proceeds from issue of shares	33,507.0	11,880.0	0.0	0.0	0.0	0.0
Movements in debt	0.0	0.0	0.0	0.0	8,000.0	0.0
Other financing activities	0.0	0.0	0.0	0.0	0.0	0.0
Cash from financing activities (CFF)	33,507.0	11,880.0	0.0	0.0	8,000.0	0.0
Cash and equivalents at beginning of period	725.0	20,978.0	13,299.0	9,803.6	4,669.8	5,088.8
Increase/(decrease) in cash and equivalents	20,253.0	(7,679.0)	(3,495.4)	(5,133.8)	419.0	1,062.0
Cash and equivalents at end of period	20,978.0	13,299.0	9,803.6	4,669.8	5,088.8	6,150.8
Net (debt) cash	20,978.0	13,299.0	9,803.6	4,669.8	(2,911.2)	(1,849.2)

Source: Shield Therapeutics accounts, Edison Investment Research

Contact details	Revenue by geography
Northern Design Center Studio 6 3rd Floor Gateshead NE8 3DF United Kingdom +44 (0)19 1511 8500 www.shieldtherapeutics.com	

Management team

Chairman: James Karis	CEO: Carl Sterritt
James Karis has been a non-executive director of Shield Therapeutics since February 2016 and was appointed non-executive chairman in January 2019. He has over 35 years of experience in the pharmaceutical, healthcare services, technology and medical device industries and has previously held senior management and executive roles at CollabRx, Entelos, Inc., PAREXEL International, Pharmaco International and Baxter International. He has a B.S. in Management and Economics from Purdue University and a M.A. in Applied Economics from The American University.	Carl Sterritt has led Shield as its CEO since he co-founded the group in 2008. He has approximately 20 years of management and executive level experience in pharmaceutical development and commercialisation. He has held senior management roles at United Therapeutics where he was pivotal in the commercialisation of Remodulin, a treatment for pulmonary hypertension, and at Encysive Pharmaceuticals until its acquisition by Pfizer. Carl has an academic background in life sciences and an MBA from Henley Management College.
Interim CFO: Tim Watts	**CMO: Dr Mark Sampson**
Tim Watts joined as interim chief financial officer in August 2018 and has over 25 years' experience in the pharmaceutical and biotech sectors. He was previously CFO at Oxford BioMedica (2012–17) and Archimedes Pharma (2007–11), and spent 22 years at ICI, moving to FD of Zeneca Pharmaceuticals and then group financial controller of AstraZeneca in 2001. Tim is a qualified chartered accountant.	Dr Mark Sampson was appointed as VP, medical affairs at Shield in 2015 before transitioning into the role of CMO in 2016. With more than 25 years of medical practice, pharmaceutical development and commercialisation experience, Mark has a strong pedigree in medical development and leadership at companies such as SmithKline Beecham, Amgen and Gilead. Mark was also a member of the UK Prescription Medicines Code of Practice Appeals Board for 13 years.

Principal shareholders	(%)
W. Health L.P.	48.1
MaRu AG	10.8
Carl Sterritt	8.7
Richard Griffiths	7.8
Christian Schweiger	4.9
Universities Superannuation Scheme	4.4

Companies named in this report

Norgine Pharmaceuticals, AOP Orphan Pharmaceuticals, Ewopharma, Teva Pharmaceutical Industries (TLV: TEVA), Vifor Pharma (SWX: VIFN), BTG (LSE: BTG), Vitra Pharmaceuticals, Luitpold Pharmaceuticals, Daiichi Sankyo Company (TYO: 4568)

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Frankfurt +49 (0)69 78 8076 960
Schumannstrasse 34b
60325 Frankfurt
Germany

London +44 (0)20 3077 5700
280 High Holborn
London, WC1V 7EE
United Kingdom

New York +1 646 653 7026
1,185 Avenue of the Americas
3rd Floor, New York, NY 10036
United States of America

Sydney +61 (0)2 8249 8342
Level 4, Office 1205
95 Pitt Street, Sydney
NSW 2000, Australia