Durect Corp  (DRRX-NASDAQ)

Highly Compelling Initial Ph2a DUR-928 Alcoholic Hepatitis Data. Final Data Later This Year Could Be Value Inflection Event

We value DRRX using sum-of-the-parts, with most of the value related to DUR-928 based on pricing of recent NASH-targeted M&A transactions as a proxy. Our methodology also includes DCF of DRRX's current cash-generating products and earn-outs.

Current Price (05/16/19) $0.75
Valuation $6.00

OUTLOOK

With an average AH-related hospitalization costing ~$50k and the disease associated with tens of thousands of deaths each year in the U.S., the condition is expensive to treat and often deadly. In fact, short-term mortality of severe AH is estimated to be as 50%. There are no approved treatments for AH. While corticosteroids are considered first-line treatment, there is no significant evidence that they are effective in treating the disease.

Preliminary data from DUR-928 Ph2a trial in alcoholic hepatitis on first 10 patients (8 30mg: 4 moderate, 4 severe and 2 90mg: 1 moderate, 1 severe) was reported on May 7th. Results in our opinion are highly compelling, indicating potentially potent efficacy signal and lack of toxicity. Our enthusiasm is further bolstered by supportive comments from AH KOLs (which joined the call).

We also note that (given the lack of effective treatment options for AH) if the full study data further supports the safety and effectiveness of DUR-928 and largely confirms the findings from these initial nine patients, we think that could represent a value inflection event for the share price.

SUMMARY DATA

| 52-Week High | $2.25 |
| 52-Week Low | $0.46 |
| One-Year Return (%) | -64.51 |
| Beta | 2.02 |
| Average Daily Volume (sh) | 888,004 |
| Shares Outstanding (mil) | 162 |
| Market Capitalization ($mil) | $120 |
| Short Interest Ratio (days) | N/A |
| Institutional Ownership (%) | 46 |
| Insider Ownership (%) | 4 |
| Annual Cash Dividend | $0.00 |
| Dividend Yield (%) | 0.00 |

5-Yr. Historical Growth Rates

| Sales (%) | 14.3 |
| Earnings Per Share (%) | N/A |
| Dividend (%) | N/A |

P/E using TTM EPS | N/A |

ZACKS ESTIMATES

Revenue (in millions of $)

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<th>Q1 (Mar)</th>
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<th>Q3 (Sep)</th>
<th>Q4 (Dec)</th>
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Price/Sales Ratio (Industry = 2.5x)

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<th>Q1 (Mar)</th>
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Zacks Projected EPS Growth Rate - Next 5 Years % N/A
WHAT'S NEW

Q1 Financial Results and Operational Update

Last week Durect reported financial results for their first quarter ending March 31st and provided a pipeline development update. The development update was extensive and included highly compelling results of the first 10 patients enrolled in the DUR-928 Phase 2a alcoholic hepatitis trial. We detail these results, along with the other pipeline updates, below.

Relative to the financials, total revenue of $4.1M included $2.6M in product sales, mostly related to ALZET mini pumps and LACTEL biodegradable polymer products, as well as $1.5M in collaborative revenue. Total revenue was ahead of our $3.3M, as a result of higher than anticipated collaboration revenue.

Product sales remain a cash cow. Gross margin was 51% in Q1, flat from the prior year period although down from 62% in Q4’18. Nonetheless, as earn-outs and sales royalties essentially represent 100% margin, we continue to expect that both product sales and margins will further benefit from;

- the commencement of PERSERIS-related commercialization earn-outs (which represent 100% margin). DRRX receives single-digit royalties on sales by Indivior. In late-February Indivior announced that they had launched PERSERIS with a 50-person sales team. Analyst U.S. sales estimates of PERSERIS have recently been upwardly revised
- Methydur sustained release capsules (for ADHD), Taiwan regulatory approval of which Orient Pharma received in September 2018. Orient anticipates launching ORADUR-ADHD in that country this year and is also seeking regulatory clearance and commercialization partners in other Asian countries, including in China. As a reminder, DRRX receives a royalty on sales of the product by Orient and retains rights to it in North America, Europe, Japan and all other countries not specifically licensed to Orient Pharma. DRRX is currently seeking development and commercialization partners in one or more of these territories.

Operating expenses were $9.7M, down about 5% from Q1’18 and inline with our estimate. While DRRX anticipates that SG&A expenses will fall in the near term they expect an increase in R&D expense as a result of continued progress of DUR-928 in several of the ongoing clinical trials.

Cash

Financial position remains very healthy and with a recent amendment to terms of the $20M term loan, which pushed back the initial principal repayment and final maturity dates by 18 months (to June 2020) and 27 months (to Nov 2022), respectively, DRRX’s cash runway is substantial. Cash balance was $27.6M at quarter-end. Operating burn was $5.7M (or $6.5M ex-changes in working capital) in Q1. Durect expects their current cash balance to be sufficient to fund operations through at least the next 12 months.

As it relates to the operational front…

- **DUR-928** is where we continue to believe most of the upside value lies in DRRX. As a reminder, DUR-928 could have platform-like utility and is being investigated in several formulations and potential applications including oral, intravenous and topical formulas and in indications such NASH, alcoholic hepatitis (AH) and psoriasis. Recent progress on these programs include (also see our detailed description of DUR-928 programs later in this report);
  - **AH Phase 2a study with IV DUR-928**
    - Includes two patient cohorts:
      - Part A: moderate AH at three dose levels; 30mg, 90mg and 150mg (n=4 per dose cohort) and
      - Part B: severe AH at 30mg, 90mg and possibly a 150mg dose (n=4 per dose cohort)
    - Preliminary data on first 10 patients (8 30mg: 4 moderate, 4 severe and 2 90mg: 1 moderate, 1 severe) was reported on May 7th. **Results in our opinion are highly compelling, indicating a potentially potent efficacy signal and lack of toxicity.** Our enthusiasm is further bolstered by supportive comments from AH KOLs (which joined the call)
    - Results were compared to ongoing Univ of Louisville (UL) study (led by Dr McClain) as a proxy comparator arm. UL study patients’ (n=15) therapy consisted of either supportive care or supportive care with corticosteroids.
Baseline average MELD scores (i.e. AH severity) were similar among 10 DUR-928 patients and 15 UL patients

**Results showed** (data was available for 9 of initial 10 DUR-928 patients). Along with safety, which showed no issues through the first 10 patients, results included:

- **Lille scores**: used in clinical practice to assess AH prognosis after 7 days of treatment. Studies have shown Lille score below 0.45 is associated with 85% 6-month survival rate and above 0.45 is associated with 25% 6-month survival rate
  - DUR-928 (n=9): median Lille score of 0.04 (range 0.01-0.19) at Day 7
  - UL (n=15): median Lille score of 0.41 (range 0.02-0.96) at Day 7
  - The differences (i.e. DUR-928 lower Lille scores vs UL) were statistically significant (p=0.002, Wilcoxon’s Rank Sum)

- **Bilirubin levels**: bilirubin is a determinant for liver functioning (lower is better) and is used in practice as a marker for clinical outcomes of AH patients
  - DUR-928: median bilirubin fell from baseline by 16% at Day 7 (n=9) and by 41% at Day 28 (n=8)
  - UL (n=15) median bilirubin fell from baseline by 3% at Day 7 and by 35% at Day 28
  - The change from baseline with DUR-928 was statistically significant (p=0.04) at both days (and was not statistically different with UL at either day)

- **Model of End-Stage Liver Disease (MELD) scores**: used in clinical practice as an assessment of severity of AH and patient prognosis
  - DUR-928: median MELD fell from baseline by 4% at Day 7 (n=9) and fell by 21% at Day 28 (n=8)
  - UL (n=15): median MELD increased from baseline by 4% at Day 7 and fell by 6% at Day 28
  - The change from baseline differences with DUR-928 was statistically significant at Day 28 (p=0.03) and trended towards significant reduction by Day 7

- Among the comments from the KOLs on the call that lend support for these results as well as the potential market for DUR-928 in AH include:
  - Regarding unmet need for effective AH therapy (for context, given the lack of better alternatives, corticosteroids are currently used as a first-line therapy for AH)¹
    - “There really are no therapies for this [i.e. AH]. Corticosteroids, I'm not convinced they work at all actually.”
    - “There was a recent randomized controlled trial that really did not show statistically significant benefit with [corticosteroids] product. And it’s been out for 40 years, and we rarely use it at all at Northwestern.”
    - “And liver transplant, which is the other way you can save people who are on liver failure, these patients are in general contraindicated from liver transplant.”
  - Regarding these preliminary results (relative to safety and efficacy)²
    - [These results are from] “[s]mall number of patients but give us tremendous hope in this study drug.”
    - “And the beautiful thing about it so far is the safety. We went from the 30-milligram dose to the 90, and we have -- we haven't seen any significant signals of any safety issues.”
    - “And so far, every patient we've put in my group that had a response to the treatment. And the main response we see bilirubin improving. Once bilirubin is improving, everything starts to change. The MELD score changes. The MELD rate changes. Whatever scoring system you use, bilirubin is a key element in this disease, and we have been seeing improvement in the bilirubin within the first few days.”
    - “Actually, this is my first time to see the collected data together. So I'm very enthusiastic.”

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¹ Professor of Medicine and Surgery with the Division of Hepatology at Northwestern University, a Feinberg School Of Medicine. He also serves as the Chief of Transplant Hepatology. Dr. Flamm has published and speaks widely in the field of hepatic diseases.

² Dr Tarek Hassanein. Professor of Medicine at University of California San Diego School of Medicine. Dr. Hassanein was instrumental in establishing three major liver transplant programs. [http://www.livercenters.com/about-sclc/meet-our-staff/](http://www.livercenters.com/about-sclc/meet-our-staff/)
- **Next steps**
  - Complete the 90mg cohort
  - Advance into 150 mg cohort
  - Hope to complete the trial this year
    - DRRX noted on the Q1 call that if the data from the remaining patients is positive that they will plan to present the data at AASLD in November
    - We also note that if the full study data further supports the safety and effectiveness of DUR-928 and largely confirms the findings from these initial nine patients, we think that could represent a value inflection event for the share price
  - If all goes well, following completion of the study, DRRX will meet with FDA regarding pivotal trial design and commence the pivotal program in 2020
  - The severity of AH, high mortality rate and lack of effective therapies for the disease could bold well for FDA fast-track designation of a pivotal program

- **New NASH Phase 1b program**
  - Ph1b open label, multi-site, U.S. study to evaluate safety, pharmacokinetics and signals of biological activity of orally-administered DUR-928 over 28 consecutive days in NASH patients with stage 1 – 3 fibrosis
  - Three doses; low (50mg QD), middle (150mg QD) and high (300mg QD). Each cohort n= 20 patients (60 patients total)
  - Key endpoints: safety and pharmacokinetics (PK), clinical chemistry and biomarkers (e.g., bilirubin, lipids, liver enzymes, CK-18s, and inflammatory cytokines) as well as liver imaging (with MRI-PDFF) for fat. Note that, aside from liver imaging, all of these endpoints are similar to those used in DRRX’s initial Ph1b NASH study (conducted in Australia) which showed that a single dose of DUR-928 was associated reductions in all of these biomarkers and did so with no safety issues
  - Patient dosing commenced in late-March 2019 (i.e. inline with expectations)
  - *Initial data from this study expected in 2H’19*

- **Psoriasis with topical DUR-928**
  - Phase2a proof-of-concept study with topical DUR-928 in patients with mild-to-moderate plaque psoriasis
    - U.S., multi-site, randomized, double-blind (patients serve as own control)
    - Primary endpoint is change in local psoriasis scores
    - Targeting enrollment of 20 in order to obtain data on at least 15 patients
    - DUR-928 applied topically once-daily for four weeks with four-week follow-up
  - Dosing commenced in March 2019 (inline with expectations)
  - *Topline data expected in 2H’19*

- **U.S. launch of PERSERIS.** On July 30, 2018 Indivior announced that FDA approved their NDA for PERSERIS (risperidone), the first once-monthly subcutaneous risperidone-containing, long-acting injectable for the treatment of schizophrenia in adults. **On February 27, 2019, Indivior announced the U.S. launch of PERSERIS.** DRRX will receive single-digit royalties on sales by Indivior.

- **Regulatory approval of Methydur sustained release capsules (for ADHD) in Taiwan.** Orient Pharma received notice of regulatory approval in Taiwan in September 2018. Per DRRX’s recent filings, Orient Pharma has stated that they expect to make Methydur commercially available in Taiwan in 2019. DRRX receives a royalty on sales of the product by Orient and retains rights to it in North America, Europe, Japan and all other countries not specifically licensed to Orient Pharma. DRRX is currently seeking development and commercialization partners in one or more of these territories.

- **POSIMIR CRL response anticipated.** As a reminder, DRRX submitted an NDA (via 505(b)(2) pathway) to FDA for POSIMIR in April 2013. FDA responded in February 2014 with a Complete Response Letter. Following interaction with the agency, Durect conducted and completed a Phase 3 clinical trial of POSIMIR (PERSIST trial). As reported in October 2017, while results favored POSIMIR, the trial failed to meet its primary
endoendpoint of a statistically significant reduction in pain on movement over the first 48 hours after surgery as compared to standard bupivacaine HCl. Durect has now completed a total of 16 clinical studies with POSIMIR.

DRRX recently engaged Dr. Lee S. Simon, a physician and previous (2001 – 2003) Director of FDA's Analgesic, Anti-inflammatory and Ophthalmologic Drug Products division, to evaluate potential next-steps with POSIMIR. Based on his review of the PERSIST data, Dr. Simon advised the company to formally respond to the Complete Response Letter. As such, DRRX expects to make a full response to the CRL in Q2'19 (i.e. within the coming weeks). Given an anticipated six-month FDA review period, Durect should have an answer from the agency before current year-end. As we had removed POSIMIR from our model, a ‘favorable’ response from FDA – most notably, a reasonably efficient pathway to U.S. marketing approval, would likely provide upside to our estimates.

Pipeline Refresher

DUR-928 Programs:

**Update on Phase 2a Injectable DUR-928 for AH**

In late-April 2018, Durect commenced patient dosing in a Phase 2a clinical trial of DUR-928 in patients with alcoholic hepatitis (AH).

**AH is an acute form of alcoholic liver disease** and is associated with long-term heavy alcohol use. Approximately 10% - 35% of heavy drinkers are believed to suffer from AH at some point in their life and about 320k hospitalizations occur as a result of the disease. With an average AH-related hospitalization costing ~$50k and the disease associated with tens of thousands of deaths each year in the U.S., the condition is expensive to treat and often deadly. In fact, short-term mortality of severe AH is estimated to be as 50%. **There are no approved treatments for AH.** While corticosteroids are considered first-line treatment, there is no significant evidence that they are effective in treating the disease. The only known ‘treatment’ for AH is liver transplantation, the cost of which is prohibitive and which most AH sufferers do not qualify for (given that 6-month sobriety is a prerequisite for qualification).

This is an open label, dose escalation study conducted in two parts.

- **Part A** includes patients with moderate alcoholic hepatitis (MELD = 11 to 20), and
- **Part B** will include patients with severe alcoholic hepatitis (MELD = 21 to 30)

The study is being conducted using **three dose levels** (30, 90 and 150 mg) in Part A, with sequential dose escalation following review of safety and PK results of the prior dose level. Patients receive DUR-928 by intravenous infusion, and the dose may be adjusted in Part B based on the findings from Part A. Patients will be enrolled at multiple clinical sites in the U.S. and the target number of participants to complete the study is **24-36**. The objectives of this study include safety, PK and PD signals, as determined by improvement in liver biochemistry, model for end stage liver disease (MELD) scores and Lille scores, and other biomarkers.

The study protocol was recently updated with the goal of speeding trial completion. Protocol now allows for Part B (i.e. severe AH) to commence enrollment (initially with low-dose) following review by trial oversight committee, while simultaneously continuing to enroll Part A.

**Preliminary results (of initial 10 patients): highly compelling, suggest potent efficacy, no toxicity...**

Preliminary data, on the first 10 patients, was reported on May 7th. These 10 patients included eight from the 30mg cohort (4 moderate AH and 4 severe AH) and two from the 90mg dose (1 moderate and 1 severe). Results in our opinion are highly compelling, indicating a potentially potent efficacy signal and lack of toxicity. Our enthusiasm is further bolstered by supportive comments from key opinion leaders in AH (which joined the call).

Along with safety, which showed no issues through the first ten patients, results were reported on Lille scores, bilirubin levels and MELD scores and were compared to results of an ongoing trial at the University of Louisville led by Dr. Craig McClain. These UL results, which included 15 AH patients treated with either supportive care (n=8) or supportive care with corticosteroids (n=7), were used as a proxy comparator arm.

- **Lille scores:** used in clinical practice to assess AH prognosis after 7 days of treatment. Studies have shown Lille score below 0.45 is associated with 85% 6-month survival rate and above 0.45 is associated with 25% 6-month survival rate
- DUR-928 (n=9): median Lille score of 0.04 (range 0.01-0.19) at Day 7
- UL (n=15): median Lille score of 0.41 (range 0.02-0.96) at Day 7
- The differences (i.e. DUR-928 lower Lille scores vs UL) were statistically significant (p=0.002, Wilcoxon’s Rank Sum)
- The graphic below shows that baseline MELD scores (i.e. AH severity) were approximately similar between the DUR-928 and UL patients yet Lille scores are significantly lower among DUR-928 patients as compared to UL patients

**Significantly Lower Lille Scores at Day 7 in DUR-928 Despite Similar Baseline MELD Scores**

- Bilirubin levels: bilirubin is a determinant for liver functioning (lower is better) and is used in practice as a marker for clinical outcomes of AH patients
  - DUR-928: median bilirubin fell from baseline by 16% at Day 7 (n=9) and by 41% at Day 28 (n=8)
  - UL (n=15) median bilirubin fell from baseline by 3% at Day 7 and by 35% at Day 28
  - The change from baseline with DUR-928 was statistically significant (p=0.04) at both days (and was not statistically different with UL at either day)

- Significant decrease in bilirubin among DUR-928 patients at Days 7 and 28

Source: Durect May 2019 presentation
- **Model of End-Stage Liver Disease (MELD) scores**: used in clinical practice as an assessment of severity of AH and patient prognosis
  - DUR-928: median MELD fell from baseline by 4% at Day 7 (n=9) and fell by 21% at Day 28 (n=8)
  - UL (n=15): median MELD increased from baseline by 4% at Day 7 and fell by 6% at Day 28
  - The change from baseline differences with DUR-928 was statistically significant at Day 28 (p=0.03) and trended towards significant reduction by Day 7

**Significant decrease in MELD score among DUR-928 at Day 28 (w/ reduction trend by Day 7)**

![Graph showing MELD scores](image)

**Next steps of Phase 2a trial of injectable DUR-928 for AH...**
- Complete the 90mg cohort
- Advance into 150 mg cohort
- Hope to complete the trial this year
  - DRRX noted on the Q1 call that if the data from the remaining patients is positive that they will plan to present the data at AASLD in November
  - We also note that if the full study data further supports the safety and effectiveness of DUR-928 and largely confirms the findings from these initial nine patients, we think that could represent a value inflection event for the share price
- If all goes well, following completion of the study, DRRX will meet with FDA regarding pivotal trial design and commence the pivotal program in 2020
- The severity of AH, high mortality rate and lack of effective therapies for the disease could bold well for FDA fast-track designation of a pivotal program

**Update on DUR-928 for NASH**
In January 2016, Durect initiated a single-ascending-dose **Phase 1b** clinical trial with oral DUR-928 in patients with nonalcoholic steatohepatitis (NASH) in Australia.

This Phase 1b trial of DUR-928 was a dose ranging (50 mg and 200 mg), single-ascending-dose safety and pharmacokinetic (PK) study of oral DUR-928 in subjects with NASH and matched control subjects (MCS). This study was conducted in successive cohorts evaluating single-dose levels (first a low dose and then a high dose) of oral DUR-928. Both cohorts consisted of 10 NASH patients and 6 MCS.
In April 2017 Durect presented the updated Phase 1b data at the International Liver Congress (EASL) in Amsterdam. In both cohorts, DUR-928 was well tolerated overall. There was an approximate 10-30% increase in DUR-928 exposure in NASH patients compared to MCS. A single serious adverse event (shortness of breath), designated as possibly related to study drug, was reported in cohort 2 in a NASH patient with a prior history of arrhythmia and an ongoing viral infection; no unusual abnormal biochemistry was observed and the symptom spontaneously resolved.

Exploratory biomarker analysis indicated that a single oral dose of DUR-928 resulted in reductions from baseline in the levels of both full-length and cleaved cytokeratin-18 (CK-18), bilirubin, hsCRP and IL-18 in NASH patients.

- The decrease of full-length CK-18 (a generalized cell death marker) at 12 hours was approximately 33% in the NASH patients in the low dose cohort and approximately 41% in the high dose cohort. The decrease of cleaved CK-18 (a cell apoptosis marker) at 12 hours was approximately 37% in the NASH patients in the low dose cohort and approximately 47% in the high dose cohort.
- The decrease in total bilirubin (a liver function marker for which a decrease would be seen as positive) at 12 hours in the NASH patients was approximately 27% in the low dose cohort and approximately 31% in the high dose cohort.
- High sensitivity C-Reactive Protein (hsCRP), a marker of inflammation, trended higher at 12 hours in the NASH patients by approximately 3% in the low dose cohort but trended lower by approximately 12% in the high dose cohort.
- IL-18, an inflammatory mediator implicated in both liver and kidney diseases, trended lower at 12 hours by approximately 5% in both the low dose cohort and in the high dose cohort.
**New (U.S.) NASH Phase 1b program**

DRRX recently accelerated the timeline for enrolling a new Ph1b U.S. study for oral DUR-928 in NASH which had previously been anticipated in 1H 2019 (usually implying Q2). Dosing commenced in late-March 2019.

This is a Ph1b open label, multi-site, U.S. study to evaluate safety, pharmacokinetics and ‘signals of biological activity’ of orally-administered DUR-928 over 28 consecutive days in NASH patients with stage 1 – 3 fibrosis. It will include three doses of DUR-928; low (50mg QD), middle (150mg QD) and high (300mg QD) with each cohort consisting of 20 patients (60 patients total).

**Key endpoints:** safety and PK, clinical chemistry and biomarkers (e.g., bilirubin, lipids, liver enzymes, CK-18s, and inflammatory cytokines) as well as liver imaging (with MRI-PDFF) for fat. Note that, aside from liver imaging, all of these endpoints are similar to those used in DRRX's initial Ph1b NASH study (conducted in Australia) which showed that a single dose of DUR-928 was associated reductions in all of these biomarkers and did so with no safety issues.

This 28-day study will provide a longer-duration look at both safety and biomarker effects and, depending on the results, could offer a lot more insight into later-stage study design and, potentially, even represent a valuation inflection for the share price (in our opinion). As such, we will be eagerly awaiting initial results, expected in the second half of this year.

**DUR-928 Topical Formulation for Psoriasis**

Psoriasis affects between 7M and 32M Americans. Traditional first-line prescription therapy includes steroids to address inflammation and redness. DRRX is investigating topical DUR-928 for plaque psoriasis. Durect completed an initial exploratory Phase 1b trial in psoriasis patients (n = 9 evaluable patients) in Australia. The decision to proceed with clinical testing in psoriasis was based on the anti-inflammatory and cell survival properties of DUR-928, including the downregulation of IL-17, full length CK-18, cleaved CK-18, as well as the results of a psoriasis study with DUR-928 in mice.

The Phase 1b trial was conducted with intradermal micro injections of DUR-928, and the company thinks the results warrant further investigation. As a result, the company has developed several topical formulations of DUR-928 that the company is evaluating for a topical application microplaque trial. There is a large unmet medical need for new topical drugs for psoriasis for use prior to systemic biologic treatments which often have significant associated side effects.

Dosing of their Phase2a proof-of-concept study with topical DUR-928 in patients with mild-to-moderate plaque psoriasis commenced in March of this year (inline with expectations). This will be a U.S.-based multi-site, randomized, double-blind, controlled study with targeted enrollment of ~20 anticipated, which is expected to yield ~15 evaluable patients.
Topical application will occur 1x daily for four weeks. Each patient will serve as their own control arm with DUR-928 and vehicle-control applied to separate plaques on each patient throughout the four-week duration of the study. Follow-up will occur during weeks five through eight (i.e. four weeks subsequent to treatment duration). Primary efficacy endpoint will be improvement in local psoriasis scores in the DUR-928-treated plaque compared to the vehicle-treated plaque. Topline data is expected in 2H 2019.

**Update on Phase 1b Injectable DUR-928 for Kidney Disease**

This trial was also conducted in Australia. This Phase 1b trial of DUR-928 was an open-label single-ascending-dose safety and pharmacokinetic study in patients with impaired kidney function (stage 3 and 4 chronic kidney disease) and matched control subjects. It was conducted in successive cohorts (first a low dose and then a high dose) evaluating single-dose levels of DUR-928 administered by injection.

The low dose cohort enrolled 6 kidney function impaired patients and 3 matched control subjects, and the high dose cohort enrolled 5 kidney function impaired patients and 3 matched control subjects. Results showed DUR-928 was well tolerated among all subjects and the PK parameters between the kidney function impaired patients and the matched control subjects were comparable.

**PERSERIS (long-acting injectable risperidone)**

In October 2017, Durect reached a $17.5 million patent purchase agreement with Indivior UK Limited, an affiliate of Indivior PLC (INDV.L). The deal assigned certain of Durect U.S. patent rights to Indivior for RBP-7000, Indivior’s recently FDA-approved once-monthly injectable risperidone product for the treatment of schizophrenia. Per the agreement, Indivior made an upfront payment to Durect of $12.5 million. Then, in late-July 2018, Indivior announced that FDA approved their NDA for PERSERIS, which triggered a $5M milestone payment to DRRX (received in Q3’18). DRRX will also receive quarterly earn-out payments based on a single-digit percentage of U.S. net sales of PERSERIS (as well as other products covered by the patent rights). On February 27, 2019, Indivior announced the U.S. launch of PERSERIS.

Risperidone (branded and unbranded) remains one of the most widely used anti-psychotics. PERSERIS addresses low compliance rates among individuals prescribed oral risperidone (taken daily), which has been shown to be a significant risk factor related to inadequate treatment of schizophrenia. As PERSERIS is the only long-acting risperidone-containing injectable, it represents the only available option that directly addresses lack of dosing adherence – which is particularly problematic among individuals with psychosis given their cognitive handicaps. This long-acting benefit could draw significant interest upon launch and drive early adoption, particularly for those patients that struggle with adherence to oral risperidone therapy. Indivior noted on their Q4’18 call in February 2019 that they will be detailing the product with a sales force of approximately 50 reps. We currently model initial royalty revenue from sales of PERSERIS to DRRX commencing in 1H’19.

According to prescription data aggregated by Evaluate Pharma, U.S. and WW sales of risperidone in 2017 were approximately $380M and $1.08B, respectively. While forecasts suggest U.S. market contraction into 2019, the introduction of PERSERIS is expected to push total U.S. risperidone sales back to positive growth beginning in 2020. In fact, PERSERIS is expected to be the majority driver of U.S. risperidone sales beginning in 2019 (see chart below). Average analyst estimates forecast PERSERIS (purple bar) U.S. sales of $12M in 2019 and growing to $238M in 2024 (recently upwardly revised from prior 2024 forecast of $172M) in 2024. While this implies a healthy 82% CAGR over that period, it may still be slightly more conservative than that anticipated by Indivior, which is guiding for peak annual sales of $200M - $300M. We base our PERSERIS sales related earn-out estimates on analysts' forecasted U.S. sales of the therapy (and apply an assumed 4% royalty rate) and currently look for DRRX to recognize ~$480k, $2.4M and $4.2M of PERSERIS earn-outs in 2019, 2020 and 2021, respectively.

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POSIMIR

POSIMIR is the company's investigational post-operative pain relief depot that utilizes the company's patented SABER technology and is intended to deliver bupivacaine to provide three days of pain relief after surgery.

In May 2017, Durect announced a development and commercialization agreement with Sandoz AG, a division of Novartis (NVS), to develop and market POSIMIR (SABER-Bupivacaine) in the U.S. Terms of that initial agreement called for Sandoz to make an upfront payment to DURECT of $20 million. DRRX was also eligible to receive up to $43 million in development and regulatory milestones, up to $230 million in sales-based milestones and a tiered double-digit royalty on product sales in the United States. The agreement was amended in May 2018, making Durect eligible for up to $30 million in milestone payments based on NDA approval. They continued to be eligible for up to an additional $230 million in sales-based milestones. Each party was also permitted to develop or commercialize competing products.

Then, in early January 2019, Durect received notice from Sandoz that they were terminating the agreement (effective January 27th). As a result, Sandoz returned its exclusive rights to POSIMIR for development and commercialization in the U.S. back to Durect. DRRX has initiated a formal dispute resolution regarding a termination fee (that the company claims Sandoz owes them). Durect now intends to seek a new collaboration partner for POSIMIR in the U.S.

As a reminder, DRRX submitted an NDA (via 505(b)(2) pathway) to FDA for POSIMIR in April 2013. FDA responded in February 2014 with a Complete Response Letter. Following interaction with the agency, Durect conducted and completed a Phase 3 clinical trial of POSIMIR (PERSIST trial). As reported in October 2017, while results favored POSIMIR, the trial failed to meet its primary endpoint of a statistically significant reduction in pain on movement over the first 48 hours after surgery as compared to standard bupivacaine HCl. To-date Durect has completed a total of 16 clinical studies with POSIMIR.

DRRX recently engaged Dr. Lee S. Simon, a physician and previous (2001 – 2003) Director of FDA’s Analgesic, Anti-inflammatory and Ophthalmologic Drug Products division, to evaluate potential next-steps with POSIMIR. Based on his review of the PERSIST data, Dr. Simon advised the company to formally respond to the Complete Response Letter. As such, DRRX expects to make a full response to the CRL in 1H’19. Given an anticipated six-month FDA review period, Durect should have an answer from the U.S. regulatory agency before current year-end.
As we had removed POSIMIR from our model, a ‘favorable’ response from FDA – most notably, a reasonably efficient pathway to U.S. marketing approval, would likely provide upside to our estimates.

**REMOXY**

On August 6, 2018, Durect's partner Pain Therapeutics reported that it received a Complete Response Letter (CRL) from the FDA relative to their NDA REMOXY ER (oxycodone), extended-release capsules. The CRL concluded that, "The data submitted in [the] NDA do not support the conclusion that the benefits of [REMOXY] Extended-Release Capsules outweigh the risks." Following the CRL, Pain Therapeutics further announced a strategic reorganization to align its resources on advancing its drug and diagnostic assets in Alzheimer's disease.

Following news of receipt of the CRL we removed REMOXY from our model as we noted that we believed it was more likely than not that the development program would either be completely discontinued or at least significantly delayed.

On November 12, 2018 Pain Therapeutics announced a meeting on January 31st with FDA to discuss their appeal of the latest CRL. The PR also laid out their case supporting the appeal, noting that they believe there were calculation errors, "material mistakes and misrepresentations made by FDA during a June 2018 Advisory Committee" and that when corrected for these, "REMOXY has properties that may deter against common methods of abuse, such as injection abuse". The PR goes on, making the case for REMOXY as less abusable than ER oxycodone, associated with lower health risks and meeting all evidentiary standards for FDA approval.

On February 5, 2019 Pain Therapeutics announced feedback from its meeting with FDA which notes that, "we walked out of this meeting feeling a bit disoriented by FDA's lack of transparency, clarity or helpfulness" and provides an implicit conclusion that, "we believe we are no closer today to product approval than we were over a year ago." Then on March 20, 2019 Durect received notice from Pain Therapeutics that, effective June 18, 2019, they were terminating their agreement with the company. As a result, Pain Therapeutics will be returning exclusive worldwide rights to REMOXY ER.

**VALUATION**

**Large Market Opportunity for DUR-928**

Although DUR-928 may have broad applications in many indications, we believe most of the underlying value resides in NAFLD/NASH, AH and acute kidney injury.

Non-alcoholic fatty liver disease (NAFLD) is the build-up of extra fat in liver cells that is not caused by alcohol. It is normal for the liver to contain some fat. However, if more than 5% - 10% percent of the liver's weight is fat, then it is called a fatty liver (steatosis). The more severe form of NAFLD is called non-alcoholic steatohepatitis (NASH). NASH causes the liver to swell and become damaged.

NAFLD affects about 30% of adults and 10% of children in the US, among which 10-30% will develop NASH. 25-40% NASH patients will develop progressive liver fibrosis, while 20-30% NASH patients with advanced fibrosis will develop cirrhosis, which could lead to liver cancer. Currently there are no FDA approved medicines for the treatment of NAFLD/NASH.

**Acute kidney injury (AKI)** is defined as an abrupt or rapid decline in renal filtration function. This condition is usually marked by a rise in serum creatinine concentration or by azotemia (a rise in blood urea nitrogen [BUN] concentration).

Per Medscape, in the United States, approximately 1% of patients admitted to hospitals have AKI at the time of admission. The estimated incidence rate of AKI during hospitalization is 2-5%. AKI develops within 30 days postoperatively in approximately 1% of general surgery cases and arises in up to 67% of intensive care unit (ICU) patients. Approximately 95% of consultations with nephrologists are related to AKI. The appropriate nephrologist referral rate is approximately 70 cases per million populations.
The current treatment for AKI is mainly supportive in nature. No therapeutic modalities to date have shown efficacy in treating the condition. Therapeutic agents (eg, dopamine, nesiritide, fenoldopam, mannitol) are not indicated in the management of AKI and may be harmful for the patient.

Certainly, there are highly unmet medical needs in the NAFLD/NASH and acute kidney injury fields. The unique mechanism of action and the compelling animal and human data so far make DUR-928 a highly promising candidate for the management of NAFLD/NASH and kidney injury.

**We value DRRX using sum-of-the-parts**, with most of the value related to DUR-928 based on pricing of recent NASH-targeted M&A transactions as a proxy. Our methodology also includes discounted cash flow of DRRX’s current cash-generating products and earn-outs.

**DUR-928 valued at between $750M and $1B**

Examples of some of the higher-profile NASH-related acquisitions include Allergan’s (AGN) September 2016 purchase of Tobira Therapeutics. The deal, valued at $1.7B (inclusive of potential development and commercial milestones), brought two NASH candidates; Cenicriviroc, an oral CCR2/5 inhibitor in phase 2 and Evogliptin, an oral DPP-4 inhibitor in phase 1.

Earlier in 2018 Gilead bought Nimbus Therapeutics for $400M upfront and $800M in potential development milestones. NDI-0107976, an ACC inhibitor in phase 1 for the treatment of NASH was the main attraction for Gilead. Other recent NASH-related acquisitions are in the table below which was constructed by Evercore ISI. Preclinical and phase 1 candidates have commanded as much as $450M and $1B+, respectively, in buyouts.

We think frothiness of the NASH space coupled with the potential versatility of DUR-928 as it relates to formulations (oral, IV and topical) as well as its applicability in various conditions, including NASH, acute liver disease, PCS and even psoriasis warrants potential premium pricing. Initial human proof-of-concept in phase 1 studies for various formulations demonstrating a strong safety and drug interaction profile, in addition to compelling efficacy signals, further supports the relative value of DUR-928. Based on recent M&A transactions, DUR-928 has a relative value of between $750k and $1B. Further positive clinical trial progression would likely move valuation closer to the $1B mark.

![Activity in the NASH space is high, with a number of recent acquisitions and partnerships.](image)

**Current cash-generating products and earn-outs worth ~$90M**

We estimate cash flow of DRRX’s legacy products (Actel and Lactel) and PERSERIS earn-outs of approximately $85M over the next seven years. Discounting back to present at 12%, results in NPV of approximately $60M. We assign a 50% premium to the NPV value to reflect the likelihood of additional licensing, collaboration and earn-out opportunities materializing over the same period. We also note that this NPV value ($60M x 1.5 = $90M) may be
conservative as it does not consider any assumed contribution from POSIMIR and only minimal contribution from ORADUR. Upside to either of those programs (such as ORADUR launch in, and meaningful revenue from, China or a viable development/regulatory strategy for POSIMIR), could result in relative upside to our NPV calculation.

Our sum-of-the-parts methodology values DRRX at approximately $965M, or $6.00/share
## Projected Income Statement

### Durect Corporation

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<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
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<th>Q1</th>
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<td>$(0.05)</td>
<td>$(0.20)</td>
<td>$(0.22)</td>
<td>$(0.21)</td>
</tr>
<tr>
<td>YOY Growth</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Shares Outstanding</td>
<td>153.6</td>
<td>161.6</td>
<td>162.0</td>
<td>162.0</td>
<td>159.8</td>
<td>162.1</td>
<td>162.3</td>
<td>162.4</td>
<td>171.0</td>
<td>164.4</td>
<td>190.0</td>
<td>195.0</td>
</tr>
</tbody>
</table>

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