BELL POTTER

Speculative

See Key Risks on Page 4 & Biotechnology Risk Warning on Page 37

Speculative securities may not be suitable for Retail clients

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Pharmaxis Ltd. (PXS)

Emerging as a key player in multi-billion dollar NASH market

Recommendation
Buy (Initiation)
Price
$0.255
Valuation
$0.54 (initiation)
Risk
Speculative

GICS Sector

Pharmaceuticals & Biotechnology

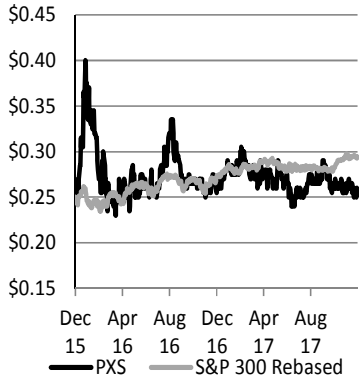
Expected Return	
Capital growth	**111.8%**
Dividend yield	**0.0%**
Total expected return	**111.8%**

Company Data & Ratios	
Enterprise value	**$52.2m**
Market cap	**$81.5m**
Issued capital	**319.7m**
Free float	**98.1%**
Avg. daily val. (52wk)	**$92,588**
12 month price range	**$0.227- $0.315**

Price Performance

	(1m)	(3m)	(12m)
Price (A$)	0.26	0.27	0.27
Absolute (%)	0.00	-3.77	-5.56
Rel market (%)	-0.29	-8.23	-15.42

Absolute Price



SOURCE: IRESS

Lead assets targeting NASH have blockbuster potential

PXS is focused on the development of drugs for inflammatory and fibrotic diseases. Its lead assets Phase 2 SSAO/VAP-1 inhibitor BI_467335 partnered in a multi-million dollar deal with Boehringer Ingelheim and currently unpartnered Phase 1 ready LOXL-2 inhibitors are targeting Non-alcoholic Steatohepatitis (NASH), a multibillion dollar market, estimated to grow to be ~US$20bn-US$35bn. The drugs while not first-in-class, have the potential to be best-in-class and be useful in other fibrotic diseases and we forecast both to be blockbusters (i.e. have over US$1bn in peak sales). NASH market is expected to grow with rise in obesity and surpass HCV as the leading cause of liver transplant by 2020. There are currently no approved drugs which make the market largely untapped and underserved. The multifactorial aspect of NASH and future treatments likely to be a combination of therapies ensures that companies remain on the lookout for promising assets to license, which bodes well for licensing prospects for PXS' LOXL-2 inhibitors. Preclinical and/or early trial data suggest that both drugs have a clean safety profile, with a favourable PK/PD profile with potent inhibition of the target. PXS also has two marketed respiratory products Bronchitol and Aridol which we view as non-core, however they represent an existing albeit small revenue stream for PXS with potential upside should US approval come through.

Investment view – Initiate with a Buy and Valuation of $0.54

We initiate coverage on PXS with a Buy (spec.) recommendation and value it using a risk adjusted DCF at $0.54. PXS' strong cash position provides it with long cash runway, with near term boost expected with ~A$15m milestone from BI and a potential multi-million dollar licensing deal in 2HCY18 on its LOXL-2 asset. The SSAO/VAP-1 asset is in two Phase 2A trials expected to report in 2HCY18 and LOXL-2 is expected to enter Phase 1 shortly. For a clinical stage company, we believe PXS is still under the radar. We also believe that the validation and credibility provided by its partner BI both of its technology platform and its ability to execute high value deals is underappreciated. Licensing and acquisition activity is high in the NASH space and recent deals have been over US$1bn. At our valuation, PXS' market cap of <A$200m is conservative given recent deals in the space have been over US$1bn.

Earnings Forecast

Year end 30th June	2016A	2017A	2018E	2019E	2020E
Revenue (A$m)	17.8	17.3	50.3	14.1	12.9
EBITDA (A$m)	-14.8	-15.2	23.8	-9.6	-7.0
NPAT (reported) (A$m)	-16.5	-18.3	20.4	-13.4	-11.1
NPAT (normalised) (A$m)	-15.3	-17.4	21.4	-12.4	-10.1
EPS (reported) (cps)	-5.2	-5.7	6.4	-4.2	-3.5
EPS (adjusted) (cps)	-4.8	-5.5	6.7	-3.9	-3.2
EPS growth (%)	N/A	N/A	NM	N/A	N/A
PER (x)	N/A	N/A	3.8	N/A	N/A
EV/EBITDA (x)	-3.5	-3.4	2.2	-5.4	-7.4
Dividend (¢ps)	0.0	0.0	0.0	0.0	0.0
Yield (%)	0.0%	0.0%	0.0%	0.0%	0.0%
Franking (%)	N/A	N/A	N/A	N/A	N/A
ROE (%)	-73.0%	-494.3%	85.9%	-99.7%	-426.3%

NOTE: REVENUE INCLUDES R&D TAX INCENTIVE, MILESTONES FROM BI DEAL AND FY19 AND FY20 REVENUE INCLUDES RISK ADJUSTED UPFRONT AND MILESTONES FROM LICENSING DEAL FOR LOXL-2. SOURCE: BELL POTTER SECURITIES ESTIMATES

Contents

Investment Case

We initiate coverage of Pharmaxis (PXS) with a buy (speculative) recommendation. Our investment thesis is based on:

$0.54 valuation: We value PXS using a risk adjusted DCF at $0.54. The valuation is approximately a 111.8% premium to the current share price of $0.255/sh.

Lead assets targeting NASH have blockbuster potential: Pharmaxis' lead assets Phase 2 SSAO/VAP-1 inhibitor BI_467335 and Phase 1 LOXL-2 inhibitor are both targeting Non-alcoholic Steatohepatitis (NASH), a multibillion dollar market, estimated to grow to be ~US$20bn-US$35bn. We model US$1.96bn peak worldwide sales (pre risk adjustment) for BI_467335 in NASH and US$1.45bn for LOXL-2 in NASH.

NASH represents significant commercial opportunity: NASH is a large market, growing rapidly with an increasing obese population. It is estimated that NASH will surpass Hepatitis C Virus (HCV) as the leading cause of liver transplants by 2020. There are currently no drugs approved for NASH, which makes this market largely untapped and underserved and a lucrative market opportunity for PXS to target. There are several drugs in development and interest and competition has both heated up. There have been a number of high value deals in this space recently and active companies are looking to license or acquire to build a portfolio of assets targeting different stages of NASH. Average deal sizes are around US$860m, however some deals recently have been over $1bn.

PXS emerging as a key player in NASH: Drugs targeting NASH in development fall under 3 groups based on their mechanism of action and stage of NASH they target – metabolic modifiers, anti-inflammatory agents and anti-fibrotic agents. It is expected that the future treatment for NASH is likely to be a cocktail of therapies as was seen earlier with HCV. Therefore we see drugs from each of the 3 categories to complement each other and competition likely to be restricted to drugs within the same category. Pharmaxis has two assets which fall under two different categories. BI_467335 is an anti-inflammatory agent and LOXL-2 asset is an anti-fibrotic agent and therefore should complement each other and other drugs in advanced development. There are very few drugs in development in these 2 categories and as far as we are aware both these drugs are currently the only one in their class being actively developed for NASH.

Drugs not first-in-class but potentially best-in-class: PXS' SSAO/VAP-1 and LOXL-2 inhibitor are not the first in their class. However based on pre-clinical data for both and Phase 1 data for the SSAO drug, we believe the drugs possess a more favourable PK/PD profile which could make them best-in-class. Data so far provides evidence of good safety profile, good oral bioavailability and potent, long lasting inhibition of targeted enzyme.

Potential exists to expand the use of lead drugs beyond NASH: Both the lead drugs have potential to be used across fibrotic diseases with the SSAO inhibitor in a phase 2 trial for Diabetic Retinopathy (DR) and LOXL-2 being explored in Pulmonary Fibrosis.

Partnership with Boehringer Ingelheim validates chemistry platform: PXS signed a multi-million dollar product acquisition deal with Boehringer Ingelheim in 2015, which marked the start of the turnaround for the company, strengthened its balance sheet and validated its amine oxidase chemistry platform and its ability to execute valuable deals.

Value inflexion points approaching: ~A$15m milestone is expected before end of CY17 from BI on dosing of first patient in DR trial. Results from both phase 2A trials for the drug are expected in 2HCY18. LOXL-2 is expected to enter Phase 1 shortly with results in mid-CY18, with a multi-million dollar licensing deal expected in 2HCY18.

Strong cash position: A$38.6m cash with further boost expected with the imminent ~A$15m milestone payment from partner BI provide at least 2.5 years cash runway.

Risks

The key risks specific to Pharmaxis include, but are not limited to, the following:

- **Clinical risk:** There is a risk that PXS' clinical trials for LOXL-2 fail to reach their endpoints, which would in turn impact its partnering prospects.
- **Timing and clinical risk on partnered product:** For its partnered product BI_467335, PXS is reliant on Boehringer Ingelheim (BI) for development timelines. The ability of PXS' products to finally reach the market and translate into royalty revenue streams for the company depends on BI. Delays in timelines will affect near term milestone payments to PXS as well as its long-term revenue flow. Also if the product fails at any stage of clinical development or BI decides to discontinue the development of the product PXS' ability to generate revenue from that asset will diminish/or fail totally.
- **Reliance on partnerships to unlock value:** The success of PXS' business model is underpinned by its ability to ultimately attract valuable partnering deals for its assets, given PXS lacks the commercial infrastructure to support commercialisation. Our valuation in part is underpinned by PXS' ability to ultimately attract a valuable partnering deal for its LOXL-2 asset. Failure to attract partners for this asset or to negotiate attractive deal terms as we have postulated will impact our forecasts.
- **Bronchitol US approval decision may have sentiment impact, although won't affect our valuation:** The revenue driver in our model for PXS is its 'New Drug Development segment' which includes the partnered BI_467335 drug for the indication NASH and Diabetic Retinopathy and its currently unpartnered asset LOXL-2 also targeting NASH and other fibrotic indications. While we look at Bronchitol and Aridol, PXS' currently marketed products as non-core assets and attribute minimal value to it, with no value in our model for Bronchitol's potential US approval and launch, we believe PXS is vulnerable to partner Chiesi's success/failure in obtaining US regulatory approval for Bronchitol, which could impact the sentiment around the company.
- **Regulatory risk:** Successful commercialisation of PXS' products is ultimately dependent on getting approval from the regulatory authorities to commercially launch the product. While PXS' partner with much more experience in navigating regulatory channels will be responsible for obtaining approvals, failure to satisfy regulatory requirements could mean that the product will fail to reach the market.
- **Commercial risk:** The pharmaceutical market is intensely competitive and in particular the NASH space which PXS is targeting has several companies engaged in drug development. PXS' products are unlikely to be the first to market and therefore would not have first mover advantage. There is no guarantee that mid-late stage clinical trial results of the BI drug or the LOXL-2 drug, even if they hit the endpoints of the studies, will be viewed as clinically meaningful by clinicians' vis-à-vis other approved NASH drugs by then on the market. Even if the drugs do get approved on successful pivotal studies, commercial adoption might still be hampered by the cost of the combination (especially in LOXL-2's case where we assume an add-on therapy positioning) or the competition in the NASH market having much larger impact than we have postulated.
- **Funding risk:** Delays in partnering of LOXL-2 may impact PXS' funding position in the long term. At the end of 1QFY18, PXS had A$38.6m in cash and debt related to finance lease of A$9.0m, amounting to a net cash position of A$29.6m. PXS is due to receive an additional ~A$15m milestone payment from BI shortly. Although PXS has a high cash balance currently, which should provide cash runway into CY20, the company may need to raise additional capital for funding its requirements beyond that should there be delays in partnering its LOXL-2 asset. There is no guarantee that PXS will be able to secure additional financing if and when required.

Introduction

Pharmaxis Ltd. (PXS.ASX), is a biopharmaceutical company focused on the development of therapies for diseases underpinned by inflammation and fibrosis. The company operates in 2 segments – Bronchitol and Aridol (marketed assets) and New Drug Development (portfolio of novel drugs).

It has been listed on the ASX for 14 years (since 2003) and is headquartered in Sydney, Australia. It also manufactures and exports it's marketed products from a purpose built manufacturing facility in Sydney.

We look at Bronchitol and Aridol, PXS' currently marketed respiratory products as non-core assets and attribute minimal value to it. Within the segment we expect Bronchitol to be the main revenue driver with a small contribution from Aridol to overall revenue. PXS believes the Bronchitol and Aridol segment could transition to profitability over the next 1-2 years, irrespective of any new US approval. On our estimates we expect the EBITDA loss from the segment to significantly come down from the FY16/FY17 levels starting FY18, however we do not see the segment becoming profitable out to several more years, continuing instead to make a modest loss, albeit declining each year as product sales pick up. Growth in this segment is likely to be driven by increased sales in existing markets due to expanded reimbursement and launch in new markets. Approval and launch in the US, currently not factored in our model, could lead to significant growth in revenue from this segment. Partner Chiesi expects to file for approval in CY18 and approval and launch would yield a US$10m milestone to PXS, along with additional sales milestones and tiered double digit royalties.

The company's core driver of growth and the key driver of our valuation is its New Drug Development segment. PXS' key strength is its proprietary amine oxidase chemistry platform, which combined with its expertise in small molecules has provided PXS with the capability to identify and develop drugs against well validated targets for treating disease areas with high value and high unmet need. The current therapeutic areas of key focus for PXS is Non-alcoholic Steatohepatitis (NASH), a late stage fatty liver disease and Pulmonary Fibrosis (lung disease). The company has a portfolio of pipeline assets at various stages of development. Its lead asset partnered with European pharma company Boehringer Ingelheim in a multi-million dollar deal is in 2 Phase 2A trials for NASH and Diabetic Retinopathy, another internal asset targeting LOXL-2 is set to enter Phase 1 trials shortly also targeting NASH and pulmonary fibrosis, which are followed by several earlier stage assets expected to enter the clinic in CY18. Key revenue driver for this segment in the short to medium term is milestone payments from existing partner and significant upfront payment and subsequent milestones expected from a new deal in 2HCY18 for its currently unpartnered Phase 1 NASH asset.

With 2 assets targeting different modalities of NASH in its pipeline, PXS is emerging as a key player in this multi-billion dollar, high growth market, which has no currently approved treatments and high licensing and acquisition activity.

The company also has a strong cash position, with further boost expected with the imminent ~A$15m milestone payment from partner BI before the end of CY17. On our estimates this should provide at least 2.5 years cash runway, with cash injection from a licensing deal for Phase 1 LOXL-2 asset in 2HCY18, expected to further extend this runway. PXS is unlikely to require any capital raisings in the medium term and we believe the company is well placed to look at capital management initiatives such as a share buyback or special dividend to return some surplus capital to its shareholders. PXS' strong cash position will also allow it to pursue some asset acquisitions to further enrich its drug development pipeline and also allow the company to consider Phase 2A/2B development for some of its pipeline assets to add more value before partnering them out.

New Drug Development – Lead assets target NASH

The key revenue driver in our model is PXS' New Drug Development segment. PXS' strategic focus in this segment is on therapeutic indications underpinned by inflammation and fibrosis. The company's key strength is its proprietary amine oxidase chemistry platform, which combined with its expertise in small molecules has provided PXS with the capability to identify and develop drugs against well validated targets for treating disease areas with high value and high unmet need.

The current therapeutic areas of key focus for PXS is Nonalcoholic Steatohepatitis (NASH) and Pulmonary Fibrosis. PXS is also applying a de-risked strategy of partnering after early/mid stage clinical trials, a process it starts quite early in the development, with the aim of 'developing drugs against targets which pharma companies would want to partner' vs. ' trying to partner drugs they have developed'. The difference we believe is in getting feedback from pharma companies quite early in the process, which could help PXS to put together ultimately a more valuable licensing data package, which would involve a more targeted approach to both its pre-clinical development as well as early stage clinical trials.

The key validation for PXS' strategy and the turnaround point for the company was the multi-million dollar product acquisition deal it signed with European Pharma company Boehringer Ingelheim in 2015. This strengthened its balance sheet and validated its amine oxidase chemistry platform, its ability to execute valuable deals and its therapeutic focus on diseases underpinned by fibrosis and inflammation, particularly NASH.

This segment includes 2 lead assets, with one being its partnered candidate with European pharma Boehringer Ingelheim BI_467335 for the indication Nonalcoholic Steatohepatitis (NASH) and Diabetic Retinopathy (DR) and its currently unpartnered LOXL-2 candidates also targeting NASH, with potentially Idiopathic Pulmonary Fibrosis (IPF) as a second indication, with potential wider applicability in other fibrotic diseases. It also includes a pipeline of earlier stage assets all which target inflammation and fibrosis, which are yet to enter formal toxicology studies and therefore we do not include in our model at this stage.

We focus on discussing the NASH market, which is the lead indication for both PXS' lead assets and discuss the key factors relevant to this market and both these assets below.

Overview of NASH market

Nonalcoholic Steatohepatitis (NASH) is a disease subset of nonalcoholic fatty liver disease (NAFLD). NAFLD occurs when fat is deposited (steatosis) in the liver in individuals who drink little to no alcohol and is the most common chronic liver disease worldwide. In most people it causes no symptoms except for fatigue at its earliest stages, but in some it can cause inflammation and scarring, with symptomatic manifestation in gastrointestinal complaints such as nausea, vomiting and pain. Inflammation and liver cell damage can cause fibrosis or scarring of the liver and may lead to cirrhosis or liver cancer, each requiring liver transplants. Patients with cirrhosis may have symptoms such as fevers and jaundice (yellowing of skin and white of the eyes).

On accumulation of fat the liver becomes inflamed and damaged over the course of time, which leads to the condition NASH. **NASH is therefore best described as inflammation of the liver and liver cell damage, in addition to accumulated fat in the liver.** NASH is also associated with a higher risk of cardiovascular disease, while NAFLD is associated with higher risk of developing Type 2 diabetes.

NASH is expected to be a multi-billion dollar drug market with rapid growth due to increasing obese population

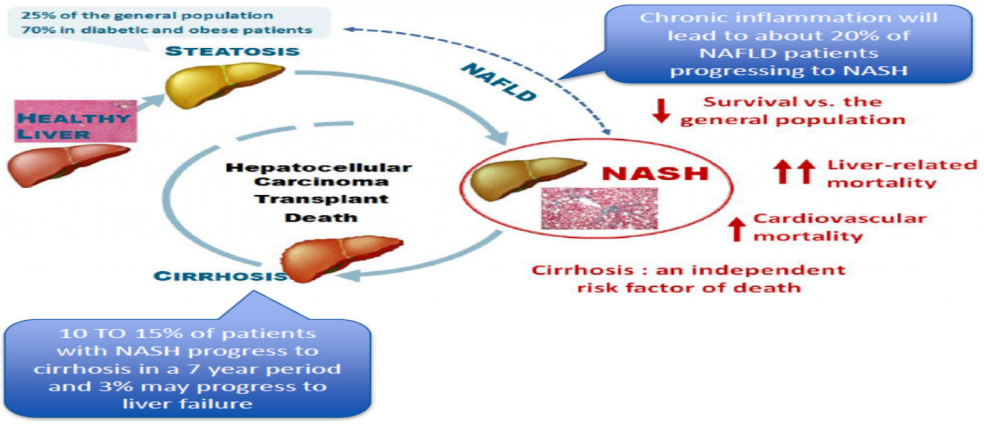
Risk factors of NAFLD include obesity, diabetes, cardiovascular risk factors such as low HDL/high LDL cholesterol, ageing, inactivity and poor sleep.

It is estimated that ~25%-30% of adults in US have NAFLD and ~20% of them may go on to develop NASH. It is estimated that ~12m-20m people in the US suffer from NASH.

Up to 16% of liver transplants in the US are currently due to NASH and industry experts estimate that NASH which is driven by the obesity and diabetes epidemic, will surpass Hepatitis C Virus (HCV) as the leading cause of liver transplants by 2020.

Industry forecasts estimate that the NASH market could grow to be ~US$20bn-US$35bn as western fatty diets continue to increase obesity rates and therefore NASH incidence.

Figure 1 – NAFLD progression to NASH and Cirrhosis



SOURCE: COMPANY DATA

Standard of care Treatment for NASH

There are currently no drugs approved for NASH, which makes this market largely untapped and underserved. There is an urgent an unmet need for safe and effective therapies to treat NASH patients with advanced stages of the disease (those with advanced fibrosis and cirrhosis), who have significant clinical symptoms and who have reduced life expectancy.

Currently, standard of care in most cases is healthy lifestyle changes and exercise to reduce body weight and treatment of any underlying diseases such as high cholesterol, diabetes or obesity. However, these treatments have not conclusively shown to halt disease progression and patient compliance seems to be poor.

However, there are several drugs currently in development to treat NASH. Due to the multifaceted nature of the disease, companies are looking to target the disease with different modalities. The expectation is that combination treatments will be crucial to adequately reduce and control the metabolic burden, inflammation and the consequent fibrosis associated with progression.

At present, treatment is also limited for NASH due to limited diagnostic tools available. Invasive and painful liver biopsy is currently the only reliable method to diagnose the level of fibrosis in NASH. We note the level of fibrosis in the liver is what determines the severity of the disease. Across all indications in the US, there are currently only 50,000 liver biopsies per year, which amounts to less than 1% of the estimated NASH population. Also, there are only 3,000 hepatologists in the US, which would also be a limiting factor to diagnose ~12m-20m people with NASH.

Imaging techniques such as MRE, Ultrasound Elastography, MRI, ultrasound can all diagnose to limited extents steatosis or late stage fibrosis/cirrhosis (Stage F3 and F4) and

in some cases earlier stages of fibrosis, however they are not all widely available, have high costs which again limit their potential for regular use.

Companies such as Genfit are developing blood based non-invasive tests using biomarkers which when used with imaging techniques could help in adequate diagnosis of patients.

NASH provides potential for accelerated approval by the FDA

Given the significant unmet need for therapies to treat NASH and growing burden of end stage disease (NASH expected to be leading cause of liver transplants by 2020), therapies currently in Phase 3 development for NASH have been granted both fast track designation from the FDA and are also eligible for accelerated approval under Subpart H on intermediate results from their Phase 3 trials. Both these expedited pathways together could enable a faster path to market for these drugs.

We note that Boehringer Ingelheim also has Fast Track designation from the FDA for the BI_467335 drug for NASH.

Under Fast Track, the drugs are eligible for certain benefits which would shorten the FDA review time. These include priority review (which shortens the review time to 6 months vs. standard 10 months) and a rolling NDA submission and review process (which enables the company to submit sections of the NDA when completed rather than waiting for all sections to complete).

Accelerated approval under Subpart H are for drugs which treat a serious condition and allows them to get to the market earlier by getting conditional approval if they can demonstrate an effect on a surrogate endpoint which is reasonably likely to predict clinical benefit or they can demonstrate an effect on a clinical endpoint that can be measured earlier than an irreversible morbidity or mortality (IMM) endpoint which again is reasonably likely to predict an effect on IMM or other clinical point.

For the 4 most advanced Phase 3 drugs currently in development which are eligible for Subpart H approval, we note that the trials which have 2000 or more patients, have been allowed to seek approval on the intermediate end point at ~50% of patients on surrogate histological endpoint after ~72 weeks. One of the surrogate endpoints for NASH approval is a criteria defining disease activity based on a centralised histological reading which looks at 'NASH resolution without worsening of fibrosis, corresponding to ballooning and inflammation'. The other surrogate endpoint is 'improving fibrosis without progression of NASH'.

The companies who get conditional approval on surrogate endpoints will still have to continue their trials post market approval to confirm the long term clinical benefits of NASH resolution, in which instance they would be tracking progression to cirrhosis and other liver related events.

Pharmaxis has two lead assets targeting NASH

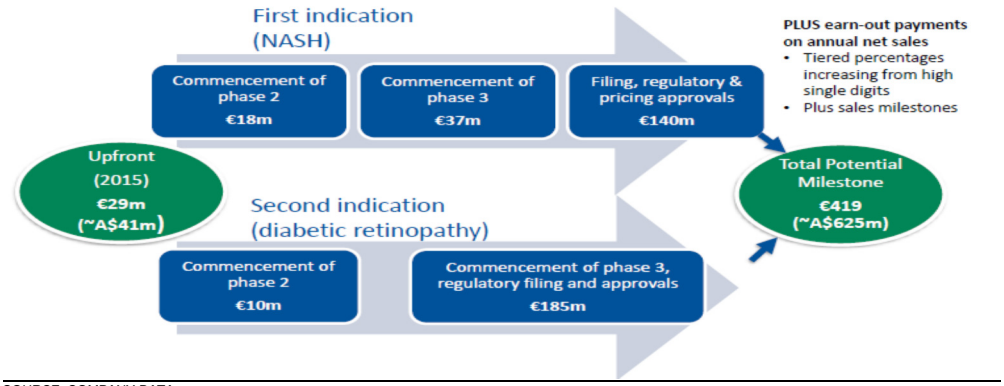
Pharmaxis has two lead assets which are targeting NASH and other secondary inflammation/fibrosis mediated diseases. The SSAO/VAP-1 inhibitor BI_467335 partnered with Boehringer Ingelheim is an anti-inflammatory agent while the currently unpartnered LOXL-2 asset is an anti-fibrotic agent. We discuss both of these briefly below:

SSAO/VAP-1 INHIBITOR BI_467335 (PREVIOUSLY KNOWN AS PXS-4728A)

Boehringer Ingelheim acquired this drug from PXS in 2015 in a deal worth A$625m in upfront and milestone payments plus further sales based milestones. **We estimate total deal was worth ~US$645m.**

At the time of the deal, the drug was close to completing a Phase 1 trial. The company has already received A$68m in upfront and development milestones from this deal to date and is expected to receive another A$15m shortly on initiation of a Phase 2A trial in a second indication Diabetic Retinopathy (DR).

Figure 2 - PXS/Boehringer SSAO/VAP-1 deal terms



SOURCE: COMPANY DATA

BI_467335 is a small molecule inhibitor of Semicarbazide-sensitive amine oxidase/ vascular adhesion protein-1 inhibitor (SSAO/VAP-1). It covalently binds to the enzymatic pocket of SSAO/VAP-1 and completely blocks enzymatic function.

Elevated levels of SSAO/VAP-1 has been observed in patients with NAFLD/NASH and also correlate with disease severity. Elevated SSAO/VAP-1 is linked to disease progression in inflammatory diseases with a fibrotic component. SSAO/VAP-1 are linked to progression of NAFLD, with this protein shown to promote an increase in infiltrating CD4+ and NKT cells to the liver and are also thought to have a role in the induction of fibrogenesis in NASH (steatohepatitis). It is also known to be able to modulate both glucose and lipid uptake in NAFLD, which suggests its role in both inflammatory and lipogenesis components of the disease.

SSAO/VAP-1 also acts as an endothelial adhesion molecule for leukocytes. Oxidative stress has been proposed as a key factor causing retinal vascular leakage. SSAO/VAP-1 has been attributed with producing toxic reactive oxygen species which initiate apoptosis (cell death). Elevated plasma levels of SSAO/VAP-1 have been linked to both diabetic patients and in diabetic retinopathy.

The drug is currently in a Phase 2A trial for NASH and has started recruiting patients for another Phase 2A trial for Diabetic Retinopathy. **Results from both these trials are expected in 2HCY18.**

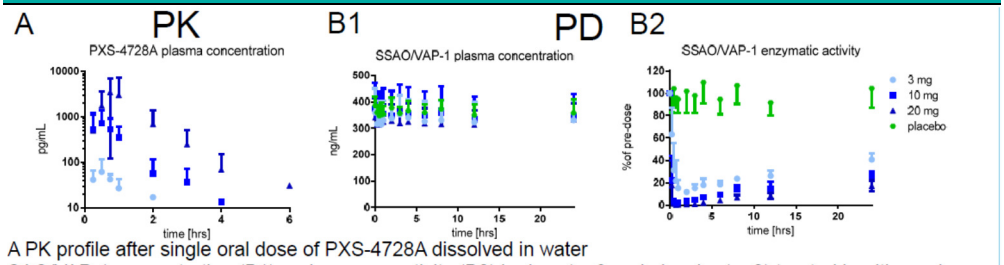
In pre-clinical animal models, this drug has exhibited both anti-inflammatory and anti-fibrotic characteristics. **The key observations from pre-clinical models were as follows:**

- Data demonstrated that the drug was a mechanism-based potent and selective inhibitor. It possesses excellent selectivity over other amine oxidases as well as macromolecular targets. The lack of significant off-target activity gives the drug a favourable safety profile.
- It was shown to possess excellent oral bioavailability, with a short-half life and long lasting enzyme inhibition (over 24 hours).
- Promising efficacy was demonstrated in various rodent models of inflammation (the drug reduced neutrophil migration to site of inflammation) and in carbon tetrachloride (CCl4) and NASH models of liver fibrosis (the drug reduced fibrosis and inflammation).
- The drug was also shown to have a large therapeutic window, being well tolerated in both single and repeated oral dosing in both rats and dogs.

The key points are that the drug has a clean safety profile and even with a modest half-life (between 1-4 hours), a single daily dose is sufficient to achieve more than 95% enzyme inhibition over 24 hours. The fast clearance likely makes the drug safer and given it almost completely blocks enzyme activity, makes the drugs overall pharmacokinetic and pharmacodynamic (PK/PD) profile very desirable.

In the Phase 1 clinical trial, the positive pre-clinical data was confirmed. The drug exhibited a clean safety profile and showed long lasting enzyme inhibition (24 hours) after a single low dose, despite its short half-life. It confirmed the drugs excellent oral bioavailability.

Figure 3 - BI_467335 Phase 1 single Ascending dose study PK results



A PK profile after single oral dose of PXS-4728A dissolved in water
SAO/VAP-1 concentration (B1) and enzyme activity (B2) in drug (n=6 and placebo (n=2) treated healthy males

SOURCE: COMPANY DATA

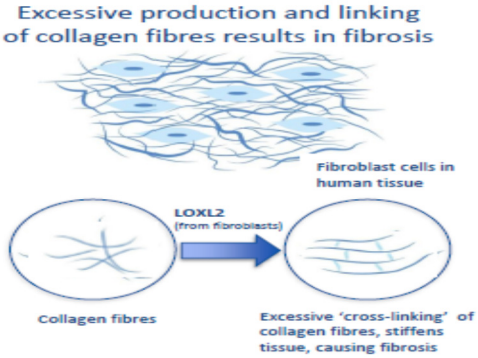
LOXL-2 INHIBITOR

PXS' LOXL-2 candidate is a small molecule inhibitor of lysyl oxidase-like 2 (LOXL-2). It covalently binds to LOXL-2 and completely blocks enzymatic function through mechanism based inhibition. It also inhibits LOXL-3 and LOXL-4, however with a 10 fold and 3 fold lower potency respectively. LOXL-3 has been strongly associated with progression of fibrosis, with little known about the relevance of the LOXL-4 target.

LOXL-2 is a crucial enzyme in the pathophysiological generation of collagen and elastin cross-links and, therefore, fibrosis. Under normal physiological conditions, cross links are essential for the stabilisation of collagen and integrity and elasticity of elastin and is driven by other family members, LOX and LOXL-1. However in disease setting, this process becomes aberrant and results in excessive cross-link formation which leads to fibrosis.

LOXL-2 has limited expression in healthy tissues. The lysyl oxidase family contains 5 members and LOXL-2 is a well validated drug target as it is upregulated in various fibrotic diseases and some solid tumours. LOXL-2 is fundamental to the fibrotic cascade that follows chronic inflammation in various fibrotic diseases by playing a crucial role in formation of collagen cross-links and therefore in the development and progression of fibrosis. Elevated LOXL-2 levels is linked to disease progression in idiopathic pulmonary fibrosis (IPF), cardiac fibrosis, kidney fibrosis and liver fibrosis (NASH). It also plays a role in some cancers.

Figure 4 – LOXL-2 and fibrosis



SOURCE: COMPANY DATA

LOXL-2 inhibition reduces the oxidation of lysine residues and therefore enables degradation of non-cross-linked collagen which reduces fibrosis. The existing cross-linked collagen also slowly degrades over time.

PXS has developed a number of selective small molecule inhibitors under its LOXL-2 program. **2 candidate compounds with different PK profile** (one liver directed specifically and one more suitable to other fibrosis indications such as IPF) **have recently cleared pre-clinical development and are expected to enter Phase 1 trials before the end of CY17.** PXS will look to partner this drug on completion of the Phase 1 trial (BPe 2HCY18).

In pre-clinical animal models (9 models across 5 different diseases), the drugs have exhibited anti-fibrotic characteristics. **The key observations from pre-clinical models were as follows:**

- Data demonstrated that the drugs were a mechanism-based potent and selective inhibitor of LOXL-2 and to a lower potency level of LOXL-3 and LOXL-4. They possess excellent selectivity over other lysyl oxidases (LOX and LOXL-1) as well as several amine oxidases and macromolecular targets. The lack of significant off-target activity gives these drugs a favourable safety profile.
- Drugs were shown to possess good oral bioavailability, with a short-half life and long lasting efficacy in vivo, which should position them favourably as a once a day oral drug.
- Promising efficacy was demonstrated in several animal fibrosis models including fibrosis of the liver (including CCl4 induced liver fibrosis model and a NASH model), lung, kidney and heart. Studies showed consistent reduction in the area of fibrosis and/or improvement of functional readouts, including reduction in number of cross-links and other fibrotic markers. In an IPF model the drug was shown to reduce tissue stiffness by ~50%, reduced fibrosis score and improved lung function (elastance).
- The drugs were also shown to be well tolerated with a good safety profile in both single and repeated oral dosing toxicology studies in animals.

Figure 5 – LOXL-2 compound A is a selective inhibitor

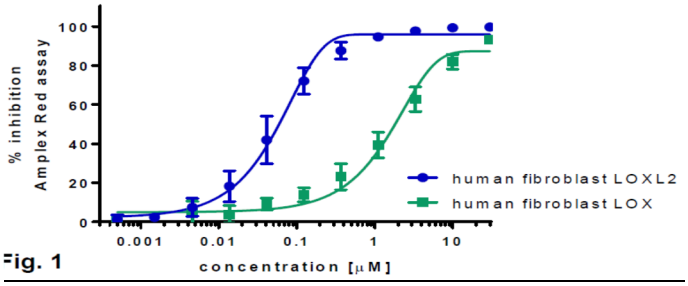
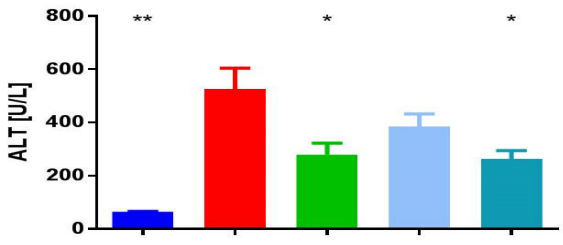


Fig. 1

SOURCE: COMPANY DATA

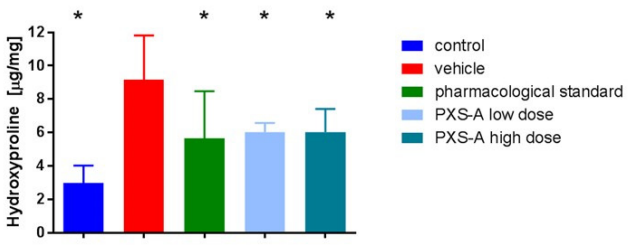
Figure 6 - LOXL-2 compound A improves liver function



PLASMA ALT LEVELS AFTER 6 WEEKS OF CCl4 TREATMENT

SOURCE: COMPANY DATA

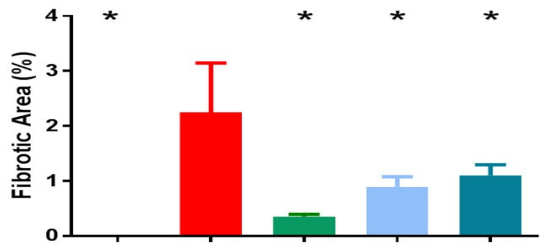
Figure 7 - LOXL-2 compound A is anti-fibrotic



FIBROSIS WAS MEASURED BY TOTAL HYDROXYPROLINE CONTENT

SOURCE: COMPANY DATA

Figure 8 - LOXL-2 compound A is anti-fibrotic



AREA OF FIBROSIS AS QUANTIFIED THROUGH PICROSIRIUS RED STAIN

SOURCE: COMPANY DATA

The PK/PD characteristics of PXS' LOXL-2 drug seem very similar to PXS' SSAO/VAP-1 inhibitor and it follows that PXS would hope to see the data confirmed similarly in Phase 1 trials. **We would expect the Phase 1 trial to confirm the safety profile and show that a single daily dose of the drug with short half-life is sufficient to achieve almost complete and long lasting enzyme inhibition.**

Given that other assets in this class, who have run Phase 1 trials and in Gilead's case a Phase 2 trial have not shown any safety issues, we believe as a class LOXL-2 inhibitors have not till date flagged any safety concerns. This fact along with the preclinical data on PXS' compounds makes us believe that safety should not be an issue in the Phase 1 trial. The target engagement and PK/PD data from the Phase 1 trial is likely to be more relevant and awaited.

PXS HAS A RESEARCH COLLABORATION WITH SYNAIRGEN ON THE DEVELOPMENT OF LOXL-2 INHIBITORS

Pharmaxis in August 2015, collaborated with UK based Synairgen on the research and development of a selective inhibitor to LOXL-2 to treat the fatal lung disease idiopathic pulmonary fibrosis (IPF).

We understand the nature of the collaboration is such that PXS is focused on NASH internally with its LOXL-2 candidate and is collaborating with Synairgen to essentially develop a LOXL-2 candidate for IPF.

Synairgen has access to proprietary human tissue based IPF models which they developed in collaboration with the University of Southampton which use lung cells from IPF patients. They also have expertise in developing respiratory drugs and good understanding of respiratory biology.

Under the terms of the collaboration agreement, Synairgen was to fund the pre-clinical studies and a Phase 1 trial of one of the LOXL-2 compounds developed for IPF.

The IPF program is being managed by a joint steering committee with Synairgen and PXS representatives through to the end of phase 1 clinical trials. Following Phase 1 trials, the collaboration will seek a license partner.

PXS can continue to develop LOXL-2 compounds outside the collaboration for other indications such as NASH, however any deal which happens on the LOXL-2 compound with more than one indication, will still fall under the collaboration.

A LOXL-2 deal with IPF as the lead indication will lead to both PXS and Synairgen sharing licensing revenues in a 50:50 ratio. However, a LOXL-2 deal with NASH as the lead indication and most likely IPF as the secondary indication will lead to PXS getting a larger share of licensing revenue from the deal than Synairgen (BPe 65:35 ratio). We understand the revenue share ratio is in accordance with the ratio of total investment by the two companies at that time.

In our view, the collaboration will make an effort to have IPF as part of any LOXL-2 deal. However we do believe NASH is likely to be the primary indication on which the deal is done given the high interest and high value deals in NASH space, with IPF likely to be the secondary indication part of any deal. Hence, in our model we have assumed PXS and Synairgen share licensing revenues in a 65:35 ratio from a LOXL-2 deal.

Competitive landscape for NASH

The prevalence of NASH which is driven by increasing prevalence of obesity and diabetes is on the rise. The blockbuster potential for any novel therapy for this largely underserved market, with currently no approved treatments is huge.

The therapies in clinical development for NASH can be broadly grouped into three broad headings based on their mechanism of action. These include:

- **Metabolic Modifiers:** Agents which target steatosis (fatty liver) and lipid metabolism, which aim to block or reverse fat accumulation in the liver. Blocking of master regulators and enzymes involved in steatosis is considered to be the first step in the pathogenesis of NASH, which is intended to disrupt the common progressive cascade from steatosis to steatohepatitis (NASH) and ultimately to cirrhosis. Genfit with its Elafibranor and Intercept with its Ocaliva are the most advanced in this category.
- **Anti-inflammatory agents:** Agents which target steatohepatitis (inflammation of the liver with simultaneous fat accumulation in the liver) by targeting key cell death pathways which play a key role in inflammation and ballooning of liver cells. Inhibiting inflammation is intended to reduce or prevent fibrotic scarring. Gilead with its Selonsertib and Allergan with Cenicriviroc are the most advanced in this category.
- **Anti-fibrotic agents:** These are pure anti-fibrotic agents who aim to directly halt or reverse liver fibrosis, as progressive liver disease can lead to cirrhosis, liver cancer and liver failure. Galectin with its GR_MD_02 is the most advanced in this category, but recently failed to achieve statistical significance for its primary endpoint in a Phase 2B trial. It did show some meaningful effect in a subpopulation and on some secondary endpoints, therefore we believe the company is likely to continue development targeting the subpopulation.

Figure 9 - Drugs in the clinic targeting NASH

	Metabolic modifiers	Anti-inflammatory	Anti-fibrotic
Intercept	Ph 3		
Genfit	Ph 3		
Galmed	Ph 2/3		
Allergan	Ph 2	Ph 3	
Gilead	Ph 2 x 2	Ph 3	
BMS	Ph 2		Ph 1
Galectin			Ph 2
Novartis	Ph 2		
Pfizer	Ph 3 x 3		
Shire	Ph 2		
Boehringer Ingelheim		Ph 2	
Inventiva	Ph 2b		
Other	Ph 2 x 3; Ph 1	Ph 2 x4	

SOURCE: COMPANY DATA

Key observations around the current competitive landscape

- Due to lack of validated non-invasive diagnostic methods, currently the first patients diagnosed and likely to be treated for NASH by any drug which gets to the market are those with advanced stages of the disease, who have significant clinical symptoms and therefore are easily diagnosed and who have reduced life expectancy which would necessitate prioritising their treatment. These are likely to be the patients with advanced fibrosis and cirrhosis (fibrosis stage F2-F4). **This observation is validated given most companies are focusing on fibrosis endpoints in the F2-F3 patient population, irrespective of whether their drug is a pure anti-fibrotic or not, as it is evident this is likely to be the first target patient population.**

- Urgent need is for anti-fibrotic drugs for NASH, however we note that the most advanced drugs and those expected to reach the market first are Intercept's Ocaliva (if it gets approved) and Genfit's Elafibranor, which are both metabolic modifiers. Metabolic modifiers could have long term effect on fibrosis by preventing progression of liver disease to inflammation and fibrosis, however they are unlikely to have potent effect on existing fibrosis or cirrhosis. **However, given the urgency to treat advance NASH stage patients and anti-fibrotic drugs still a few years away from reaching the market, we believe any metabolic modifier which does get to market first with even a modest effect on fibrosis even in the longer term is likely to be prescribed to these patients.** This is likely to continue till a better drug with more potent effect on fibrosis either alone or in combination gets to the market.
- **In our view,** the plethora of drugs in development for NASH in the metabolic modifiers category highlight two facts that this earlier stage market is likely to be the largest market in terms of patient volumes, are comparatively easier to develop with some of the targets well known for several years such as the FXR agonists and PPAR's and companies are relatively assured to get adoption as long as they are first to market with even modest effect on fibrosis even in the fibrotic population.
- We expect in 3-5 years' time when novel non-invasive and reliable diagnostic tools get approved, more patients with less severe disease, those with moderate fibrosis or NASH without fibrosis and those with just fatty liver content but at high risk of progressing to NASH would be able to get diagnosed. **Once diagnosis improves and more NASH drugs targeting inflammation or fibrosis get to the market we believe the companies to really win will be those who have a portfolio of assets targeting all the 3 different groups of NASH drugs which would mean they would have access to the entire NASH market and could therefore own combination therapies and undertake different pricing strategy dependent on what spectrum of the market they are treating.**
- **In our view, the drugs in each of the 3 different categories will eventually complement each other and be used in combination** as patients may need acute anti-fibrotic treatment to reverse fibrosis, with an anti-inflammatory treatment to tackle NASH and then also a metabolic modifier for long term management of their liver disease which would deal with the root cause of fat content in the liver. **The real competition we therefore see in the NASH space is between drugs within each category,** who will compete on safety profile especially cardiovascular risk profile and potency (i.e. efficacy).

Pharmaxis NASH assets - positioning in the NASH landscape

Pharmaxis has two assets which fall under two different categories. The SSAO/VAP-1 inhibitor BI_467335 partnered with Boehringer Ingelheim is an anti-inflammatory agent while the currently unpartnered LOXL-2 asset is an anti-fibrotic agent.

As we mentioned above, we do not see inter category competition within the NASH space **and therefore believe both PXS' drugs could complement each other and eventually be used in combination together or with any other drugs in different categories.**

We expect BI_467335 could be used as a monotherapy or in combination with the metabolic modifiers or the anti-fibrotics, however we expect the LOXL-2 is likely to be positioned as an add on therapy as it does not tackle the underlying fat content or the inflammation which damages the liver cells, but will be required to urgently treat the consequence of both of these i.e. fibrosis and cirrhosis in severe NASH patients.

The key competition for PXS is within category and to that end we note that there are a handful of drugs in development in both the anti-inflammatory category and even fewer in the anti-fibrotic category. This scarcity of assets positions PXS' assets

well in the potential combination cocktail treatment for NASH. LOXL-2 which is currently unpartnered, therefore is likely to attract significant interest for companies looking to build NASH portfolios across the 3 categories to access the whole market.

To our best knowledge, BI_467335 is the only SSAO/VAP1 inhibitor in development for NASH currently. We are aware of two other companies with SSAO/VAP-1 inhibitors but we have not had any indication of them to look at developing their respective assets for NASH.

- Upsher-Smith Laboratories through its UK subsidiary Proximagen signed a deal with Roche in 2015 to develop a SSAO/VAP-1 inhibitor for potential inflammatory diseases. Proximagen has responsibility to conduct Phase 2 trials with Roche assuming later stage development responsibility and costs. We do not have any visibility on the status of this asset or the likely indication Roche may want to target. However, we note that as far as we are aware Roche is not a player in the current NASH market.
- Astellas has a SSAO/VAP-1 inhibitor ASP8232 which has reported results from a Phase 2 trial in Europe for Diabetic Nephropathy, showing that the drug was able to achieve a clinically meaningful outcome in reducing residual albuminuria in patients. The company has also run a previous Phase 2 trial in Diabetic Macular Edema (an eye disease) with the drug, which did not meet its primary endpoint and subsequently Astellas discontinued further development of this asset for DME. We are not aware of Astellas intending to trial this asset in NASH or having any other drug in active development for NASH. Given BI has announced a trial in Diabetic Retinopathy for BI_467335, Astellas asset could have competed with it in eye diseases, however with the discontinuation of the DME study we believe it unlikely that Astellas will look at a new eye disorder trial with this drug.

To our best knowledge, PXS has the only LOXL-2 inhibitor currently in development for NASH. We are aware of two other companies with LOXL-2 inhibitors, one which was an antibody from Gilead and after poor results in NASH trial was discontinued and the other a small molecule by Pharmakea which is being targeted at IPF (Idiopathic Pulmonary Fibrosis) but we have not had any indication of them looking to develop it for NASH.

- Pharmakea with its small molecule LOXL-2 inhibitor PAT-1251 is a potential competitor for PXS at least in IPF (likely second indication). Pharmakea is more advanced than PXS since it has completed its Phase 1 trial. However, we note that at this stage the asset is unpartnered despite completion of Phase 1 trials. Pharmakea has also announced its intention to initiate a Phase 2 trial for PAT-1251 in IPF in early 2018. We have not heard any indication that they may start a Phase 2 NASH trial in the near future but it's possible. We believe that just as PXS has 2 LOXL-2 assets one which is more liver directed where small amounts can target the liver aptly and one which is more systemic and directed more towards other fibrosis indications such as IPF, kidney etc. **it is possible that the Pharmakea asset is not liver directed. We also believe that the Pharmakea asset compared to PXS' LOXL-2 inhibitor has a less favourable PK/PD profile.** We have seen from Pharmakea's data that it seems to be slow acting with higher plasma concentrations required for longer time for effect. PXS' LOXL-2 candidate on the other hand is fast acting and also fast clearing, which should reduce toxicity as well. We also note that PXS' LOXL-2 inhibitor also inhibits LOXL-3 which is strongly associated with the progression of fibrosis (albeit at a much lower potency than its inhibition on LOXL-2). We are not aware that Pharmakea's asset has any inhibition of LOXL-3, therefore dual LOXL-2/3 inhibition may make the PXS compound more potent.
- Gilead's asset Simtuzumab unlike PXS' and Pharmakea's asset is an antibody. We believe the drug failed in the Phase 2 trial and was subsequently discontinued by Gilead as it lacked potency. It did not block the LOXL-2 enzyme completely. PXS' LOXL-2 compound on the other hand has shown complete inhibition of LOXL-2 in

preclinical studies. Being an antibody, simtuzumab was administered via IV route (intravenous infusion). We note that PXS' LOXL-2 compound is orally administered and therefore its ease of use was likely to give it an advantage over simtuzumab anyhow.

We present a broad overview of selective emerging agents in Phase 3 or Phase 2B development for NASH in the table below.

Table 1 - Overview of selective emerging NASH drugs in development

Company	Drug	Target	Development Stage	Type of drug	Comments
Intercept	Ocaliva (OCA) or obeticholic acid	FXR (farnesoid X receptor) Agonist	Phase 3	Metabolic Modifier	This drug has been granted Breakthrough Therapy Status by the FDA for NASH with liver fibrosis and is eligible for Subpart H on intermediate results of Phase 3. This has already received approval for another rare chronic liver disease 'primary biliary cholangitis' (PBC). This drug has been highlighted in clinical trials to increase cholesterol levels (LDL) of patients that were already on statin treatments, increase insulin resistance and high incidence of pruritus in treated patients. Also, for the PBC indication FDA has released a safety alert highlighting the drugs increased risk of serious liver injury and death on incorrect dosing and is likely to lead to a boxed warning on its label. This may be first NASH drug to get to market should it be approved. However due to the negative safety profile in particular increased cardiovascular risk, even if approved its use may be significatly restricted to people with no cardiovascular disease/risk factor or uncontrolled diabetes, which is likely to significantly reduce the NASH market it is able to access.
Genfit	Elafibranor (GFT505)	Dual PPAR (Peroxisome prliferator-activator receptors) α/δ agonist	Phase 3	Metabolic Modifier	This drug has been granted Fast Track designation by the FDA for NASH and is eligible for Subpart H on intermediate results of Phase 3 from the FDA and conditional approval from the EMA. The company also has a biomarker pogram ongoing for non-invasive diagnosis of NAFLD/NASH. In Phase 2B this drug was shown to be safe and well tolerated and also improved cardiometabolic risk profile (lowered LDL and increased HDL levels). It was shown to improve insulin sensitivity. It also met the endpoint of 'resolution of NASH without worsening of fibrosis'.
Gilead	Selonsertib (GS-4997)	ASK1 inhibitor	Phase 3	Anti-inflammatory	This drug has been granted Fast Track designation by the FDA for NASH with liver fibrosis and is eligible for Subpart H on intermediate results of Phase 3 from the FDA. Phase 2 open label trial showed the drug was well tolerated and was shown to reduce fibrosis in aptients with NASH and stage 2-3 liver fibrosis. Previous data shows its positive effects on liver enzymes as well.
Allergan	Cenicriviroc (CVC)	CCR2/5 antagonist	Phase 3	Anti-inflammatory	This drug has been granted Fast Track designation by the FDA for NASH with liver fibrosis and is eligible for Subpart H on intermediate results of Phase 3 from the FDA. Allergan got this drug as part of its acquisition of Tobira. The Phase 3 primary composite endpoint is ' reduction in fibrosis by at least 1 stage with no worsening of NASH at 12 months'. In previous Phase 2B trial CVC failed to meet its primary endpoint of improvement in NAFLD score and also did not show a complete resolution of steatohepatitis. However it did show positive results on a second liver fibrosis end point, which is being used as the primary endpoint in the Phase 3 trial. We note that Novartis and Allergan have teamed up to run a combination trial with their NASH assets. It seems the drug which was anti-inflammatory is being now positioned as an anti-fibrotic.
Galectin	GR_MD_02	Galectin Inhibitor	Phase 2B complete	Anti-fibrotic	This drug has been granted Fast Track designation by the FDA for NASH with liver fibrosis. Preclinical data in animals have shown that this drug has good treatment effect in reversing liver fibrosis and cirrhosis. A Phase 2 A trial focused on NASH stage 4 (cirrhosis) failed to meet its endpoints but the company argued that the short 4 month duration of the trial was inadequate to see an efficacy response and the larger Phase 2B will hopefully be able to demonstrate the effect. Unfortunately, the company reported results from this trial earlier this week and the trial failed to achieve statistical significance on its primary end point. However some statistically significant impact were noted in subgroup of NASH cirrhosis patients without esophageal varices and on a secondary endpoint it achieved statistical significance in the improvement of hepatocyte ballooning. We believe the company is likely to pursue further studies targeting the subpopulation in which it did show meaningful effect. Unlike most other drugs in development for NASH which are orally delivered, the Galectin drug is an injectable.
Galmed	Aramchol (arachidyl amido cholanoic acid)	FABACs (fatty acid bile acid conjugates)	Phase 2B	Metabolic Modifier	This drug has been granted Fast Track designation by the FDA for NASH with liver fibrosis. In a Phase 2A trial it demonstrated reduction in liver fat content as measured by MRs, however no histological measures were performed. In preclinical models the drug has shown some anti-fibrotic effect. We understand the safety profile of the drug has been good so far.

SOURCE: BELL POTTER SECURITIES, COMPANY DATA

Comparable deals in NASH space

Industry experts estimate that NASH which is driven by obesity and diabetes epidemic, will surpass Hepatitis C Virus (HCV) as the leading cause of liver transplants by 2020. With the plethora of effective HCV treatments available now, pharma companies have now moved to the next potential multi-billion dollar market NASH. With no drugs currently approved for NASH, the market for NASH is largely untapped and underserved. **There have been a number of high value deals in this space recently and there has emerged a trend of companies active in this space to be on the lookout for additional promising assets to license or acquire to build a portfolio of assets targeting different stages of NASH, as the future treatment for NASH seems likely to be a cocktail of therapies as was seen earlier with HCV.**

We highlight two of the high value deals in NASH, Gilead's acquisition of Nimbus' NASH asset alone for US$1.2bn and Allergan's company acquisition of Tobira for US$1.7bn. Gilead acquired the Nimbus asset after completion of Phase 1 trials, while it was yet to enter Phase 2A trials. If we look at this deal, the PXS/BI deal while it was running Phase 1 trial seems to be of much lower value. With LOXL-2 PXS wants to partner at exactly the same stage as the Nimbus asset i.e. post Phase 1 completion, prior to starting Phase 2A.

Allergan on the other hand acquired Tobira when its market value had declined significantly on the results from a Phase 2B trial. This asset showed no effect on the metabolic component of NASH (i.e. did not meet the primary endpoint of at least a 2 point improvement in NAFLD score without worsening of fibrosis), but did show positive results on a second liver fibrosis end point. Allergan with this deal got a much later stage asset which at least had clinical results on one aspect i.e. fibrosis for NASH.

Looking at these two deals alone, we can infer that companies are willing to pay high value for drugs even at earlier stage of development and also that companies do put a reasonable value on the potential of getting first to the market, with currently no approved drugs, high level of unmet need and where any effect on the disease is likely to be sufficient to make it a blockbuster.

Looking at some of the deals listed in the table below, the average deal size in the NASH space is ~US$864m. At this stage, in the absence of clinical data from LOXL-2, we conservatively assume a lower than the average deal size as a reasonable assumption for the dollar value PXS' LOXL-2 may fetch, especially given that this is unlikely to have any value put to it for early access to the NASH market.

We believe the best comparator for LOXL-2 deal size at this stage is the previous deal PXS signed with Boehringer Ingelheim on the BI_467335 SSAO/VAP-1 inhibitor which was also at end of Phase 1 trials at the time of partnering and the Conatus/Novartis deal. Both these deals sit around the middle of the low and high end valued deals in the NASH space.

We expect a LOXL-2 deal to attract more partnering interest than PXS' SSAO/VAP-1 anti-inflammatory asset, given the scarcity of anti-fibrotic assets in development for NASH and stronger preclinical data with more animal disease models explored for LOXL-2. However, given that LOXL-2 is likely to get to market a few years behind the SSAO/VAP-1 asset and likely be used as an add-on therapy, we only expect a modest premium to the SSAO/VAP-1 deal at this stage. Therefore we expect the LOXL-2 deal size to be slightly larger, with a slightly higher initial upfront payment than the BI/PXS deal. We assume the upfront payment for LOXL-2 deal to be in line with the Conatus deal.

We forecast that LOXL-2 gets licensed in CY2H18 for a total deal package of US$700m, including US$50m as upfront payment. We also expect tiered low double digit royalties on net sales to be part of the deal, should LOXL-2 successfully reach the market. For conservatism sake, we model a flat rate of 11% for now.

Table 2 – Deals in the NASH space

Date	Company	Deal Type	Product	Indication	Stage at licensing	Licensee/Acquirer	Total deal value in USDm (upfront plus milestones)	Upfront (USDm)	Milestones (USDm)	Note
Apr-16	Nimbus	Asset acquisition	Drug NDI-010976 and includes other preclinical Acetyl-CoA Carboxylase (ACC) inhibitor program	NASH- metabolic	Phase I	Gilead	1200	400	800	NDI-010976 had fast Track designation from the FDA
Jan-15	Phenex	Asset acquisition	small molecule FXR agonist program including GS-9674 and other candidates	NASH- metabolic and other liver diseases	Phase II	Gilead	470	UD	UD	Gilead paid undisclosed milestone in Feb 2016 on start of Phase 1 in NASH and a US$100m milestone to Phenex in Jan 2017 on continued development of this program
Dec-16	Conatus	Option and co-development deal	emricasan, first-in-class pan-caspase inhibitor	NASH-inflammatory	Phase II	Novartis	650	50	600	Novartis will pay 50% of Conatus' phase 2B emricasan development costs and all the expenses of phase-three trials. Deal included US$7m in option exercise fees payable to Conatus. Novartis exercised its option once Conatus started a Phase 2B trial in May 2017. Conatus could also borrow up to $15 million in the form of convertible promissory notes under an investment agreement with Novartis. Deal also included tiered double digit royalties on emricasan single agent sales and tiered single to double digit royalties on sales of combination products containing emricasan. Conatus has the option to co-commercialize emricasan in the US, including combination therapies, on a cost-sharing and revenue-sharing basis in lieu of U.S. royalties and with reduced ex-U.S. royalties.
Sep-16	Tobira	Acquisition	Cenicriviroc (CVC) First-in-Class Oral CCR2/5 Inhibitor Impacting Inflammation, Evogliptin, Oral DPP-4 Inhibitor, for NASH in Combination with CVC Impacting Metabolic Element of Disease	NASH-inflammatory	Phase IIb CVC, Phase I Evogliptin	Allergan	1695	600	1095	At the time of the acquisition, Tobira had a market cap less than $100m following a steep decline in its price on an unsuccessful Phase 2B trial which did not meet its primary endpoint
Sep-16	Akarna Therapeutics	Acquisition	AKN-083 FXR agonist and other follow on FXR compounds	NASH-metabolic	Pre-clinical	Allergan	UD	50	UD	
Nov-16	Nitto Denko	License for NASH and option to license for lung and other fibrosis	ND-L02-s0201 and siRNA molecules targeting heat shock protein 47 (HSP47) in vitamin A-containing formulations	NASH-fibrotic and scarring due to hep c infection	Phase Ib	BMS (Bristol Myers Squibb)	UD	100	UD	
May-14	Lumena	Acquisition	LUM002 -ASBT inhibitor and LUM001	NASH-inflammatory and other rare diseases such as Alagille syndrome and Primary Biliary Cirrhosis	Phase I LUM002, Phase 2 LUM001	Shire	525	260	265	In October 2015, Shire terminated its deal with Lumena with a $90m payoff following a failed Phase 2 trial. Contingenet cash consideration payable in total by Shire was maximum US$265m
May-15	Pharmaxis	Asset acquisition	PXS478A- SSAO/VAP-1 Inhibitor (now known as BI_467335)	NASH-Inflammatory and a second indication (Diabetic Retinopathy)	Phase I	Boehringer Ingelheim	645	33	612	Upfront payment included ~US$1.4m option exercise fee. Deal value A$40m upfront and total deal value over A$750m including sales milestones (BPe US$645m) for 2 indications. Deal also includes tiered royalties on net sales starting high single digits to low double digits
Dec-10	Arresto	Acquisition	AB0024 - anti-LOXL2 antibody (was called simtuzumab later on)	NASH-fibrosis, IPF and cancer	Phase I	Gilead	UD	225	UD	
						Average	**864**	**215**		

NOTE: UD = UNDISCLOSED. SOURCE: COMPANY DATA AND BELL POTTER SECURITIES

Bronchitol and Aridol – Non core marketed assets

We look at Bronchitol and Aridol, PXS' currently marketed products as non-core assets and attribute minimal value to it. However, they represent an existing albeit small revenue stream for PXS, with potential upside should US approval come through. Within the segment we expect Bronchitol to be the main revenue driver with a small contribution from Aridol to overall revenue.

Bronchitol is an inhaled dry powder for the treatment of cystic fibrosis (CF) and has been the subject of three large scale Phase 3 global clinical trials. The product is currently approved and marketed in Western Europe, a number of Eastern Europe countries (including Middle East), Russia and Australia.

Aridol is an innovative lung function test designed to help doctors diagnose and manage asthma. Aridol is approved and marketed in Australia, major European countries and South Korea. We note Aridol is approved in the US but it is not currently marketed in that country.

PXS believes the Bronchitol and Aridol segment could transition to profitability over the next 1-2 years, irrespective of any US approval. On our estimates we expect the EBITDA loss from the segment to significantly come down from the FY16/FY17 levels starting FY18, however we do not see the segment becoming profitable out to several more years, continuing instead to make a modest loss, albeit declining each year as product sales pick up. We discuss the key factors relevant to this business segment below:

Bronchitol

Cystic fibrosis (CF) is a rare genetic disease which affects ~88,000 people in the world. It is a disease characterised by poorly hydrated and thick mucus and a rapid decline in lung function. Chronic airways infection and inflammation is associated with considerable morbidity and early mortality in patients with cystic fibrosis.

Mechanical clearance of secretions from the airways is a primary therapy for CF patients, with a number of airway clearance therapies. Despite the current available treatments, there is a need for alternative treatments which can improve the quality of life of CF patients and provide an alternative for them if they are unable to tolerate an existing treatment.

Bronchitol, with the active ingredient Mannitol (a naturally occurring sugar alcohol), is delivered as a respirable dry powder through a convenient disposable inhaler device. Bronchitol works by restoring the airway surface liquid and enhancing mucus clearance from airways and consequently improves lung function and reduces incidence of lung infections and exacerbations.

Bronchitol has been approved for use in adults with CF in Europe and in adults and children over 6 years of age in Australia and Russia.

Previously, the company ran two randomised, double blind, placebo controlled, Phase 3 trials (Study CF-301 and Study CF-302), where it studied the efficacy of Bronchitol as adults as a subgroup. The primary endpoint was a measure of lung function i.e. absolute change from baseline in FEV1 over the 26 week treatment period.

Bronchitol was not approved by the FDA who issued a Complete Response Letter, as only one trial (Study-301) met its primary endpoint and showed a statistically significant result in improvement of lung function in the overall population (children and adults). However, we note that both the trials showed a consistent significant effect in the subgroup of adults.

Based on discussions with FDA, PXS then decided to conduct a third Phase 3 trial (Study CF-303) only in adults to confirm the efficacy of Bronchitol in this subpopulation.

However, the company decided to restructure its business and focus on new drug development using its proprietary amine oxidase chemistry platform. Subsequently for the Bronchitol business the company reduced its expense base and partnered with Chiesi Pharma in major global markets including US to share the risk and minimise its investment in this segment.

PXS started the CF-303 trial in late 2014, which was a multi-centre trial with 126 sites across 21 countries.

In December 2014, the company signed an agreement with Chiesi for US, under which Chiesi would fund the cost of the recently initiated third adult confirmatory trial designed to obtain approval in the US up to US$22m, with the balance ~US$4m to be funded by PXS. If the trial was successful, Chiesi would also assume responsibility for regulatory submission and commercialisation thereafter in the US. On launch in US, PXS is eligible to receive a US$10m milestone payment from Chiesi and in addition up to US$15m in sales milestones, as well as royalties on net sales. PXS retained manufacturing of Bronchitol and would supply the product to Chiesi from its Sydney factory.

In our view, the Chiesi partnership reduced PXS' investment in Bronchitol, but at the same time in the event that Bronchitol gets approved in the US, would allow PXS to benefit from the upside.

Later, Chiesi also became the company's distributor of Bronchitol in key EU markets including Germany, UK, Italy and Ireland.

In June, 2017 PXS announced the results of its 423 patient Phase 3 trial CF-303. We note that the trial met its primary endpoint of improvement in lung function (change in FEV1 from baseline over 26 weeks), however the effect size was lower than that seen in the adult sub-population in the previous 2 Phase 3 trials. The trial also did not show any significant difference in secondary endpoints, however a trend was observed in the secondary lung function parameter FVC. Adverse events were similar between the treatment and control arms.

In our view, the study while meeting its primary endpoint has not yielded strong enough results to guarantee a positive response by the FDA. PXS and its partner Chiesi believe the results are sufficient in totality to file an NDA for approval with the FDA in CY18. We believe their belief is based on the ongoing need for alternative treatments for people who either can't tolerate an existing CF treatment or are still progressing despite treatment with a poor quality of life.

Given the strength of the data, we conservatively do not model Bronchitol's opportunity in the US. While a negative FDA decision is unlikely to impact our valuation, a positive decision will represent an upside to our estimates.

Aridol

For Aridol, we model the existing markets of Australia, Europe and South Korea. Sales from this product are modest (FY17: A$2m) and we expect will remain a small contributor to overall revenues. Historically, South Korea sales have been lumpy and can affect the sales from this product on a quarterly basis.

The company is also pursuing approval and launch in Canada, We expect filing for approval in 2HCY18, with potential launch in FY20.

Aridol already has US approval, but it is not currently marketed in that country. We do not model the US market for Aridol as yet. PXS has appointed a distributor for the US and plans to launch subsequent to FDA approval of its Sydney manufacturing facility in FY19.

Major Financial Assumptions

Revenues

PXS currently derives revenue primarily through its two main business segments – Bronchitol and Aridol and New Drug Development, with a small other revenue contribution from corporate/unallocated segment.

The key assumptions behind our revenue forecasts for each of the business segments are as follows:

BRONCHITOL AND ARIDOL

- In FY18, we forecast that total revenues from the Bronchitol and Aridol segment will decrease to A$7.7m (vs. A$13.5m in FY17), as with the Phase 3 clinical trial for Bronchitol now complete, there will no longer be the substantial clinical trial cost reimbursement revenue from Chiesi. In FY18 we estimate deferred clinical trial cost reimbursement of A$1.1m (vs. A$8.6m in FY17). The decline in clinical trial cost reimbursement revenue will be partially offset by an expected increase in product sales for both Bronchitol and Aridol. We forecast product sales from the segment to grow from A$4.8m in FY17 to A$6.5m in FY18. Starting FY19, we model only product sales revenue for this segment and forecast it to grow at a 6% CAGR (FY19-22), reaching A$8.8m by FY22.
- For Aridol, we forecast low single digit percentage growth in product sales over the next 5 years. **We forecast Aridol revenue to grow at a 4.5% CAGR, reaching A$2.5m by 2022.** We expect modest growth in all the current markets (Australia, Europe and South Korea) and from FY20 launch in Canada is expected to further drive sales. We currently assign a 60% probability of success (of reaching the market) to Aridol for the Canadian market.
- For Bronchitol, we forecast double digit percentage growth in product sales over the next 5 years. **We forecast Bronchitol revenue to grow at a 17.7% CAGR, from A$2.8m in FY17, reaching A$6.3m by 2022.**
- **The growth driver in our model for Bronchitol include** a) increased sales in Australia at the back of expanded reimbursement as recommended by the Pharmaceutical Benefits Advisory Committee (PBAC) in Australia, which would allow Bronchital use in combination with widely used cystic fibrosis drug Pulmozyme to now be reimbursed. PXS is now in negotiations with the government to enable the Pharmaceutical Benefits Scheme (PBS) listing for the same; b) increased sales in Russia once reimbursement for Bronchitol is approved under Russia's program for guaranteed funding of seven orphan diseases known as the '7 Nosologies Program'; c) increased sales to Chiesi for Western Europe to be driven by UK, Germany and new market Italy and d) some new markets expected to come online in Eastern Europe behind Turkey starting FY18.

NEW DRUG DEVELOPMENT

- **The key revenue driver in our model is PXS' New Drug Development segment,** which includes its partnered candidate with European pharma Boehringer Ingelheim BI_467335 for the indication Nonalcoholic Steatohepatitis (NASH) and Diabetic Retinopathy (DR) and its currently unpartnered LOXL-2 candidate also targeting NASH, with potentially Idiopathic Pulmonary Fibrosis (IPF) as a second indication.
- **For the LOXL-2 asset, we have assumed that the asset gets licensed after completion of Phase 1 trials in CY2H18**, with the partner assuming all future development, regulatory and marketing costs and paying upfront and milestone

payments to PXS and royalties on net sales, in return for exclusive worldwide rights to the drug.

Our revenue forecasts for the New Drug Development segment are broken down into the following two categories:

- **Commercial (Milestone + license+ royalty) revenue:** This comprises of the upfront and milestone payment already received from BI for BI_467335 and the potential milestone payments expected to be received by PXS from BI. PXS has already received €47m from BI in upfronts and milestones to date and is expected to receive another €372m in development milestones and additionally sales milestones (BPe ~€125m) across 2 indications. It also includes our estimated PXS' share (BPe 65% share) of US$520m of potential upfront and development milestone payments receivable from a potential licensee for LOXL-2. Also included in this is potential royalties on net sales (BPe 11% royalty rate) from BI_467335 and LOXL-2 once they reach the market in FY26 and FY28 respectively. We have used a patient-driven market model to estimate the sales trajectory of BI_467335 for NASH and DR and of LOXL-2 for NASH. At this stage we do not model PXS' share of the additional US$180m in potential sales milestones part of the LOXL-2 deal and also do not model royalty revenues from the second indication i.e. IPF for LOXL-2. **We note that in FY18 PXS has already received ~A$27m milestone payment from BI** on first patient being dosed in a Phase 2A trial in NASH. **We expect PXS to receive another ~A$15m milestone from BI** on first patient dosed in the announced Phase 2A trial in DR **before the end of 1HFY18.**
- **Other income:** This includes the R&D Tax incentive received by PXS from the Australian Government and drug discovery service fees related to its development partner Synairgen. We don't include any future R&D tax incentive revenue or service fees from Synairgen in our forward forecasts starting FY18.

Market model assumptions for BI_467335 SSAO/VAP-1 inhibitor

We model US$1.96bn peak worldwide sales (pre risk adjustment) for BI_467335 in NASH. Our forecasts are based on the following assumptions:

- We assume that there are ~4.3m NASH patients with F2/F3 stage of fibrosis in the US and ~7.2m in EU. Industry estimates expect the number of F2/F3 patients to grow to ~10m by 2030 in the US alone, from their current 6-10m estimate. On our current estimates, we conservatively assume a 1% growth each year to 2030.
- We assume that 50% of the F2/F3 NASH patients in the US and 40% in EU get treated with a NASH pharmacotherapy.
- We assume that at Peak in US, BI_467335 is used in 5% of treated patients in US and 3.5% of treated patients in EU. We are conservative as we expect BI_467335 to be behind a few years to other advanced NASH assets before it reaches the market.
- At this stage we assume an annual cost of treatment of US$10,000 in the US and in EU at US$7,000. We note that the price will ultimately be dictated by efficacy and the pricing of other NASH drugs who may be approved by then. So if BI-467335 ends up having better clinical data than other approved drugs by then on the market, it is likely to command a higher price.
- We assume BI_467335 gets launched in the US in FY26 and in EU in FY27.

We model US$813m peak worldwide sales (pre risk adjustment) for BI_467335 in Diabetic Retinopathy. Our forecasts are based on the following assumptions:

- We assume that there are over 600,000 patients with moderate to severe Non Proliferative Diabetic Retinopathy (NPDR) and Diabetic Macular Edema (DME) without

central involvement in US and over 500,000 patients in EU. We conservatively assume this target population grows by 2% in US and 1% in EU each year to 2030.

- We assume that at Peak, BI_467335 is used in 10% of target patients both in US and EU, in the absence of any clinical data in DR.
- At this stage we assume an annual cost of treatment of ~US$6,500 in the US and in EU at US$4,500. We assume that the drug will be priced at a discount to the annual cost of Anti-VEGF treatment (assuming 7 injections on average of anti-VEGF a year). We note that the price will ultimately be dictated by efficacy and if BI_467335 ends up having better clinical data than the anti-VEGF drugs, it is likely to command a higher price.
- We assume BI_467335 gets launched in the US in FY26 and in EU in FY27.

Market model assumptions for LOXL-2 inhibitor

We model US$1.45bn peak worldwide sales (pre risk adjustment) for LOXL-2 in NASH. Our forecasts are based on the following assumptions:

- We assume that there are ~2.4m NASH patients with F3/F4 stage of fibrosis in the US and ~4.0m in EU and conservatively assume ~1% growth in this population each year.
- We assume that 65% of the F3/F4 NASH patients in the US and 55% in EU get treated with a NASH pharmacotherapy.
- We assume that at Peak in US, LOXL-2 is used in 5% of treated patients in US and 3.5% of treated patients in EU. We are conservative as we expect LOXL-2 to be behind several years to other advanced NASH assets before it reaches the market and by then it is likely to be used as a combination therapy with either the anti-inflammatory NASH drugs or the metabolic modifier NASH drugs.
- At this stage we assume an annual cost of treatment of US$10,000 in the US and in EU at US$7,000, same as our forecasts for BI_467335. We note that the price will ultimately be dictated by efficacy, the pricing of other NASH drugs who may be approved by then and LOXL-2's position as an add-on therapy albeit in a much more severe end of the NASH population.
- We assume LOXL-2 gets launched in the US in FY28 and in EU in FY29.

We risk-adjust our net sales numbers for both the BI_1467335 SSAO/VAP-1 Inhibitor and the LOXL-2 inhibitor, as well as the potential upfront and milestone payments from deals based on our assumed probability of success, which in turn is dependent on the clinical phase of their development.

We have used Bell Potter's current long term estimate for the AUD/USD and AUD/EUR cross rates to convert the USD and EUR commercial revenue numbers to AUD in our model.

CORPORATE/UNALLOCATED SEGMENT

There is a small other revenue contribution from PXS' corporate/unallocated segment. This includes some unallocated R&D tax credits and income earned by PXS on sub lease of their warehouse and car space. We assume a flat $0.4m revenue from this segment from FY18 onwards.

We summarise our revenue and EBITDA forecast for PXS across the 3 business segments in the figure below:

Figure 10 - Revenue and EBITDA Summary by segment for PXS FY16-FY22

Y/e June 30	2016A	2017A	2018E	2019E	2020E	2021E	2022E
Bronchitol and Aridol							
Product Sales	6.1	4.8	6.5	7.3	7.9	8.4	8.8
Other revenue (Clinical trial cost reimbursement)	8.2	8.6	1.1	0.0	0.0	0.0	0.0
Other income	0.6	0.1	0.1	0.0	0.0	0.0	0.0
Total Revenues	**14.9**	**13.5**	**7.7**	**7.3**	**7.9**	**8.4**	**8.8**
EBITDA	**-8.2**	**-7.1**	**-3.7**	**-2.7**	**-2.3**	**-2.0**	**-1.8**
New Drug Development							
Product Sales	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other revenue (Milestone+license+royalty)	0.0	0.0	42.1	6.3	4.5	0.0	23.0
Other income (R&D tax incentive etc.)	2.6	3.4	0.0	0.0	0.0	0.0	0.0
Total Revenues	**2.6**	**3.4**	**42.1**	**6.3**	**4.5**	**0.0**	**23.0**
EBITDA	**-2.6**	**-4.1**	**31.6**	**-2.8**	**-0.6**	**-5.2**	**17.8**
Corporate							
Other income	**0.3**	**0.3**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**
EBITDA	**-4.0**	**-4.0**	**-4.1**	**-4.1**	**-4.1**	**-4.1**	**-4.1**
Total Company							
Revenues	**17.8**	**17.3**	**50.3**	**14.1**	**12.9**	**8.8**	**32.3**
EBITDA	**-14.8**	**-15.2**	**23.8**	**-9.6**	**-7.0**	**-11.3**	**11.9**

NOTE: FROM FY19 ONWARDS, UPFRONT AND MILESTONES FROM LOXL-2 DEAL AND MILESTONE FROM BI DEAL ARE RISK ADJUSTED BY THE PROBABILITY OF SUCCESS ASSIGNED TO EACH PROGRAM. ALL AMOUNTS IN AUD IN MILLIONS. SOURCE: BELL POTTER SECURITIES ESTIMATES

Other Financial Assumptions

Expenses from ordinary activities: Operating expenses include employee costs, administration & corporate costs, rent, occupancy & utilities costs, clinical trial costs, drug development expenses, sales, marketing & distribution costs, safety, medical & regulatory affairs costs, manufacturing purchases expenses and other expenses. We expect operating expenses will fall in FY18 mainly driven by lower clinical trials costs and safety, medical & regulatory affairs costs following the completion of the Bronchitol Phase 3 study and also the completion of the EU Bronchitol observational safety study. This will be partially offset by increased clinical trials and drug development costs in the company's new drug development segment, with PXS to start Phase 1 trials for its LOXL-2 compound and undertake formal toxicology studies on its other pre-clinical compounds. We expect opex to continue to decline over FY19 and FY20, with further reduction in costs after LOXL-2 asset is partnered.

Depreciation and amortisation: We forecast depreciation and amortisation to be relatively stable over the next few years, tracking between A$3.1m-A$3.2m.

Tax: PXS has unused tax losses of $326m at 30th June 2017. Hence, we do not expect the company to pay tax for the foreseeable future despite reporting profits in the years it receives significant upfront and milestone revenue from its partners.

Capex: We expect PXS' capex requirements to be modest as seen historically. From FY18 onwards we estimate annual capex costs to be ~A$0.8m. Currently on its balance sheet, PXS has plant and equipment worth A$16.0m, computer equipment worth A$0.9m and leased building & improvements worth A$23.0m.

Investment in intangibles: We forecast investment in intangible assets to remain steady at ~$0.4m per year.

NovaQuest Financing agreement: PXS has a financing agreement with NovaQuest Pharma opportunities Fund, since 2013. This was amended subsequently in Dec'2014. This agreement relates to Bronchitol only. NovaQuest invested US$20m to support the development, manufacturing and commercialisation of Bronchitol for Cystic Fibrosis in the EU and the US. In return NovaQuest is to receive payments from PXS based on the EU and US sales revenue for Bronchitol, with EU payments ceasing on 1st April 2021 and US payments ceasing 7 years from launch of Bronchitol in US. Apart from sales based payments, PXS is not liable to make any other cash payment to service this liability. At this

stage we estimate cash outflow for PXS related to the NovaQuest financing agreement to be ~A$0.4m for FY18-20, based just on EU Bronchitol sales.

Borrowings: PXS has A$9.0m debt on its balance sheet at the end of 1QFY18 which relates to a 15 years financial lease on its custom designed manufacturing, warehousing, research and office facility in Sydney. We estimate ~A$1.6m-A$1.7m as cash outflow for PXS for lease payments for FY18-20.

Funding position: At the end of 1QFY18 (quarter ended 30th Sep'17), PXS had A$38.6m in cash and debt related to finance lease of A$9.0m, amounting to a net cash position of A$29.6m. The company has ~A$3.1m in receivables on its balance sheet which relates to estimated tax refund from the Australian government under the R&D Tax incentive scheme and is expected to be received in 2HFY18. We are also expecting ~A$15m milestone from its partner Boehringer Ingelheim before the end of 1HFY18, triggered on the first patient being dosed in the ongoing Phase 2A trial with BI_1467335 in Diabetic Retinopathy. We estimate PXS to end FY1H18 with 48.9m in cash, which should provide at least 2.5 years cash runway, into CY20 alone. Cash injection from a licensing deal for LOXL-2 in 2HCY18, will further extend this runway by more than 2 years.

Hence, we believe PXS is sufficiently funded for the foreseeable future and is unlikely to require any capital raisings to boost its cash reserves. In fact, we believe with its strong cash position the company is well placed to look at capital management initiatives such as a share buyback or special dividend to return some surplus capital to its shareholders. PXS' strong cash position will also allow it to pursue some asset acquisitions to further enrich its drug development pipeline and also allow the company to consider Phase 2A/2B development for some of its pipeline assets before partnering them out.

Valuation

We value Pharmaxis using a risk-weighted DCF. DCF is an absolute valuation approach. We believe the DCF valuation is the most appropriate methodology for Pharmaxis and other early stage biotech companies, as it best captures the long-term nature of drug development and commercialization.

The key revenue driver in our model is PXS' New Drug Development segment, which includes its partnered candidate with European pharma Boehringer Ingelheim BI_467335 for the indication Nonalcoholic Steatohepatitis (NASH) and Diabetic Retinopathy (DR) and its currently unpartnered LOXL-2 candidate also targeting NASH, with potentially Idiopathic Pulmonary Fibrosis (IPF) as a secondary indication.

Our DCF model uses risk-adjusted revenue numbers based on the probability of success (of reaching the market) assigned to both BI_467335 and LOXL-2 drug. The probability of success we attribute to them is dependent on their development phase. BI_467335 is currently in Phase 2A trials for both NASH and DR, while the LOXL-2 candidate is due to enter Phase 1 trials imminently.

We assume that the LOXL-2 asset gets licensed after completion of Phase 1 trials in 2HCY18 and similar to the Boehringer Ingelheim deal for BI_467335, we assume that the LOXL-2 partner will assume all future development, regulatory and marketing costs and pay upfront and milestone payments to Pharmaxis and royalties on net sales, in return for exclusive worldwide rights to the drug.

Our DCF valuation model is based on a WACC of 16.0%. We assume a terminal growth rate of 1% to arrive at our valuation of A$0.54/sh for Pharmaxis.

Table 3 - Summary of Valuation

Forecasts	Base case
Enterprise value from DCF (AUDm)	149.5
Add: Reported Cash (AUDm)	38.6
Less: Current Debt	9.3
Equity value (AUDm)	178.9
Total diluted shares (million)	333.5
Value per share (AUD)	**$0.54**
Current Share price (AUD)	$0.26
Expected Capital Growth	111.8%

SOURCE: BELL POTTER SECURITIES ESTIMATES

Table 4 - PXS Sum-of-parts DCF Valuation Summary

Asset	Probability adjusted NPV (A$m)	Value per share (A$)	% Mix	Probability of success/Risk adjustment	Current Phase
Bronchitol and Aridol	($11)	**-$0.03**	-6.0%	Aridol - Canada (60%)	Marketed (Ex -US and Canada)
New Drug Development	$190	**$0.57**	106.5%	BI_1467335 (NASH, DR - 23.5%), LOXL-2 (NASH -14.5%)	BI_1467335 (Phase 2A) and LOXL-2 (Phase 1 to be initiated)
Corporate/Non-Allocated	($30)	**-$0.09**	-16.9%	NA	NA
Reported Cash	$39	**$0.12**	21.6%	NA	NA
Reported Debt	($9)	**-$0.03**	-5.2%	NA	NA
Equity Value	**$178.9**	**$0.54**	**100.0%**		

SOURCE: BELL POTTER SECURITIES ESTIMATES

Table 5 – PXS- Key assumptions used in New Drug Development segment

Asset	Indication	Stage	Partnering Status	First Fiscal Year of sales (Est.)	Peak Market share	Peak Global Sales (US$m)	Probability of success
BI_1467335	NASH - F2/F3 fibrosis stage	Phase 2A	Boehringer Ingelheim	2026	5% (US), (3.5% ROW)	$1,962	23.5%
BI_1467335	Diabetic Retinopathy (DR)	Phase 2A	Boehringer Ingelheim	2026	10.0%	$813	23.5%
LOXL-2	NASH - F3/F4 fibrosis stage	Phase 1 to be initiated	Will look to partner	2028	5% (US), (3.5% ROW)	$1,448	14.5%

GLOBAL PEAK SALES ARE PRE-RISK ADJUSTMENT AND ROYALTIES. SOURCE: BELL POTTER SECURITIES ESTIMATES

Table 6 – Deal Assumptions for Key Drug Development Pipeline Assets

Asset	Indication	Stage at Licensing	Licensee	Fiscal Year Timing of deal (Est.)	Total Deal Value in USDm (upfront plus milestones)	Upfront (USDm)	Other developmental & regulatory Milestones (USDm)	Commercial Milestones Est (USDm)	Royalty Rate (%)	PXS's share (Est.)
BI_467335	NASH and Diabetic Retinopathy	Phase 1	Boehringer Ingelheim	2015	645	33	462	150	11.0%	100.0%
LOXL-2	NASH and a second indication (potentially IPF)	Phase 1 complete	TBC	2019	700	50	470	180	11.0%	65.0%

NOTE: ROYALTIES ARE LIKELY TO BE TIERED. WE ASSUME A FLAT RATE FOR NOW. FOR LOXL-2 DEAL WE ASSUME A DEAL WITH LEAD INDICATION NASH AND SECOND INDICATION IPF, BASED ON WHICH WE ASSUME PXS AND ITS PARTNER SYNAIRGEN WILL SHARE THE DEAL VALUE IN 65:35 RATIO. THE BI DEAL VALUE INCLUDES OUR ESTIMATES ABOUT POTENTIAL UNDISCLOSED COMMERCIAL MILESTONES WHICH ARE PART OF THE DEAL AND HENCE MAY BE CONSERVATIVE. THE BI DEAL IS IN EUROS, WE HAVE CONVERTED IT TO USD AT CURRENT EXCHANGE RATES. SOURCE: BELL POTTER SECURITIES ESTIMATES

Upside Risk to our valuation

- **Clinical success will allow for increased probability of success:** We currently assign a 23.5% probability of success (of reaching the market) to BI_1467335, given that it's currently in a Phase 2A trial, for both NASH and DR. We envisage that completion of the trial with positive results and subsequent advancement of BI_1467335 into Phase 2B trials (BPe 1HCY19) will allow us to assign a higher probability of success and therefore will lead to material upgrades in our numbers.

  Similarly, we currently assign a 14.5% probability of success (of reaching the market) to LOXL-2 in NASH, given that a Phase 1 trial is due to start imminently. We envisage that completion of the trial with positive results and subsequent advancement of LOXL-2 into Phase 2A trials will allow us to assign a higher probability of success and therefore will lead to material upgrades in our numbers.
- **Timing assumption for licensing deal for LOXL-2:** We currently assume a licensing deal for LOXL-2 in 2HCY18, on completion of its Phase 1 trial. If it gets licensed prior to our estimates, it will be an upside to our valuation.
- **Conservative assumptions for BI_1467335 in absence of Phase 2 clinical data:** Our market penetration & pricing assumptions, are all based on the premise that BI_1467335 will be behind a few years to other NASH approaches such as Allergan's CCR2/CCR5 antagonist and Gilead's selonsertib. Our base assumption at this stage is that BI_1467335 shows at least equivalent efficacy to these assets, with a better safety profile, with the advantage potentially to be used both as a monotherapy and in combination, in the moderate-severe fibrosis stage NASH population, with one or more approved assets by that stage. In the absence of Phase 2 clinical data we are conservative in our assumptions at this stage.
- **Conservative assumptions for LOXL-2 to start with in absence of clinical data:** Our market penetration & pricing assumptions and deal size assumptions, are all based on the premise that LOXL-2 will be behind several years to other drugs targeting NASH to get to market. At that stage we expect the drug is more likely than not to be used as an add on therapy with existing standard of care by then to improve efficacy, likely in the more severe end of the fibrosis stage spectrum of NASH. However, given the scarcity of anti-fibrotic assets in development for NASH, we expect both partnering interest and deal size for the LOXL-2 asset with its novel mechanism of action (MoA) to be in line with other high value deals in this space recently. In the absence of clinical data from LOXL-2 we are conservative in our assumptions at this stage including our assumptions for the deal size. Positive Phase 1 data and interest by multiple pharma parties could lead to a deal higher than our current forecast.
- **We do not model royalty revenue from a second indication (likely IPF) for LOXL-2 presently:** At this stage in our valuation, we do not include a market revenue model for LOXL-2 for Idiopathic Pulmonary Fibrosis (IPF) as a potential secondary indication and therefore do not model royalty revenue as a percentage of net sales from this indication to PXS. Confirmation of IPF as a second indication by PXS' future partner and progress of this into Phase 2 clinical trials is likely to considerably increase the market

opportunity for this asset, in which case it's likely to be a source of considerable upside to our valuation in future.

- **No sales milestones from LOXL-2 deal included in our model:** At this stage we do not model PXS' share of the assumed US$180m sales milestones from a potential LOXL-2 deal in our model. We intend to include it in our model once a LOXL-2 deal is inked by PXS, in which case it's likely to be a source of upside to our valuation.
- **No value assigned for other early stage pipeline assets:** We also do not include any value for PXS' other early stage assets namely SSAO/MPO inhibitor and LOX inhibitor. These 2 assets are in the final stages of pre-clinical testing and are due to commence formal toxicology studies shortly, with the view to moving to the clinic (Phase 1 human trials) in CY2018.

  The SSAO/MPO program is developing a dual inhibitor of both SSAO and myeloperoxidase (MPO), which has potential anti-inflammatory application in both respiratory and cardiovascular disease. PXS is currently focused on fully profiling the drugs under development and identifying the appropriate indications to pursue.

  The LOX inhibitor program is developing a drug which broadly inhibits all the LOX family of enzymes, which has potential anti-fibrotic application in scarring (a topical formulation) and other severe fibrotic indications including some cancers (likely oral formulation). PXS is currently focused on formulation for the scarring application and is also exploring other severe fibrotic indications where this may also have application.

  PXS believes that the above two assets may have higher potential and value add if developed to Phase 2A or 2B before partnering, vs. the strategy with its later stage assets targeting NASH which it looked to partner at or after Phase 1. Progress of these two assets into the clinic in future is likely to be a source of upside to our valuation.
- **We model limited markets for Bronchitol and do not model US market as yet:** For Bronchitol, we model the existing markets of Australia, Western Europe including Italy, Eastern Europe and Russia. We do not model the US market for Bronchitol as yet. PXS' US partner Chiesi is responsible for completing and finalising a New Drug Application (NDA) with the US FDA and subsequent commercialisation of it. Should Bronchitol get approved and launch in US, PXS will receive a US$10m milestone from Chiesi, additional US$15m sales milestones and a mid to high teen percentage of royalties on net sales. FDA approval and launch of Bronchitol in the US therefore will be an upside to our valuation for PXS.
- **We model limited markets for Aridol and do not model US market as yet:** For Aridol, we model the existing markets of Australia, Europe and South Korea. We also model revenue from Canada (assigning it a 60% probability of success), given Aridol is not approved in Canada as yet, and filing for approval is not expected till mid CY18. We note we assume a FY20 launch in Canada, however PXS believes it might launch earlier than that, in which case it may be an upside to our estimates. We do not model the US market for Aridol as yet. PXS has appointed a distributor for the US and plans to launch subsequent to FDA approval of its Sydney manufacturing facility in FY19.
- **Limited contribution from Bronchitol and Aridol segment in our valuation:** We note that PXS believes the Bronchitol and Aridol segment could transition to profitability over the next 1-2 years, irrespective of any US approval. On our estimates we expect the EBITDA loss from the segment to significantly come down from the FY16/FY17 levels starting FY18, however we do not see the segment becoming profitable out to several more years, continuing instead to make a modest loss, albeit declining each year as product sales pick up. We believe Russia for Bronchitol and Canada for Aridol may surprise us on the upside, however at this stage we choose to be conservative till we see increasing traction in Russia for Bronchitol on obtaining reimbursement and launch in Canada for Aridol.

PXS' Intellectual Property

We provide a brief summary of PXS' intellectual property across its key assets.

Bronchitol and Aridol

The patent underlying Bronchitol and Aridol 'Method and device for the provocation of air passage narrowing and/or the induction of sputum' expired in 2015 in most countries. However, there are supplemental protection certificates which effectively extend the patent out to 2020 which have been granted in UK, Germany, Italy, Spain and France.

Additionally, Bronchitol has orphan drug status in both US and EU which provides it with market exclusivity until 2022 in the EU and in the US will provide it with 7 years exclusivity following approval.

We also note that generic competition are more prevalent for drugs which have considerable revenues and a large market. Given our modest sales forecast for Bronchitol and Aridol at this stage, we believe it's unlikely to be attractive enough for a generic player to target.

BI_1467335 SSAO/VAP-1 Inhibitor

Pharmaxis filed its patent covering a large number of novel SSAO/VAP-1 inhibitors in 2012, which when granted will provide patent protection to these compounds including BI_1467335 drug up to 2032 in US and other key markets including Europe, Australia, China and Japan. This patent covers the composition of matter as well as its use for the treatment of various indications including inflammatory diseases, ocular diseases, fibrotic diseases, diabetes-induced diseases and cancer. Given, Boehringer Ingelheim (BI) has acquired this asset, we believe they could further file a specific 'method of manufacturing' patent specifically for BI_1467335 should they wish to do so, which could provide further protection to the drug.

We also understand that since NASH development times are longer than for most other drugs, depending on the jurisdiction, it is possible for the authorities to provide further extension to the patents (up to 5 years max), when considering the longer development time.

LOXL-2 inhibitor

Pharmaxis filed two patents covering the composition of matter and uses thereof covering the family of inhibitors of Lysyl oxidases including LOXL-2 in 2016, which when granted will provide patent protection to its LOXL-2 drug up to 2036 in US and other key markets including Europe, Australia, China and Japan. These patents covers the composition of matter as well as the use of these compounds for the treatment of various indications including fibrosis, cancer and/or angiogenesis in human subjects as well as in pets and livestock. The difference between the two patents are in terms of differing chemistry and Pharmacokinetic (PK) profile, with one set of compounds having systemic application being more suited to fibrotic indications such as IPF, renal and cardiac fibrosis and the other set of compounds more 'liver-directed' and therefore low doses of it should be suitable for liver fibrosis indications such as NASH or ASH.

We also understand that since NASH development times are longer than for most other drugs, depending on the jurisdiction, it is possible for the authorities to provide further extension to the patents (up to 5 years max), when considering the longer development time.

Scientific Advisory Board

In July 2016, Pharmaxis established a Scientific Advisory Board (SAB), which would oversee the company's drug discovery and development programs. PXS' SAB represents a group of eminent physicians who have extensive knowledge and industry experience in the field of fibrosis and inflammation. Importantly, the SAB has a good mix of both academics and industry veterans with drug development experience within a pharma company. The SAB started with 2 members initially and since then has expanded to its current size with 6 members. Most of the members are based in Australia, except for Dr. Kathleen Metters who is based in the US.

The SAB provides key scientific and strategic guidance for PXS' development programs. They help by providing PXS with an objective and external perspective on its programs which helps the company to prioritise its focus for each of the programs. They have been instrumental in assessing PXS' existing programs and reviewing the potential disease indications. They augment the support and guidance PXS already receives from various Key Opinion Leaders (KOL's), academics and industry participants on each of its individual pipeline programs. PXS' SAB and support from other KOL's together, in our view, impart more credibility to the PXS story and also provide a validation of its technology. PXS' SAB is as below.

Table 7 – PXS Scientific Advisory Board

SAB Member	Experience
Professor Jacob George	Professor George is the Robert W Storr Professor of Hepatic Medicine at the Storr Liver Unit, Westmead Millennium Institute, University of Sydney and is Head of the Department of Gastroenterology and Hepatology at Westmead Hospital and Director of Gastroenterology and Hepatology Services for the Western Sydney Local Health Network. He undertakes basic and clinical research on hepatitis C, liver cancer, NASH and hepatic fibrosis. He is or was on the Editorial Board of several Journals including Hepatology, Liver international, Hepatology International and the World Journal of Gastroenterology. He is a member of the Executive Council of the Asian Pacific Association for the Study of the Liver and of the Gastroenterological society of Australia.
Dr Alan Robertson	Dr. Robertson is the former CEO and former Executive Director of PCS who led the company's IPO. Formerly, he served as Medicinal Chemist of Wellcome PLC in London. He has also served as New Product Development Manager of Faulding Group in the past with specific responsibilities for the global development of generic injectable drugs. Formerly, he was also the Head of Drug Development of Amrad Pty Ltd. In the past, he has served as Technical Director of Promics and a NED of both Promics Ltd. and Patrys Ltd. He is currently a Member of the SAB of Xenome Limited. He is the co-inventor of 18 patents and author of more than 35 scientific papers. He is also the inventor of the migraine therapeutic Zomig, which is marketed worldwide by AstraZeneca. He holds a BSc and a PhD in Synthetic Organic Chemistry from the University of Glasgow and undertook a three-year post-doctoral appointment with Nobel Laureate, Professor Sir John Cornforth, at the University of Sussex.
Professor Carol Pollock	Professor Pollock is a distinguished academic nephrologist with over 280 publications in basic research and clinical medicine. She is Chair of the NSW Cardiovascular Research Network and Chairs the Research Advisory Committee of the Australian and New Zealand Society of Nephrology. She has been the Chair of the Northern Sydney Local Health District Board since its inception in 2011 and since 2016 was Director and then Chair of the NSW Bureau of Health Information. She is a current Director of Kidney Health Australia and Chairs the International Society of Nephrology Meetings committee, responsible for delivering both research and educational meetings and policy forums across the globe.
Professor Andrew Boyle	Professor Andrew Boyle is the Head of Cardiovascular Medicine, Director of Priority Clinical Centre for Cardiovascular Health at the University of Newcastle and John Hunter Hospital. He is a cardiologist who studies left ventricular remodeling. In particular, his research focuses on the molecular and cellular mechanisms of fibrosis and stem cell function in the heart. He received his medical degree from Monash University and then completed cardiology advanced training in Melbourne. He undertook a PhD at the University of Melbourne studying cardiac regeneration, and then moved to the US and continued this study as a fellow at Johns Hopkins University. He then joined the faculty at the University of California San Francisco, becoming Associate Professor of Medicine, where his laboratory focused on the effects of ageing on left ventricular remodeling, funded by the US NIH. After 7 years there, he moved to the University of Newcastle and the Hunter Medical Research Institute (HMRI). He has a research laboratory based at HMRI where he studies pre-clinical models of left ventricular remodeling and he also performs clinical research at the John Hunter Hospital.
Dr Kathleen Metters	Dr. Metters is also a Non-Executive Director of PXS. She has more than 25 years of experience in the discovery and development of novel therapies for treatment of serious diseases. She is currently working as an independent biopharma consultant and as senior advisor for New York-based Bridge Medicines. She spent 9 years with Merck & Co. including a period as senior vice president and head of Worldwide Basic Research and leading their External Discovery and Preclinical Sciences. She subsequently was appointed as President and CEO for Lycera Corp., a biopharmaceutical company pioneering innovative approaches to novel oral medicines for treatment of autoimmune diseases and cancer. She holds a B.S. in biochemistry from the University of Manchester Institute for Science and Technology, and a Ph.D. from Imperial College of Science and Technology in London.
Professor Darren Kelly	Professor Kelly is the Associate Dean (Innovation and Enterprise, MDHS) at The University of Melbourne, the Director of Innovation and Enterprise at the Centre for Eye Research Australia (CERA) and Director of Biomedical Research in the Department of Medicine, St Vincent's Hospital Melbourne. He was CEO of Fibrotech Ltd which was successfully sold to Shire in 2014 and is now the CEO and Managing Director of Australian biotech company OccuRx. He is the entrepreneur in residence at the Medical Research Commercialisation Fund. He has published over 200 manuscripts in the field of translational research and novel interventions many of which have had a direct impact on human disease.

SOURCE: COMPANY DATA

Board of Directors

The directors of PXS are listed below.

Table 8 – Pharmaxis - Board of Directors have broad industry and investment banking experience

Directors	Position	Year Appointed	Experience
Gary J Phillips	Managing Director & CEO	2013	Mr. Phillips brings over 30 years of operational management experience in the pharmaceutical and healthcare industry in Europe, Asia and Australia. He joined Pharmaxis in 2003 and since then has held various positions, including COO and Commercial Director, before assuming the mantle of CEO and joining the PXS Board in March 2013. He is behind PXS's current business vision and therapeutic focus of applying their proprietary amine oxidase chemistry to inflammation and fibrosis and a de-risked strategy of partnering after early/mid stage clinical trials. Under his stewardship, PXS signed a multi-million dollar product acquisition deal with European Pharma company Boehringer Ingelheim in 2015. Prior to joining Pharmaxis, he was Group Company Head and CEO of Novartis Australia's Pharmaceutical Division, successfully launching leading oncology and ophthalmology products. He has also served as Area Manager for Novartis responsible for 9 countries in Asia Pacific and is also the former CEO of Ciba Geigy in Hungary (Merged to form Novartis in 1996) where he led the successful launch of a portfolio of new products. Mr Phillips holds a B. Pharm. in Pharmacy with honors from Nottingham University in the UK and an MBA from Henley Management College.
Malcolm J McComas	Chairman & Non-Executive Director	2012 (Chairman), 2003 (NED)	Mr. McComas is also a member of the Company's Audit and the Remuneration and Nomination Committees. He is a former investment banker and commercial lawyer. He is the principal of McComas Capital and was previously a director of the investment banking and funds management group Grant Samuel. Formerly he served for 10 years as Managing Director of Investment Banking at County NatWest and its successor organization Salomon Smith Barney (now Citigroup) and in various executive roles with Morgan Grenfell (now Deutsche Bank) in Melbourne, Sydney and London. He has worked with many high growth companies across various industry sectors and has experience in equity and debt finance, acquisitions, divestments and privatisations. He has led more than 50 IPO's and significant secondary offerings for companies, institutions and governments. Mr McComas is a director of Saunders International Limited, Royalco Resources Limited, Australasian Leukaemia and Lymphoma Group, Chairman of Fitzroy River Corporation Limited and a former director of BC Iron Limited and Consolidated Minerals Limited.
William L Delaat	Non-Executive Director	2008	Mr Delaat is also the Chairman of the Company's Audit Committee and a member of the Remuneration and Nomination Committee. He has over 40 years' experience in the global pharmaceutical industry, most recently as the Managing Director of the Australian subsidiary of Merck & Co. Formerly he has also held executive positions in both Europe and Australia for Merck and AstraZeneca. He has extensive experience in pharmaceutical sales and marketing and has been responsible for numerous international product launches and commercialisation of respiratory products. He is the former Chairman of the pharmaceutical peak body Medicines Australia, and the Pharmaceuticals Industry Council. He is also the former Chairman of EnGeneIC Ltd, an unlisted Australian biotech company and a member of other Government appointed Councils and Not-for-Profit Boards. Mr. Delaat holds a Bachelor of Science, Physiology & Chemistry, from the University of London.
Simon HW Buckingham	Non-Executive Directo	2012	Mr Buckingham is also the Chairman of the Company's Remuneration and Nomination Committee and a member of the Audit Committee. He has over 25 years' experience in the global pharmaceutical industry across a range of functions and a variety of therapeutic areas. He is currently a non-executive director of several companies, as well as a Global Advisor/Consultant to Swiss biotech Idorsia Pharmaceuticals Ltd. Formerly, he was President, Global Corporate and Business Development at Actelion, a position which spanned licensing, M&A, alliance management and corporate strategic planning. He has also served as President, North America and Asia-Pacific at Actelion in the past, with responsibility for all commercial operations in the region. He was the founding President of Actelion Pharmaceuticals US. He has also worked in sales and marketing for Parke-Davis (now part of Pfizer) in the US and prior to that served in roles in sales, marketing and development at Roche, both in Switzerland and Australia, for 9 years. He is currently a non-executive director of Vaxxilon AG, a European based start-up, Admedus Limited and the Can Too Foundation, a non-profit organisation raising funds for cancer research. He holds a Bachelor of Veterinary Science degree from the University of Sydney, a PhD from the University of Melbourne and a Graduate Management Qualification from the AGSM, University of NSW.
Dr. Kathleen M Metters	Non-Executive Director	2017	Dr. Metters is also on the company's Scientific Advisory Board. She has more than 25 years of experience in the discovery and development of novel therapies for treatment of serious diseases. She is currently working as an independent biopharma consultant and as senior advisor for New York-based Bridge Medicines. She has spent 9 years in her career as a senior executive with major pharma company Merck & Co. Formerly, she was the Senior Vice President and Head of Worldwide Basic Research for Merck & Co. with oversight of all the company's global research projects. In a subsequent role at Merck &Co. she led work on External Discovery and Preclinical Sciences. Dr. Metters was formerly President and CEO of biopharmaceutical company Lycera Corp. Under her leadership, Lycera developed a robust pipeline of proprietary and partnered immune modulator programs which led, in June 2015, to an exclusive global collaboration with Celgene Corporation. She graduated with a B.S. in biochemistry from the University of Manchester Institute for Science and Technology, and a Ph.D. from Imperial College of Science and Technology in London. She completed post-doctoral training at the Centre National de la Recherche Scientifique in France and at the Clinical Research Institute of Montréal.

SOURCE: COMPANY DATA

Key points:

- **Mr. Malcolm McComas has been Chairman since 2012** and has been a Non-Executive Director of PXS since 2003.
- **Directors hold <2% of the company:** The directors collectively hold approximately 3.82m shares in PXS or approximately 1.2% of the shares on issue. The largest shareholder amongst the directors is CEO Gary Phillips who hold 3.05m shares and the second largest is Chairman Malcolm McComas who owns 0.54m shares.
- **Dr. Kathleen Metters was recently appointed as a non-executive director (NED).** She joined the Board in early June 2017. Apart, from Dr. Metters appointment, there have been no recent changes to the Board of PXS.

Key Management

The key members of PXS' leadership team are:

Chief Executive Officer & Managing Director: Gary Phillips (Since 2013)

Since his appointment as CEO in 2013, CEO Gary Phillips has been instrumental in transforming the company from being focused on respiratory diseases and Bronchitol for cystic fibrosis undertaking risky late stage trials and commercialisation, to a company today with a strong focus on partnering at an earlier stage to de-risk its portfolio. He is behind PXS' current business vision and therapeutic focus of applying their proprietary amine oxidase chemistry to inflammation and fibrosis particularly in the area of NASH and a de-risked strategy of partnering after early/mid stage clinical trials. Most importantly, under his leadership, PXS signed a multi-million dollar product acquisition deal with European Pharma company Boehringer Ingelheim in 2015, which marked the start of the turnaround for the company, strengthened its balance sheet and validated its amine oxidase chemistry platform, its ability to execute valuable deals and its therapeutic focus on diseases underpinned by fibrosis and inflammation, particularly NASH.

Mr. Phillips brings over 30 years of operational management experience in the pharmaceutical and healthcare industry in Europe, Asia and Australia. He joined Pharmaxis when it listed on the ASX in 2003 and since then has held various positions, including COO and Commercial Director, before assuming the mantle of CEO and joining the PXS Board in March 2013. Prior to joining PXS, he was Group Company Head and CEO of Novartis Australia's Pharmaceutical Division, successfully launching leading oncology and ophthalmology products. He has also served as Area Manager for Novartis responsible for 9 countries in Asia Pacific and is also the former CEO of Ciba Geigy in Hungary (Merged to form Novartis in 1996) where he led the successful launch of a portfolio of new products. Mr Phillips holds a B. Pharm. in Pharmacy with honors from Nottingham University in the UK and an MBA from Henley Management College.

Chief Financial Officer & Company Secretary: David McGarvey (Since 2002)

CFO & CS David McGarvey has over 30 years of experience in building and funding Australian based companies from inception to globally successful enterprises. Formerly he has served as CFO of the Filtration and Separations Group of U.S. Filter and CFO of Memtec Limited. While at Memtec, he oversaw the U.S. listing of Memtec on the Nasdaq and the NYSE and managed numerous international merger and acquisition transactions. Formerly, he has also held various positions at PricewaterhouseCoopers. Mr McGarvey holds a B.A. in Accounting from Macquarie University and was admitted to Chartered Accountants ANZ in 1981, to the membership of CPA Australia in 1993 and is a Graduate of the Australian Institute of Company Directors.

Medical Director: Brett Charlton (Since 1998)

Mr. Charlton has over 25 years of experience in clinical trial design and management. He is a co-founder of Pharmaxis and a former Board Member. Dr Charlton is the author of more than 80 scientific papers. He was founding Medical Director of the National Health Sciences Centre and established its Clinical Trials Unit. Formerly, he held various positions with the Australian National University, Stanford University, the Baxter Centre for Medical Research, Royal Melbourne Hospital and the Walter and Eliza Hall Institute. He holds an M.B.B.S. with honors and a PhD from the University of NSW.

Head of Drug Discovery: Wolfgang Jarolimek (Since 2012)

Mr. Jarolimek has over 18 years of experience in pharmaceutical drug discovery. He joined PXS initially in 2010 as Manager in vitro Pharmacology, before assuming the role of Head of Drug Discovery in August 2012. He has published more than 30 peer reviewed articles.

Formerly, he served as Director of Assay Development and Compound Profiling at the GlaxoSmithKline Center of Excellence in Drug Discovery in Verona, Italy. Previously, he spent 4 years at the Neuroscience Center of Merck, Sharp and Dohme in Harlow, England, as a Senior Research Scientist in the electrophysiology group. He also spent 8 years as post-doc at the Max-Plank Institute in Munich, Germany, Baylor College of Medicine, Houston, Texas, Rammelkamp Center, Cleveland Ohio and University of Heidelberg, Germany. He holds a B.Sc. in Pharmacy and a PhD from the University of Saarbrücken, Germany. He was also an Assistant Professor in Physiology at the University of Heidelberg, Germany.

Head of Medical Affairs: Kristen Morgan (Since 2008)

Ms Morgan joined Pharmaxis in August 2008 as Head of Medical Affairs and has over 19 years of experience in the pharmaceutical industry. Her responsibility at PXS includes both Medical and Regulatory Affairs and Alliance Management. She has previously held a senior role in Medical Affairs at Sanofi-aventis and a commercial sales role at GlaxoSmithKline (GSK). Ms Morgan holds a BSc from Queensland University (major in pharmacology), a Postgraduate Diploma of Business Administration from Queensland University of Technology and a Masters of Medical Science (Drug Development) from University of New South Wales.

Key Shareholders

Substantial Shareholders

The combined holdings of the Top 4 shareholders of PXS represent ~43.1%. The largest shareholders of PXS are shown in the table below:

Figure 11 – Substantial Shareholders in PXS

Investor	No of shares held	% current holding
BVF Partners LP	63,823,669	19.96%
Australian Ethical Investment Limited	32,424,427	10.14%
Allan Gray Australia PTY Ltd	22,385,398	7.00%
Montoya Investments Limited	19,123,830	5.98%

SOURCE: COMPANY DATA

Key points:

- **BVF Partners is the largest shareholder**: US specialist Biotech fund, BVF Partners is the largest shareholder in PXS with 63.8m shares or 19.96% of issued capital. The fund became substantial on 5th June 2015, following close behind PXS and Boehringer Ingelheim's 2015 deal and has been steadily increasing its holding since then.
- **Australian Ethical Investment is next largest shareholder**: Australian Ethical Investments is the second largest shareholder in PXS with 32.4m shares or 10.14% of issued capital. In recent months the fund has steadily increased its holding in PXS.
- **Allan Gray Australia is third largest shareholder**: Allan Gray has 22.4m shares or 7.0% of issued capital. In recent months the fund has steadily decreased its holding in PXS.
- **Montoya Investments is fourth largest shareholder**: Montoya Investments has 19.1m shares or 5.98% of issued capital. There has been no change in the number of PXS shares held by this fund since 2013, when it became substantial.

Top 20 Shareholders

The Top 20 shareholders in PXS (as of 4th September, 2017) are shown in the Figure below.

Figure 12 - Top 20 Shareholders in PXS (as of 4th September, 2017)

Top 20 shareholders as of 4th September 2017	No. of ordinary shares	% holding
Citicorp Nominees Pty Limited	88,843,847	27.8%
National Nominees Limited	38,137,438	11.9%
HSBC Custody Nominees (Australia) Limited	27,064,028	8.5%
J P Morgan Nominees Australia Limited	15,847,438	5.0%
George Engineering Pty Ltd (PG Superfund a/c)	2,500,000	0.8%
Mr Yingkai Li	2,360,000	0.7%
David Newnham Super Pty Ltd (DRN Superannuation Fund a/c)	2,289,333	0.7%
Healthcare Management Consulting (Australia) Pty Ltd	2,220,000	0.7%
Mutual Trust Pty Ltd	2,185,000	0.7%
Pakasoluto Pty Limited (Barkl Family Superfund a/c)	2,086,838	0.7%
Alpha Matilda Trading Pty Ltd (Alpha Matilda Superfund a/c)	1,750,446	0.5%
Simgon Pty Ltd (R K Superfund a/c)	1,750,000	0.5%
Moggs Creek Pty Ltd (Moggs Creek Superfund a/c)	1,747,020	0.5%
Lawn Views Pty Ltd	1,252,980	0.4%
Mr Marco Andrea Negro	1,200,000	0.4%
Ginga Pty Ltd (TG Klinger Superfund a/c)	1,159,397	0.4%
Mr Brian Tully + Mrs Margaret Tully (Superannuation Fund a/c)	1,145,500	0.4%
Kilcare Holdings Pty Ltd (Kilcare a/c)	1,104,413	0.3%
Ms Bei Xu + Mr Dongning Wu	1,080,747	0.3%
Capital Regional Et Cooperatif Desjardins	1,053,867	0.3%
Total Top 20 investors holding	**196,778,292**	**61.6%**
Total Other Investors	122,912,552	38.4%
Total Shares on Issue	**319,690,844**	**100.0%**

SOURCE: COMPANY DATA

Free Float

The shares held by the Board and management together total approximately 5.96m shares or 1.9% of issued capital. **We therefore estimate the free float of the company to be ~98.1%.**

The details of shares held by the Board and management are shown in the Figure below.

Figure 13 – Shares held by management and directors

Directors/Management	No. of ordinary shares held	% holding	Position
Malcolm J McComas	539,999	0.17%	Chairman & Non-Executive Director
Gary J Phillips	3,050,000	0.95%	CEO & Managing Director
William L Delaat	33,334	0.01%	Non-Executive Director
Simon HW Buckingham	200,000	0.06%	Non-Executive Director
Dr. Kathleen M Metters	0	0.00%	Non-Executive Director
Wolfgang G Jarolimek	621,550	0.19%	Head of Drug Discovery
Brett Charlton	602,214	0.19%	Medical Director
David M McGarvey	900,127	0.28%	CFO & Company Secretary
Kristen Morgan	7,860	0.00%	Alliance Management
Shares held by management and directors	5,955,084	1.9%	
Free Float		**98.1%**	

SOURCE: COMPANY DATA

Pharmaxis Ltd.
as at 8 December 2017

Recommendation	Buy, Speculative
Price	$0.255
Valuation	$0.54

Table 9 - Financial summary

Pharmaxis Ltd (PXS) — **Share price (A$) $0.255**
As at 8 December 2017 — **Market cap (A$m 81.5**

Profit and Loss

Y/e June 30 (A$m)	2016A	2017A	2018E	2019E	2020E
Product Sales Revenues	6.1	4.8	6.5	7.3	7.9
Other Revenue (commercial)	8.2	8.6	43.2	6.3	4.5
Other Income	3.5	3.9	0.5	0.4	0.4
Total Revenue	**17.8**	**17.3**	**50.3**	**14.1**	**12.9**
EBITDA	**-14.8**	**-15.2**	**23.8**	**-9.6**	**-7.0**
Depreciation & Amortisation	-3.0	-3.1	-3.1	-3.2	-3.2
EBIT	**-17.9**	**-18.3**	**20.7**	**-12.8**	**-10.3**
Net interest & Other Income/(Expense)	2.6	0.9	0.7	0.3	0.2
Pre-tax profit	**-15.3**	**-17.4**	**21.4**	**-12.4**	**-10.1**
Tax	0.0	0.0	0.0	0.0	0.0
Net profit (loss) normalised	**-15.3**	**-17.4**	**21.4**	**-12.4**	**-10.1**
Abnormal items	-1.2	-0.9	-1.0	-1.0	-1.0
Reported Net profit (loss)	**-16.5**	**-18.3**	**20.4**	**-13.4**	**-11.1**

Cashflow

Y/e June 30 (A$m)	2016A	2017A	2018E	2019E	2020E
Reported NPAT	-16.5	-18.3	20.4	-13.4	-11.1
Non-cash items	2.6	3.7	4.2	4.7	4.6
Net change in Working capital	1.8	-0.6	-1.0	0.0	0.0
Operating cashflow	**-12.0**	**-15.3**	**23.5**	**-8.8**	**-6.4**
Capex	-1.4	-0.3	-0.8	-0.8	-0.8
Investments	0.0	0.0	0.0	0.0	0.0
Investments in intangible assets	0.0	-0.4	-0.4	-0.4	-0.4
Other investing cash flow	0.0	0.0	0.0	0.0	0.0
Investing cashflow	**-1.4**	**-0.7**	**-1.2**	**-1.2**	**-1.2**
Change in borrowings	-1.4	-1.5	-1.6	-1.6	-1.7
Equity issued	0.0	0.0	0.0	0.0	0.0
Dividends paid	0.0	0.0	0.0	0.0	0.0
Other financing cash flow	-0.3	-0.2	-0.4	-0.4	-0.4
Financing cashflow	**-1.7**	**-1.7**	**-1.9**	**-2.0**	**-2.0**
Net change in cash	**-15.1**	**-17.7**	**20.5**	**-11.9**	**-9.6**
Cash at end of period*	39.2	21.5	42.0	30.1	20.5
* Includes effect of exchange rate fluctuations on cash balance					
Free cash flow (op. CF less capex and intangibles)	**-13.4**	**-16.0**	**22.4**	**-9.9**	**-7.6**

Balance sheet

Y/e June 30 (A$m)	2016A	2017A	2018E	2019E	2020E
Cash	39.2	21.5	42.0	30.1	20.5
Current receivables	4.8	4.4	1.4	1.5	1.6
Inventories	2.2	2.6	2.7	2.8	2.9
Other current assets	0.1	0.1	0.1	0.1	0.1
Current assets	**46.4**	**28.6**	**46.2**	**34.5**	**25.1**
PPE	17.8	14.9	12.3	9.7	7.0
Non-current receivables	1.3	1.4	1.5	1.5	1.5
Intangible assets	0.1	0.5	0.8	1.2	1.5
Other non-current assets	0.0	0.0	0.0	0.0	0.0
Non-current assets	**19.2**	**16.8**	**14.7**	**12.4**	**10.0**
Total assets	**65.7**	**45.4**	**60.9**	**46.9**	**35.1**
Payables	5.0	6.8	3.9	4.0	4.1
Debt	10.1	9.3	8.3	7.1	5.9
Provisions	0.8	0.9	1.0	1.1	1.2
Financial liabilities (Novaquest financing agreement)	23.2	22.1	21.4	21.0	20.6
Deferred Lease Incentive	1.9	1.6	1.4	1.1	0.9
Other liabilities	3.7	1.1	0.0	0.0	0.0
Total liabilities	**44.7**	**41.9**	**36.0**	**34.5**	**32.8**
Net Assets	**20.9**	**3.5**	**24.9**	**12.5**	**2.4**
Shareholders' equity	344.6	344.6	344.6	344.6	344.6
Reserves	18.6	19.5	20.5	21.5	22.5
Retained earnings/(losses)	-342.3	-360.6	-340.3	-353.7	-364.8
Total shareholders equity	**20.9**	**3.5**	**24.9**	**12.5**	**2.4**

Valuation data

Y/e June 30	2016A	2017A	2018E	2019E	2020E
Net profit -normalised (A$m)	-15.3	-17.4	21.4	-12.4	-10.1
EPS - normalised (c)	-4.8	-5.5	6.7	-3.9	-3.2
EPS growth (%)	N/A	N/A	NM	N/A	N/A
P/E ratio (x)	N/A	N/A	3.8	N/A	N/A
FCFPS (c)	-4.2	-5.0	7.0	-3.1	-2.4
Price/FCF (x)	-6.0	-5.1	3.6	-8.2	-10.7
DPS (c)	0.0	0.0	0.0	0.0	0.0
Yield (%)	0.0%	0.0%	0.0%	0.0%	0.0%
Franking (%)	N/A	N/A	N/A	N/A	N/A
EV/EBITDA	-3.5	-3.4	2.2	-5.4	-7.4
EV/EBIT	-2.9	-2.9	2.5	-4.1	-5.1

Share price now (A$)	$0.255
Valuation (A$):	$0.54
Premium (discount) to price	111.8%
Recommendation:	Buy
Risk Rating	Speculative

Profitability ratios

Y/e June 30	2016A	2017A	2018E	2019E	2020E
EBITDA margin (%)	N/A	N/A	47.4%	N/A	N/A
EBIT margin (%)	N/A	N/A	41.2%	N/A	N/A
Return on assets (%)	-23.3%	-38.3%	35.1%	-26.5%	-28.7%
Return on equity (%)	-73.0%	-494.3%	85.9%	-99.7%	-426.3%
Dividend cover (x)	N/A	N/A	N/A	N/A	N/A
Effective tax rate (%)	0.0%	0.0%	0.0%	0.0%	0.0%

Liquidity and leverage ratios

Y/e June 30	2016A	2017A	2018E	2019E	2020E
Net debt (cash) (A$m)	-29.1	-12.3	-33.7	-22.9	-14.6
Net debt/equity (%)	N/A	N/A	N/A	N/A	N/A
Net interest cover (x)	N/A	N/A	N/A	N/A	N/A
Current ratio (x)	4.2	2.7	6.9	4.9	3.4

Segmentals

Y/e June 30	2016A	2017A	2018E	2019E	2020E
Bronchitol and Aridol					
Product Sales	6.1	4.8	6.5	7.3	7.9
Other revenue (Clinical trial cost reimbursement)	8.2	8.6	1.1	0.0	0.0
Other income	0.6	0.1	0.1	0.0	0.0
Total Revenues	**14.9**	**13.5**	**7.7**	**7.3**	**7.9**
EBITDA	**-8.2**	**-7.1**	**-3.7**	**-2.7**	**-2.3**
New Drug Development					
Product Sales	0.0	0.0	0.0	0.0	0.0
Other revenue (Milestone+license+royalty)	0.0	0.0	42.1	6.3	4.5
Other income (R&D tax incentive etc.)	2.6	3.4	0.0	0.0	0.0
Total Revenues	**2.6**	**3.4**	**42.1**	**6.3**	**4.5**
EBITDA	**-2.6**	**-4.1**	**31.6**	**-2.8**	**-0.6**
Corporate					
Other income	**0.3**	**0.3**	**0.4**	**0.4**	**0.4**
EBITDA	**-4.0**	**-4.0**	**-4.1**	**-4.1**	**-4.1**
Total Company					
Revenues	**17.8**	**17.3**	**50.3**	**14.1**	**12.9**
EBITDA	**-14.8**	**-15.2**	**23.8**	**-9.6**	**-7.0**

Interims

Y/e June 30 (A$m)	2H16A	1H17A	2H17A	1H18E	2H18E
Revenue	9.1	6.5	10.8	45.7	4.5
EBITDA	-6.8	-8.4	-6.8	32.4	-8.6
Depreciation & Amortisation	-1.5	-1.5	-1.5	-1.7	-1.5
EBIT	**-8.3**	**-10.0**	**-8.3**	**30.8**	**-10.1**
Net interest & Other Expense	3.6	-0.6	1.5	0.5	0.1
Pre-tax profit	-4.7	-10.6	-6.8	31.3	-10.0
Tax	0.0	0.0	0.0	0.0	0.0
Net Profit (loss) - normalised	**-4.7**	**-10.6**	**-6.8**	**31.3**	**-10.0**
Net Profit (loss) - reported	-5.3	-11.0	-7.3	30.8	-10.5

SOURCE: BELL POTTER SECURITIES ESTIMATES

Recommendation structure

Buy: Expect >15% total return on a 12 month view. For stocks regarded as 'Speculative' a return of >30% is expected.

Hold: Expect total return between -5% and 15% on a 12 month view

Sell: Expect <-5% total return on a 12 month view

Speculative Investments are either start-up enterprises with nil or only prospective operations or recently commenced operations with only forecast cash flows, or companies that have commenced operations or have been in operation for some time but have only forecast cash flows and/or a stressed balance sheet.

Such investments may carry an exceptionally high level of capital risk and volatility of returns.

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