morgans

Stockbroking | Wealth Management | Corporate Advice

April 12, 2022

Pharmaxis

Following the science

SPECULATIVE BUY (initiation)

Stock code:	PXS AU
Price:	A$0.09
12-month target price:	A$0.58
Previous target price:	A$0.00
Up/downside to target price:	544.4%
Dividend yield:	0.0%
12-month TSR*:	544.4%
Market cap:	A$49m
Average daily turnover:	A$0.06m
Index inclusion:	N/A

** Total stock return – Up/downside to target price + 12-month forward dividend yield.*

Price performance

(%)	1M	3M	12M	3Y
Absolute	7.1	-10.0	13.9	-70.5
Rel ASX/S&P200	1.2	-11.3	6.6	-90.2

Source: Bloomberg

Financial summary

	Jun-21A	Jun-22F	Jun-23F	Jun-24F
Revenue (A$m)	23.7	13.0	13.5	18.5
EBITDA Norm (A$m)	0.2	-13.5	-14.9	-12.8
Net Profit (A$m)	-2.9	-16.2	-17.7	-15.5
EPS Norm (A$)	-0.01	-0.03	-0.03	-0.02
EPS Growth Norm (%)	-87.2%	404.6%	-10.7%	-20.5%
P/E Norm (x)	NA	NA	NA	NA
DPS (A$)	0.00	0.00	0.00	0.00
Dividend Yield (%)	0.0%	0.0%	0.0%	0.0%
EV/EBITDA (x)	168.6	-2.5	-1.8	-3.3
Gearing (Net Debt/EBITDA)	-102.81	1.17	1.57	0.53

Source: Company data, Morgans estimates

Related research

Sector report - 17 Mar 2022

Dr Derek JELLINEK

(61) 2 9043 7904

derek.jellinek@morgans.com.au

Iain WILKIE

Scott POWER

Analyst(s) own shares in the following stocks mentioned in this report:

– Pharmaxis

- Pharmaxis (PXS) has a solid clinical pipeline targeting cancers and inflammatory conditions, as well as a revenue generating respiratory franchise.
- Key catalysts are efficacy read-outs for established scars and myelofibrosis due in late CY22.
- We initiate coverage of PXS with a Speculative Buy recommendation and a target price of A$0.58/share, which provides significant upside potential for investors if the company delivers on its milestones.

Overview

- PXS is a commercial stage drug development company boasting two approved respiratory products and a deep R&D pipeline targeting inflammation and fibrosis, key processes that underlie many chronic diseases and cancers.

What we like about it

- Two approved respiratory products, Bronchitol and Aridol, have been partnered across multiple geographies, with sales forecast of over A$10m in FY22 and upside from US$15m in sales-linked milestone payments in the future.
- PXS has built a broad portfolio of drug candidates leveraging its proprietary platform and expertise in amine oxidases, critical enzymes that either directly or indirectly influence many cells and tissues, and thus offer broad potential applications to treat a number of diseases.
- Lead drug candidate PXS-5505 is targeting Myelofibrosis (MF), a rare myeloproliferative cancer where fibrous tissue builds up inside bone marrow replacing normal tissue, a market opportunity north of US$1bn.
- In a Phase 1c trial in MF patients, PXS-5505 has shown good tolerability, with no severe side effects reported, and encouragingly, a good dose-response profile, inhibiting >90% of lysyl oxidase (LOX and LOX-like enzymes) activity, its targeted amine oxidase family members.

Forecast and valuation update

- In December 2021 PXS completed a placement and share purchase plan raising A$9.7m @ A$0.105/share. The closing 1H21 cash position was sound at A$20.8m, sufficient to fund the current clinical programs through to key results at the end of CY22. We forecast a net loss of A$16.2m and A$17.7m in FY22/23 respectively reflecting a higher level of costs driven mainly by advancing the clinical programs.
- We have used a DCF methodology to derive a A$0.58 valuation. We set our target price at the same level. As a comparison we reviewed several ASX listed life science companies undertaking either pre-clinical or clinical trials and noted an average EV of A$72m. PXS has an EV of A$34.0m and offers attractive upside potential compared to others in the sector.

Investment view

- We initiate coverage with a Speculative Buy recommendation. An investment in PXS is suitable only for investors with a higher risk profile.

Price catalysts

- Key upcoming milestones include the results of the established scarring and Myelofibrosis trials which are due by the end of CY22.

Risks

- Delays in trial recruitment and failure to meet clinical endpoints.

Pharmaxis

as at April 12, 2022

Rating	SPECULATIVE BUY	Price (A$):	0.09
Market cap (A$m):	49	12-month target price (A$):	0.58
Shares outstanding (m):	548.9	Up/downside to target price (%):	544.4
Free float (%):	100.0	Dividend yield (%):	0.0

Company description

Pharmaxis (PXS) engages in the research, development, and commercialisation of healthcare products for the treatment of fibrotic and inflammatory diseases worldwide. The company operates through two segments, Mannitol Respiratory Business and New Drug Development. It offers Bronchitol, an inhaled dry powder for the treatment of cystic fibrosis; and Aridol, an airways inflammation test that is used to assist in diagnosing and managing asthma. The company's product pipeline consists of amine oxidase inhibitors comprising semicarbazide-sensitive amine oxidase for neuro inflammatory conditions such as Parkinson's Disease; selective lysyl oxidase like inhibitors targeting chronic fibrotic diseases, such as pulmonary fibrosis, kidney fibrosis, and cardiac fibrosis; and pan-lysyl oxidase inhibitors targeting myelofibrosis and other cancers, and scarring.

Market considerations

Myelofibrosis

Commercial Opportunity

- Current standard of care; revenue ~US$1b per annum

Hepatocellular Carcinoma (HCC)

- **Commercial Opportunity**
  - Drugs market currently worth ~US$2bn with rising incidence forecasted to drive growth to ~US$7bn by 2027

Hypertrophic and keloid scarring

- Commercial Opportunity
  - Total scar treatment market in 2019 exceeded US$19b. Keloid and hypertrophic scar segment ~US$3.5b

Source: Company

Near-term milestones (CY22)

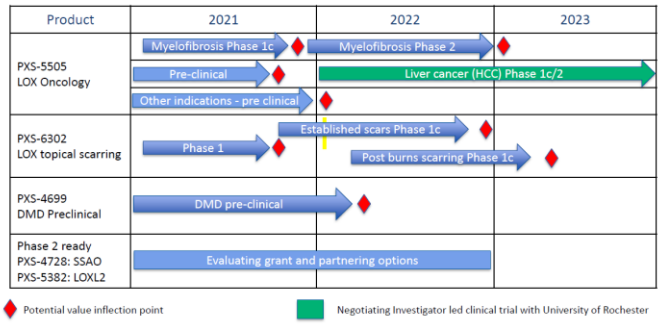
Complete recruitment of clinical trials for Myelofibrosis, established scars and burns.

Efficacy results of PXS-5505 in Phase 1/2a trial in Myelofibrosis (expected 4QCY22) and of PXS-6302 trial Phase Ic trial in established scars (4QCY22) and burns (1HCY23).

Sales in Mannitol respiratory business.

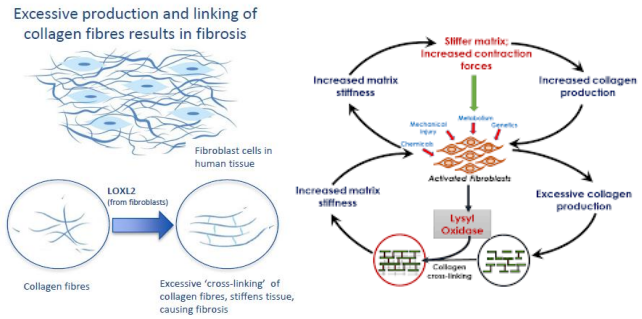
Source: Morgans, Company

Expected product pipeline timelines



Source: Company

Mechanism of action



Source: Company

Product Pipeline

Disease/target	Drug	Status
Cystic fibrosis	Bronchitol	Approved
Asthma	Aridol	Approved
Neuro inflammation (SSAO inhibitor)	PXS-4728	Phase 2
Myelofibrosis (oral pan-LOX inhibitor)	PXS-5505	Phase 2a commenced
Liver cancer (oral pan-LOX inhibitor)	PXS-5505	Phase 1c/2a
Scarring (Topical pan-LOX inhibitor)	PXS-6302	Phase 1c
Chronic fibrotic diseases (LOXL2 inhibitor)	PXS-5382	Phase 1 completed
Duchenne Muscular Dystrophy (dual SSAO/MAOB inhibitor)	PXS-4699	Pre-clinical

Source: Company

Key drivers / risks

Key Drivers

Licensing deal value for late stage assets

Clinical progression for oral pan-LOX (PXS-5505) and topical pan-LOX (PXS-6302)

Potential partnership

Key risks:

Trial risks

Lower than expected Mannitol sales which is linked to COVID

COVID related impacts on recruitment for clinical trials

Funding risk

Alternative Therapies

Source: Morgans, Company

Figure 1: Financial summary

Pharmaxis

Income statement	2020A	2021A	2022F	2023F	2024F
Divisional sales	12.7	23.7	13.0	13.0	18.0
Milestone payments	0.0	0.0	0.0	0.0	0.0
R&D rebates + other	0.0	0.0	0.0	0.3	0.3
Total revenue	**12.7**	**23.7**	**13.0**	**13.3**	**18.3**
EBITDA	**-11.1**	**0.2**	**-13.5**	**-14.9**	**-12.8**
Associate income	0.0	0.0	0.0	0.0	0.0
Depreciation	3.2	3.2	3.1	3.1	3.1
EBITA	-14.3	-3.0	-16.6	-18.0	-15.9
Amortisation/impairment	0.0	0.0	0.0	0.0	0.0
EBIT	**-14.3**	**-3.0**	**-16.6**	**-18.0**	**-15.9**
EBIT(incl associate profit)	-14.3	-3.0	-16.6	-18.0	-15.9
Net interest expense/FX	0.0	-0.4	-0.1	-0.4	-0.3
Pre-tax profit	-13.9	-2.9	-16.2	-17.7	-15.5
Income tax expense	0.0	0.0	0.0	0.0	0.0
After-tax profit	-13.9	-2.9	-16.2	-17.7	-15.5
Minority interests	0.0	0.0	0.0	0.0	0.0
NPAT	**-13.9**	**-2.9**	**-16.2**	**-17.7**	**-15.5**
Significant items	0.0	0.0	0.0	0.0	0.0
NPAT post abnormals	-13.9	-2.9	-16.2	-17.7	-15.5

Cash flow statement	2020A	2021A	2022F	2023F	2024F
EBITDA	-11.1	0.2	-13.5	-14.9	-12.8
Other cash items	0.0	0.0	0.0	0.0	0.0
Net interest (pd)/rec	0.4	0.1	0.4	0.3	0.5
Taxes paid	0.0	0.0	0.0	0.0	0.0
Change in working capital	-2.6	2.8	3.6	0.1	-1.0
Cash flow from ops (1)	**-13.3**	**3.1**	**-9.5**	**-14.4**	**-13.3**
Capex (2)	-0.3	-0.3	-3.2	-3.1	-3.1
Disposals/(acquisitions)	0.0	0.0	0.0	0.0	0.0
Other investing cash flow	-0.3	-0.3	0.0	0.0	0.0
Cash flow from invest (3)	**-0.6**	**-0.6**	**-3.2**	**-3.1**	**-3.1**
Incr/(decr) in equity	0.0	4.1	9.8	25.0	0.0
Incr/(decr) in debt	0.0	0.0	0.0	0.0	0.0
Ordinary dividend paid	0.0	0.0	0.0	0.0	0.0
Preferred dividends (4)	0.0	0.0	0.0	0.0	0.0
Other financing cash flow	0.0	0.0	0.0	0.0	0.0
Cash flow from fin (5)	**0.0**	**4.1**	**9.8**	**25.0**	**0.0**
Forex and disc ops (6)	0.0	0.0	0.0	0.0	0.0
Inc/(decr) cash (1+3+5+6)	-13.9	6.5	-2.9	7.4	-16.4
Equity FCF (1+2+4)	-13.5	2.7	-12.7	-17.6	-16.4

Balance sheet	2020A	2021A	2022F	2023F	2024F
Cash & deposits	14.8	18.7	15.8	23.3	6.8
Trade debtors	8.2	3.9	2.1	2.2	3.0
Inventory	2.6	3.6	1.3	1.3	1.8
Investments	0.0	0.0	0.0	0.0	0.0
Goodwill	0.0	0.0	0.0	0.0	0.0
Other intangible assets	0.9	1.1	1.1	1.1	1.1
Fixed assets	8.9	6.2	6.3	6.3	6.3
Other assets	0.0	0.0	0.0	0.0	0.0
Total assets	**35.4**	**33.6**	**26.6**	**34.2**	**19.1**
Short-term borrowings	0.0	0.0	0.0	0.0	0.0
Trade payables	3.5	3.8	3.3	3.5	3.9
Long-term borrowings	0.0	0.0	0.0	0.0	0.0
Provisions	1.5	2.1	2.1	2.1	2.1
Other liabilities	29.0	24.9	24.9	24.9	24.9
Total liabilities	**34.0**	**30.7**	**30.2**	**30.5**	**30.8**
Share capital	367.3	371.4	364.9	372.3	356.8
Other reserves	22.3	22.6	22.6	22.6	22.6
Retained earnings	-388.2	-391.2	-391.2	-391.2	-391.2
Other equity	0.0	0.0	0.0	0.0	0.0
Total equity	1.4	2.8	-3.6	3.7	-11.7
Minority interest	0.0	0.0	0.0	0.0	0.0
Total shareholders' equit	**1.4**	**2.8**	**-3.6**	**3.7**	**-11.7**
Total liabilities & SE	**35.4**	**33.6**	**26.6**	**34.2**	**19.1**

Closing price (A$)	0.09	Price target (A$)	0.58
Valuation metrics			
Methodology -DCF-PER Comp		Target Price	$0.58
DCF valuation inputs			
Rf	3.00%		
Rm-Rf	5.50%		
Beta	1.40		
CAPM (Rf+Beta(Rm-Rf))	10.5%		
E/EV*Ke+D/EV*Kd(1-t)		NPV cash flow (A$m)	389.2
Equity (E/EV)	97.9%	Minority interest (A$m)	0.0
Debt (D/EV)	2.1%	Net debt (A$m)	0.0
Interest rate	5.00%	Investments (A$m)	0.0
Tax rate (t)	30.0%	Equity market value (A$m)	389.2
WACC	10.5%	Diluted no. of shares (m)	673.9
		DCF valuation	$0.58

Multiples	2020A	2021A	2022F	2023F	2024F
Enterprise value (A$m)	47.9	44.0	46.8	39.4	55.8
EV/Sales (x)	3.8	1.9	3.6	3.0	3.1
EV/EBITDA (x)	-4.3	241.5	-3.5	-2.7	-4.4
EV/EBIT (x)	-3.3	-14.8	-2.8	-2.2	-3.5
PE (pre-goodwill) (x)	-3.0	-14.5	-3.1	-3.5	-4.1
PEG (pre-goodwill) (x)	na	na	0.0	0.0	0.5

At target price	2020A	2021A	2022F	2023F	2024F
EV/EBITDA (x)	-3.3	-14.8	-2.8	-2.2	-3.5
PE (pre-goodwill) (x)	-18.9	-90.1	-19.5	-22.0	-25.2

Per share data	2020A	2021A	2022F	2023F	2024F
No. shares	455.6	455.6	548.9	673.9	673.9
EPS (cps)	-3.1	-0.6	-3.0	-2.6	-2.3
EPS (normalised) (c)	-3.1	-0.6	-3.0	-2.6	-2.3
Dividend per share (c)	0.0	0.0	0.0	0.0	0.0
Dividend payout ratio (%)	0.0%	0.0%	0.0%	0.0%	0.0%
Dividend yield (%)	0.0%	0.0%	0.0%	0.0%	0.0%

Growth ratios	2020A	2021A	2022F	2023F	2024F
Sales growth		86.9%	-45.1%	0.0%	38.5%
Operating cost growth		-1.0%	12.8%	5.1%	10.6%
EBITDA growth		79.2%	-459.5%	-8.2%	11.4%
EBITA growth		79.2%	-459.5%	-8.2%	11.4%
EBIT growth		79.2%	-459.5%	-8.2%	11.4%
NPAT growth		79.1%	-456.3%	-8.8%	12.4%
Pre-goodwill NPAT growth		79.1%	-456.3%	-8.8%	12.4%
Pre-goodwill EPS growth			79.1%	-456.3%	-8.8%
Normalised EPS growth			79.1%	-456.3%	-8.8%

Operating performance	2020A	2021A	2022F	2023F	2024F
Asset turnover (%)	17.9	17.2	10.8	10.7	16.9
EBITDA margin (%)	-87.4	0.8	-103.8	-114.3	-71.2
EBIT margin (%)	-113.0	-12.5	-127.8	-138.3	-88.5
Net profit margin (%)	-110.1	-12.3	-125.0	-135.9	-86.0
Return on net assets (%)	-999.8	-104.4	461.3	-481.8	135.8
Net debt (A$m)	-14.8	-18.7	-15.8	-23.3	-6.8
Net debt/equity (%)	-1031.7	-657.7	439.7	-623.7	58.3
Net interest/EBIT cover (x)		-8.2	-332.4	-48.1	-50.3

Source: Morgans estimates, company data

Background

Company overview

PXS is a clinical stage drug development company targeting inflammation and fibrosis (including some cancer indications). The pipeline of orally ingested drugs targets underlying processes (inflammation and fibrosis) that cause many chronic diseases of the liver, kidney, lung, heart and several cancers. The company has several drug candidates in clinic trials alongside two approved respiratory products currently for sale globally.

The company was established in 1998 and listed on the ASX in 2003. PXS's head office and laboratories are in Sydney, Australia.

Value drivers

There are several key value drivers:

- **Novel technology/ mechanism of action**
  - PXS's patented technology has a novel approach to the treatment of fibrosis, beyond that of symptomatic relief alone.
- **Efficacy readouts from two-lead pan-LOX program by end of CY22**
  - Phase 2 trial of PXS-5505 in Myelofibrosis has started recruitment with top line results and read out expected by the end of CY22.
  - Topical pan-LOX Phase 1c efficacy result in patients with established scars.
- **Pipeline of drugs well placed to deliver value in coming years**
  - PXS has a strong pipeline of drugs in pre-clinical development.
- **Further applications of lead drug in oncology adjunct to standard of care**
  - Investigational New Drug application (IND) for a trial of PXS-5505 in hepatocellular carcinoma (HCC) cleared by the FDA.
  - HCC phase 1c study will be run by Rochester University with funding from PXS.
- **Scarring topical drug – large potential market**
  - Large addressable market in topical anti-scarring treatment with no other pharmacological treatments for scars to date.
- **Revenue stream from two approved respiratory products**
  - PXS has two mannitol products (Bronchitol® and Aridol®), which are FDA approved and sold globally.
  - Three milestone payments from Chiesi totalling up to $15m if US sales targets are achieved. Sales revenue is forecast to provide positive EBITDA growing to $10m / year in five to six years.

Risks

Although PXS has two commercially developed products, its primary focus is further clinical development, which brings with it inherent risks including:

- **Technology risk –** PXS has patent protection around its products and programs but there is no guarantee the patents will be successfully defended;
- **Clinical trial risk –** there is potential for recruitment to be delayed or the results of the trial may not meet the primary or secondary endpoint;
- **Competitor risk –** There is risk of competition in the space, with alternative therapies that may be developed which could impact the commercialisation of PXS's suite of products in clinical development;

- **Funding risks –** We do not rule out the need for additional capital to fund ongoing trials. In our modelling we assume a further $20m capital is raised in FY23; and
- **Commercialisation risk –** Whilst the launch of Bronchitol® and Aridol®, show PXS can develop a clinical drug through to commercialisation, there is no guarantee future products developed will be licensed out, approved or commercialised.

Approved Products – Mannitol Respiratory products

PXS has two regulatory approved respiratory products - Bronchitol® and Aridol®.

Bronchitol® is a spray dried form of mannitol, it is used as an add on treatment to help clear mucus from the lungs of patients with cystic fibrosis. Cystic fibrosis is an inherited disorder that affects the cells that produce mucus, causing the airways to become dry and prone to infections. Bronchitol® rehydrates the airway, making it easier to cough and help improve lung function and quality of life. It is approved and sold in the US, Europe, Russia, and Australia.

Aridol® is another form of mannitol that is used in testing lung function to assist in the diagnosis and management of asthma. It is an inhaler / dry powder combination that detects active airway inflammation and hyper responsiveness. Aridol® is approved and sold in Australia, South Korea, US, China, and several European countries.

PXS has partnered with Chiesi for the commercialisation of Bronchitol® in the US; the partnership saw PXS receive a US$10m initial milestone payment upon commercial launch of the product in March 2021. PXS has appointed Chiesi as an exclusive distributor of Bronchitol® in the US, of which the company will receive high teen percentage of net sales. A further three milestone payments totaling US$15m will be paid upon achieving sales thresholds. Chiesi was also appointed the exclusive distributor in Europe.

PXS has sold the distribution rights in Russia to GEN İlaç ve Sağlık Ürünleri San. ve Tic. A.Ş. (GEN) for A$2m (A$1.4m received in FY21 and a further A$0.6m due in May 2022) with the manufacturing from Sydney factory. The deal will see A$1m in cost savings on selling, marketing, and regulatory expenses.

Further to this deal, PXS has sold the distribution rights of Bronchitol® and Aridol® in Australia and New Zealand (and some parts of Asia) to BTC Health for A$2m – paid in July 2021.

Key clinical and pre-clinical programs

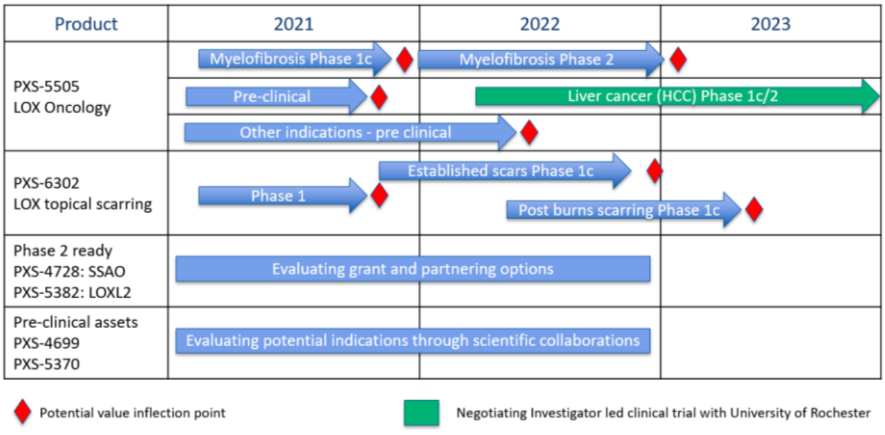
Key clinical and pre-clinical programs are set out graphically in Figure 2 overleaf. Lead product PXS-5505 is a small molecule drug targeting disease modifying potential in treating bone marrow cancer myelofibrosis. The drug is an oral pan lysyl oxidase (LOX) enzyme inhibitor. LOX and LOX-like enzymes (LOXL1-4) are a family of amine oxidases that predominantly catalyse the cross-linking of extracellular matrix (ECM) proteins. Inhibition of these proteins has been shown to suppress fibrosis progression and acts to reverse the fibrosis. PXS-5505 is in a Phase 2 trial with a read-out expected by the end of CY22. PXS-5505 is also being investigated as a potential treatment for other cancers, in particular hepatocellular carcinoma (a type of liver cancer) and is due to commence recruitment of a Phase 1c/2a trial to evaluate the safety and tolerability as well as efficacy with read outs expected 2HCY23.

PXS is also developing PXS-6302, a second pan-LOX inhibitor, that is topically administered to improve the appearance and function of established scars and to prevent problematic scars after injury and surgery. PXS-6302 has shown positive preclinical results, inhibiting the enzymes associated with the development of scar tissue. A Phase 1c trial is underway in established scarring and is expected to read out results in late CY22.

Whilst focus to date has been on pan-LOX inhibitors (both oral and topical), PXS has several other assets in its drug pipeline based on its expertise in amine oxidase inhibitors. These include:

- PXS-5382 (LOXL-2 inhibitor) antifibrotic indications such as kidney fibrosis, pulmonary fibrosis, non-alcoholic steatohepatitis (NASH) and cardiac fibrosis;
- PXS-4699 (dual SSAO/ MAO-B inhibitor) indications in anti-inflammatory diseases;
- PXS-4728 (SSAO inhibitor) targeting neuro inflammatory diseases such as Parkinson's Disease; and
- PXS-5370 (dual SSAO/MPO inhibitor) anti-inflammatory drug for multiple indications.

Figure 2: Target product timeline - multiple potential value inflection points



Source: Pharmaxis

Amine Oxidase inhibitors

PXS has built a portfolio of drug candidates based on an amine oxidase chemistry. In fact, PXS is recognised as expert in the chemistry of amine oxidase inhibitors, with multi-year research programs and worldwide scientific collaborations. Notably, the company has synthesised inhibitors with different pharmacological and pharmacokinetic profiles to potentially treat a number of inflammatory and fibrotic diseases.

Amine oxidases are a wide family of enzymes that catalyse the oxidation of primary amines to aldehydes, with the subsequent release of aldehydes, ammonia and hydrogen peroxide, which either directly or indirectly may influence cells and tissues. Amine oxidases have a broad range of functions, including cell differentiation and growth, wound healing, detoxification and cell signaling. As such, inhibition of amine oxidase-based enzymes has broad potential applications.

Members of this family include: primary-amine oxidase (also known as Semicarbazide-sensitive amine oxidase; SSAO); lysyl oxidases (LOX and LOXLs); monoamine oxidases (MAOs); and diamine oxidase (DAO).

SSAO - Semicarbazide-sensitive amine oxidase (SSAO) is an enzyme with a unique dual function in controlling inflammation processes as well as reactive oxygen species (ROS) generation. Specifically, SSAO regulates the migration of leukocytes into areas of inflammation and can result in inflammatory cell accumulation. In addition, the end products of its enzymatic cleavage (ie hydrogen peroxide and reactive aldehydes) react with structural proteins and induces oxidative stress. The enzyme is predominantly located in the endothelium, but can also be found in large amounts in fat tissue, the liver, and smooth muscle cells, and a soluble version is found in plasma (known as vascular-adhesion protein-1 (VAP)-1). While the exact function of SSAO in certain diseases remains unknown,

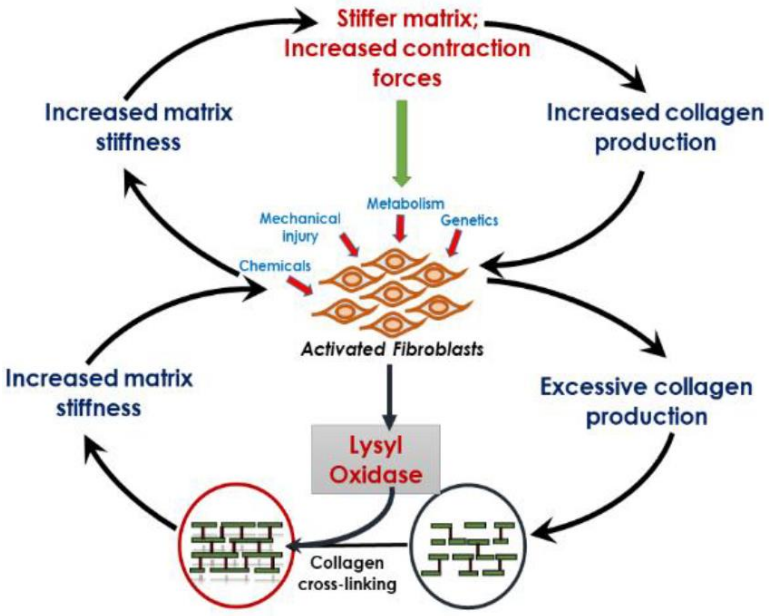
inhibiting two key processes that result in the development of fibrosis appears rational for the treatment of fibrotic-based diseases.

LOX - The lysyl oxidase (LOX) family encompasses enzymes that play a critical role in the formation, maturation, and remodeling of extracellular matrix (ECM). There is growing evidence that ECM changes are not only critical to promoting the growth and dissemination of solid tumours, but also ECM changes are a direct result of tumour action. The LOX family is composed of LOX and four LOX-like proteins (LOXL1-4), all of which have a highly conserved C-terminal amino acid sequence (the LOX domain) that is required for amine oxidase catalytic activity. The inhibition of LOX enzymes prevents the cross linking of collagen and elastin, which reduces the stiffness of the ECM, thereby reducing the deposition of scar tissue (fibrosis). As outlined in Figure 3, this process of cross linking and matrix stiffening creates a feedback loop, creating excessive collagen, increasing matrix stiffness and leads to fibrosis. Thus, inhibiting LOX enzymes that cross-link the ECM could short-circuit this feedback loop.

MAOs - Monoamine oxidases are flavin-containing mitochondrial enzymes widely distributed throughout the body. Humans have two isoenzymes, MAO-A and MAO-B, that vary by substrate and distribution in the body. MAOs inhibitors are used for the treatment of neurological diseases like Parkinson's or depression.

DAO - Diamone oxidase metabolises histamine and other primary amines in the gut and other organs.

Figure 3: Fibrosis mechanism



Source: Pharmaxis

Myeloperoxidase (MPO)

Myeloperoxidase (MPO) belongs to the family of peroxidases. It is a heme-containing enzyme abundant in neutrophil and monocytes that catalyses the hydrogen peroxide dependent formation of hypochlorous acid (HOCl) and other reactive species. These end products are cytotoxic and used by neutrophils/monocytes to kill bacteria and other pathogens. However, these molecules can cause oxidative damage to host tissue, with elevated plasma MPO levels associated with a variety of conditions including: systemic inflammation; eclampsia; cardiovascular events; vascular endothelial dysfunction; multiple sclerosis; and complications during hemodialysis (eg prospective mortality and oxidative stress).

Target indications and trial progress

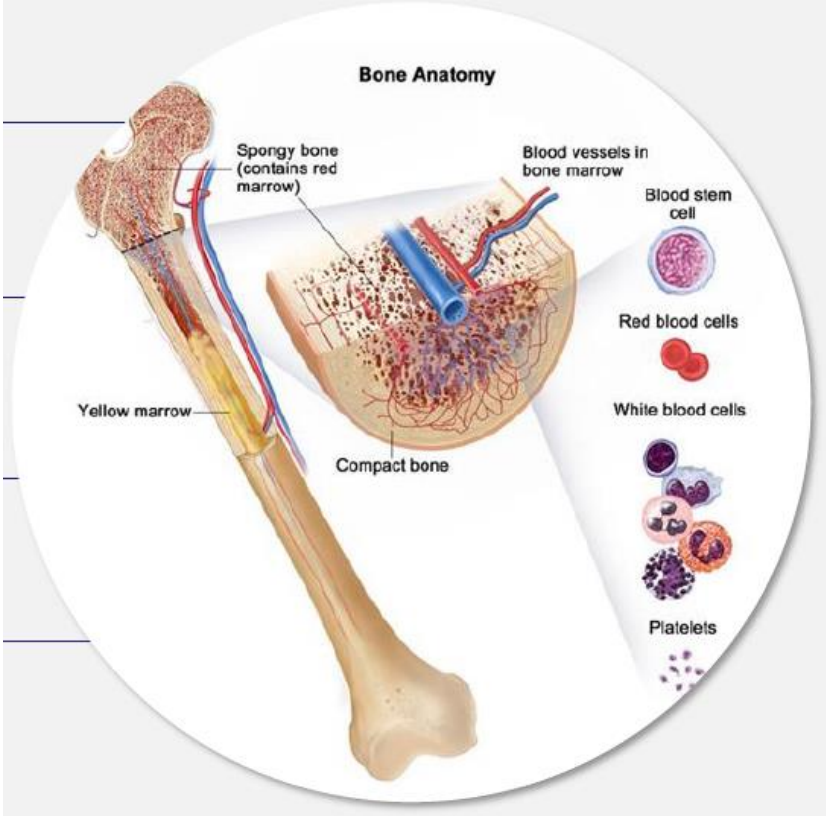
Myelofibrosis – PXS-5505 (oral)

What is Myelofibrosis?

Myelofibrosis (MF) is a rare type of myeloproliferative neoplasm (MPN) disorder whereby fibrous scar tissue builds up inside bone marrow replacing normal tissue. This gradual build-up of scar tissue is accompanied by reduced production of healthy blood cells.

Normal bone marrow has a network of fibres made by fibroblasts on which stem cells can divide and grow, as depicted in the diagram below. Myelofibrosis is caused by mutations in stem cells that lead to abnormal production of blood cells and build-up of scar tissue. Patients with MF tend to suffer from constitutional symptoms (eg, fatigue, night sweats, fever) bleeding and blood clots, and splenomegaly (ie, an enlarged spleen).

Figure 4: Bone anatomy



Source: Pharmaxis

Myelofibrosis can occur spontaneously (primary MF) or can occur as a result of a different diseases (secondary Myelofibrosis such as complication of an autoimmune disease). Closely related MPNs include polycythemia vera (PV) and essential thrombocythemia (ET), with around 15% of these patients progressing into MF-like characteristics (ie, post-ET/PV MF). The cause of MF is largely unknown, but is usually associated with JAK2, CALR, or MPL mutations (in around 90% of the patients) and generally has a poor prognosis.

MF typically develops gradually and is diagnosed at older ages, above 50 years and generally between 60-70 years.

Current diagnosis of PMF is based on bone marrow morphology as determined by the 2016 WHO-criteria. This grading system sub-classifies MF into “prefibrotic” and “overtly fibrotic” PMF based on a composite assessment of clinical and laboratory features (Figure 5).

Figure 5: 2016-revised WHO diagnostic criteria for MF

Primary myelofibrosis (overtly fibrotic) (Diagnosis requires meeting all three major criteria and one minor criterion)	Primary myelofibrosis (pre-fibrotic) (Diagnosis requires meeting all three major criteria and one minor criterion)
Major criteria:	Major criteria:
1. Typical megakaryocyte changes,[a] accompanied by ≥grade 2 reticulin/collagen fibrosis[b]	1. Typical megakaryocyte changes,[a] accompanied by ≤grade 1 reticulin/collagen fibrosis
2. Presence of *JAK2*, *CALR* or *MPL* mutations, or presence of other clonal markers, or absence of evidence for reactive bone marrow fibrosis	2. Presence of *JAK2*, *CALR* or *MPL* mutations, or presence of other clonal markers, or absence of evidence for reactive bone marrow fibrosis
Not meeting WHO criteria for other myeloid neoplasms	3. Not meeting WHO criteria for other myeloid neoplasms
Minor criteria:	Minor criteria:
Anemia not otherwise explained	Anemia not otherwise explained
Leukocytosis ≥ 11×10^9/L	Leukocytosis ≥ 11×10^9/L
Palpable splenomegaly	Palpable splenomegaly
Increased serum lactate dehydrogenase	Increased serum lactate dehydrogenase
A leukoerythroblastic blood smear	

Note: These changes are often accompanied by increased cellularity, granulocytic proliferation and decreased erythropoiesis.

[a] Megakaryocyte proliferation and atypia; aberrant nuclear/cytoplasmic ratio; hyperchromatic and irregularly folded nuclei; dense megakaryocyte clustering;

[b] Diffuse often coarse fiber network with or without evidence of collagenization (trichrome stain).

Source: WHO

Treatments

The only known curative treatment for MF is allogenic hematopoietic stem cell transplant (AHSCT), whereas other treatments are aimed at alleviating the symptoms. However, AHSCT is associated with at least a 50% rate of transplant-related deaths or severe morbidity (eg, graft vs host disease), so the risk of using AHSCT must be balanced against expected survival without AHSCT.

Current drug treatments for MF are mainly palliative, having not shown favourable disease modification activity or a survival advantage, and include hydroxyurea, Janus kinase (JAK) inhibitor ruxolitinib, steroids and anti-angiogenesis inhibitors, refer Figure 6. However, response rates with these agents are modest, ranging from 15% to 25% and of short duration (one to two years).

JAK inhibitors represent the mainstay of care. These oral molecules inhibit the activity of the JK family of enzymes, which reduce inflammatory and immune responses. Although, this treatment is limited to symptom relief and reduction in spleen size, with limited survival improvement, JAK inhibitors contribute to US$1bn of annual revenue. In addition, tolerability is an issue, with up to 75% of patients discontinuing treatment at 5 years.

While JAK inhibitors have not been shown to reverse bone marrow fibrosis or induce complete or partial remissions, research on JAK inhibitors continues with multiple agents in Phase 3 trials.

Figure 6: FDA-approved or Phase 3 tested JAK inhibitors in MF

Drug	Inhibitory activity	Trial	Treatment arms	Spleen response	Anemia Response	Symptom response	Toxicity
Ruxolitinib* (RUX)	JAK1, JAK2	COMFORT-1	Ruxolitinib vs placebo (n = 309)	41.9% vs 0.7% (P < .01) Week 24	None	Week 24, 45.9% vs 5.3% (P < .001)	Anemia (45.2 vs 19.2%) Thrombocytopenia (12.9 vs 1.3%)
		COMFORT-II	RUX vs BAT (n = 219)	28% vs 0% (P < .01) Week 48	None	Improved compared to BAT	Anemia ≥grade 3 (42% vs 31%) Thrombocytopenia (41% vs 1%)
Fedratinib* (FED)	JAK2, FLT3, RET	JAKARTA-1	FED vs placebo (n = 289)	36-40% vs 1% (P < .01)	None	Week 24 34-36% vs 7% (P < .001)	Anemia, GI distress, increased transaminases, creatinine, and pancreatic enzymes four cases of encephalopathy
		JAKARTA-2	FED in previously treated with rux (n = 97)	55%	None	26%	GI distress, Anemia, Thrombocytopenia, 1 case of encephalopathy
Momelotinib (MOM)	JAK1, JAK2, ACVR1	SIMPLIFY-1	MOM vs RUX (n = 432)	Week 24, 26.5% vs 29%	Transfusion needs improved with MOM (P < .019)	28.4% vs 42.2% (P = .98)	Anemia, thrombocytopenia, infections, neuropathy
		SIMPLIFY-2	MOM vs BAT, including rux (n = 156)	Week 24, 7% vs 6% (P = .90)	Week 24 Transfusion Independence 43% vs 21% (P = .0012)	26% vs 6% (P = .0006)	Anemia, thrombocytopenia, peripheral neuropathy
Pacritinib (PAC)	JAK2, FLT3, IRAK1, CSF1R	PERSIST-1	PAC vs BAT excluding JAKi (n = 327)	Week 24: 19% vs 5% (P = .0003)	Transfusion independence (25% vs 0% (P = .043)	Week 24 19% vs 10% (P = 0.24)	Anemia, Thrombocytopenia, diarrhea, Cardiac failure
		PERIST-2	PAC vs BAT including rux in patients with platelet count < 100 × 109/L (n = 311)	Week 24 18% vs 3% (P = .001)	Transfusion independence in two patients in the PAC group	Week 24 25% vs 14% (P = 0.08)	Thrombocytopenia, Anemia, GI events, Cardiac events (21% vs 9%)
		PAC203 (Phase 2)	PAC 100 mg QD, PAC 100 mg BID, or PAC 200 mg BID in patients failed rux (n = 164)	Week 24 9.3% (200 mg BID), 1.8% (100 mg BID): 1.8%; 0% (100 mg QD)		Week 24 7.4% (200 mg BID): 5.5% (100 mg BID); 5.8% (100 mg QD)	Diarrhea, Nausea, Thrombocytopenia, Anemia, Hemorrhage, Cardiac events, Infections

Source: Primary myelofibrosis 2021 update

Competitive R&D landscape

A number of new agents, alone or in combination with ruxolitinib, are currently under investigation. In fact, Clinicaltrials.gov lists 148 studies in MF, with 18 in Phase 3/4. These new agents include: PI3/AKT inhibitors (eg, buparlisib), LSD1 (histone demethylase specific for H3K4) inhibitor (bomedemstat), BET inhibitor (eg, CPI-0610) telomerase inhibitor (eg, imetelstat), aurora kinase inhibitor (eg, alisertib), BCL-2/BCL-X inhibitors (eg, navitoclax, venetoclax), CD123 (IL3RA)-directed cytotoxin (IL3 fused to diphtheria toxin) (eg, tagraxofusp (SL-401), and others. Preliminary results indicate fairly modest single agent activity for either anaemia or splenomegaly, limited synergistic activity when coupled with ruxolitinib and questionable tolerability profiles. Longer term follow-up and additional studies are required to better assess these agents' usefulness.

Market opportunity

MF incidence in the US is estimated between 16,000 to 18,500 people (0.16-0.85 cases per 100,000), while in EU it stands around 0.1 to 1.0 cases per 100,000 individuals.

PXS has estimated the addressable market size for PXS-5505 in MF as US$1bn, which we view as conservative given the mainstay JAK inhibitor treatments are not disease modifying and tend to have low tolerability and several side effects.

Pre-clinical and clinical progress

In a mouse model of PMF, PXS-5505 administered at 15mg/kg four times a week for 10 weeks was shown to be well tolerated, with mice treated with the drug candidate showing significantly lower spleen weights, BM fibrosis and splenic

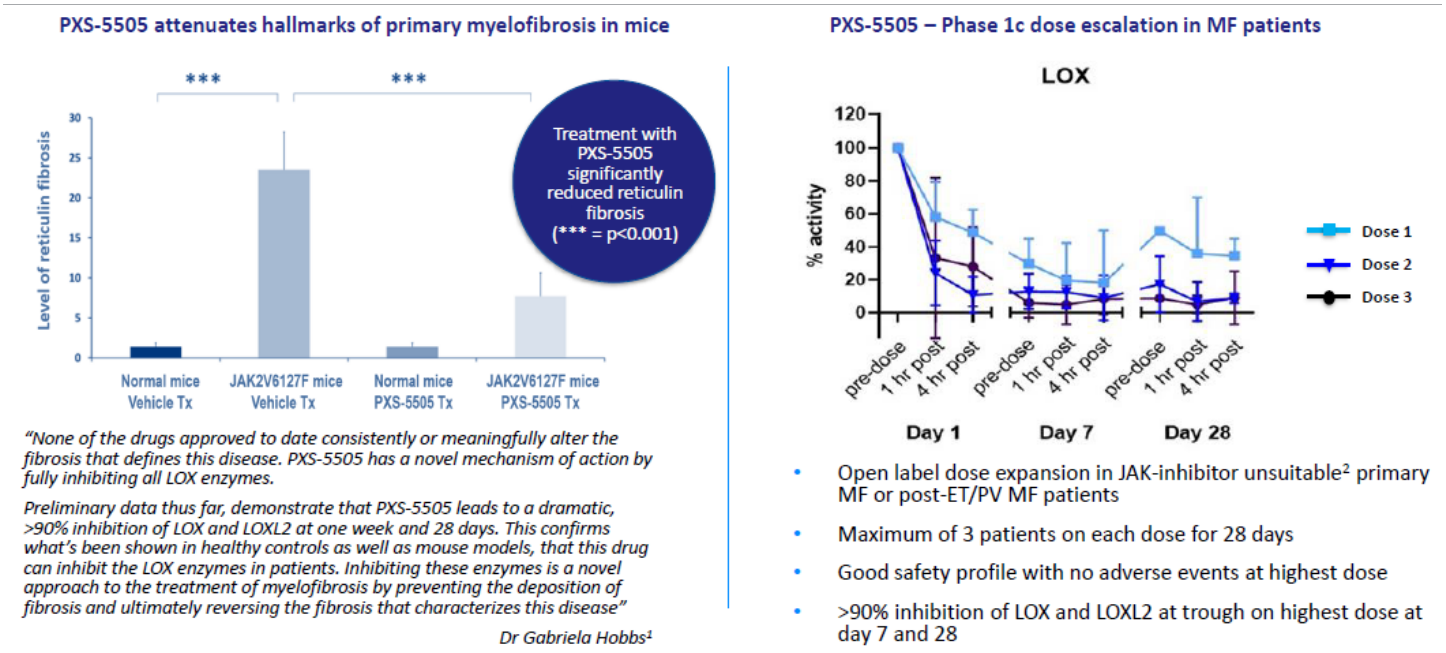
fibrosis compared to vehicle group (242.25 ± 18 mg vs 305.11 ± 22.4 mg, p < 0.05; 5.01 ± 0.4 vs 11.88 ± 0.62. p < 0.0001; 13.17 ± 0.53 vs 16.33 ± 0.5, p < 0.001).

A Phase 1 trial in 56 healthy volunteers started in Feb-19 and reported results in Apr-20. The trial showed effective inhibition of all enzymes in LOX family that are involved in fibrosis. The drug candidate was well tolerated, with six-month toxicity studies completed clearing the way for Phase 2 studies in several cancers.

In Feb-21, PXS commenced a Phase 1c/2a trial aiming to show PXS-5505 monotherapy is safe and effective in MF patients who are intolerant, unresponsive or ineligible for treatment with approved JAK drugs. The study is comprised of a dose escalation phase followed by a dose expansion phase. The dose escalation phase recruited up to 18 patients in sites in Australia and South Korea and aims to select the optimum dose of PXS-5505. The expansion phase will recruit 24 patients at multiple sites, with PXS-5505 evaluated over a six-month period.

In the Phase 1c open-label, dose escalation trial in patients with primary MF or post ET/PV MF unsuitable for JAK-inhibitor treatment, PXS-5505 showed good tolerability, with no SAEs at the highest dose. Importantly, the drug candidate showed a good dose-response, with >90% inhibition of LOX and LOXL2 activity in the highest dose cohort up to 4 hours post administration at day 7 and 28.

Figure 7: PXS-5505 Clinical Trial



Source: Pharmaxis

Phase 2a (Open label, randomised, multicentre, n=24)

Following the approval of IND (Investigational New Drug) application by the FDA in August 2020, PXS was given approval to commence a randomised, multicentre Phase 2a trial in 24 MF patients. The budget is A$8.5m (US$6.0m). Following on from the Phase 1c dose escalation trial, it is now recruiting for the cohort expansion. Importantly, the patients in the dose escalation chose to also participate in the 2a expansion trial. The study is expected to complete late CY22, aiming to achieve the following endpoints.

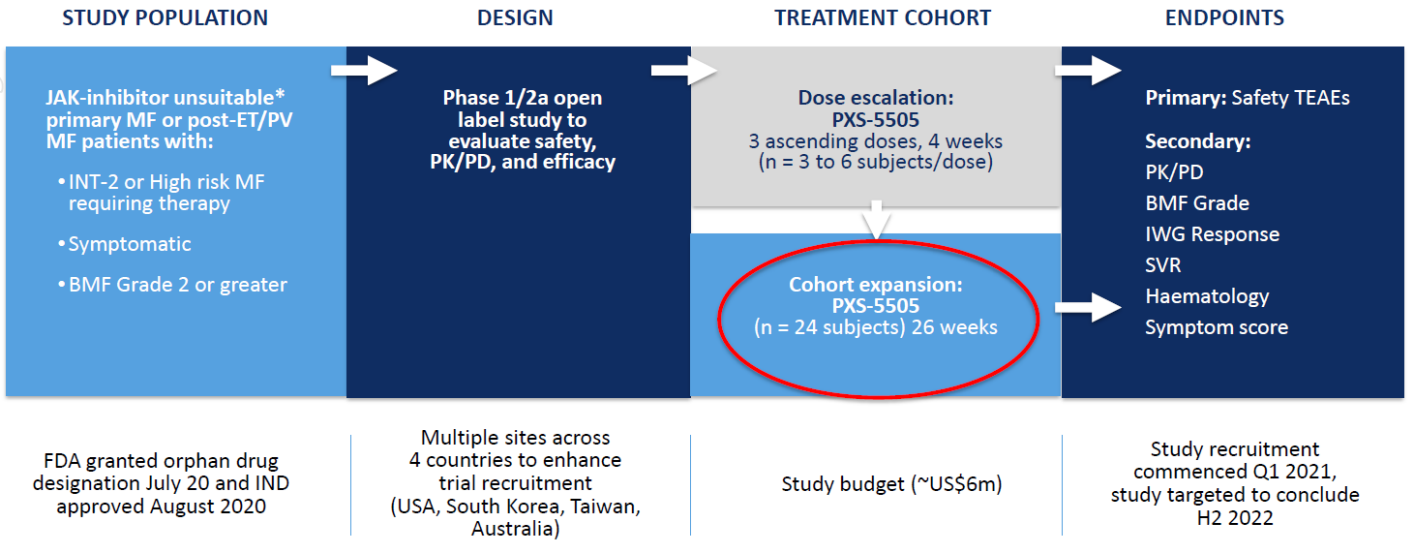
Primary Endpoint: Safety of PXS-5505 in patients with myelofibrosis

Secondary Endpoints:

- Determine therapeutic dose
- Characterise pharmacokinetic and pharmacodynamic parameters
- Determine reduction in bone marrow fibrosis

- Determine response rates
- Evaluate efficacy of PXS-5505 in spleen size reduction (measured by CT or MRI)
- Evaluate efficacy of PXS-5505 on MF related symptoms

Figure 8: Phase I/2a Trial design



*Unsuitable = ineligible for JAKi treatment, intolerant of JAKi treatment, relapsed during JAKi treatment, or refractory to JAKi treatment.

Source: Pharmaxis

Hepatocellular Carcinoma – PXS 5505 (oral)

In October, PXS announced that the FDA cleared an Investigational New Drug (IND) application for a Phase 2 trial of PXS-5505 added to standard of care in hepatocellular carcinoma (HCC). This was submitted by the University of Rochester, which will be the lead investigator of the trial. In the Investigator lead trial, PXS-5505 will be used in addition to current chemotherapy standard of care and combination of drugs with patients newly diagnosed with HCC carcinoma. The estimated cost of the trial is A$3.5m (US$2.5m).

Liver cancer presents a significant unmet need. HCC is the most common type of primary liver cancer, which has doubled in incidence over the last two decades. It is the fourth leading cause of cancer related death worldwide, with a five-year survival rate of ~20%.

Tumour tissue specimens show LOX enzymes are significantly elevated in human liver cancer. PXS and the University of Rochester believe PXS-5505 can improve the efficacy of the chemotherapy treatment by inhibiting the lysyl oxidase enzymes, delaying tumour growth and reducing intertumoral pressure. The company has estimated an addressable market opportunity of US$7bn.

Pancreatic Cancer – PXS 5505 (oral)

PXS has further extended its application of lead pan-LOX drug PXS-5505 application in cancer to pancreatic cancer. Associate professor Thomas Cox from the Garvan Institute of Medical research has been awarded an $827,500 NHMRC development grant to lead a multi-disciplinary team investigating PXS-5505 as a potential new treatment approach for pancreatic cancer. The pre-clinical studies will use PXS-5505 in combination with first line chemotherapy treatment.

Pancreatic cancer has a five-year survival rate of less than 10% and resistance to chemotherapy represents a significant problem. Similarly, to liver cancer (and solid tumours generally), the resistance of chemotherapy is partially driven by the fibrosis whereby scar tissue builds up around the tumour cells, meaning the

treatments are unable to target the cancer cells directly, resulting in growth and spread of the cancer.

PXS represents a significant opportunity to be delivered in line with first line therapy to enhance the effectiveness of existing chemotherapy treatments.

Scaring and burns – PXS 6302 (topical pan-LOX)

PXS has also developed a topical pan-LOX inhibitor for potential use in scarring and burn wounds. When the skin is damaged, fibrous tissue forms over the wound as it tries to repair and protect the skin. Severely damaged skin such as hypertrophic and keloid scars are thought to be caused by an excessive skin healing response to injuries (eg, surgery or burns) and the over production of skin tissue.

The body's response to injury stimulates the fibroblast through inflammation, creating excessive ECM and collagen. This, in turn, leads to stiffening of matrix and further stimulating fibroblasts to proliferate and creates excessive ECM and collagen. This cross-linking then creates the fibrous tissue, which appears on the skin as raised area.

PXS has estimated an initial addressable market for established keloid and hypertrophic scars of US$3.5bn, with the total scar treatment market in 2019 exceeding US$19bn. Current treatment for scars include corticosteroids, surgical revision, cryotherapy and laser therapy.

Phase 1 healthy volunteer clinical data

The pre-clinical results of a Phase 1a study of PXS-6302 in 10 healthy volunteers have demonstrated good tolerability of the drug and full inhibition of the targeted enzymes.

Phase 1c – Investigator lead trial in established scars

The trial is investigator lead by Fiona Wood AM and colleagues from the Western Australia University. The phase 1c trial has started recruiting and a read-out is expected by the end of CY22. The trial is in 50 patients with established scars and is placebo controlled, for three months. A further study (50 patients) will focus on patients with burns injuries and will access the effectiveness of PXS-6302 in preventing the emergence of problematic scars after the initial surgery and healing process has been completed.

Forecasts, model assumptions and valuation

In December 2021 PXS completed a placement and share purchase plan raising A$9.7m @ A$0.105/share. At 31 December 2021 the cash position was sound at A$20.8m, which we believe is sufficient to fund the current clinical programs through 2022.

The 2Q22 cashflow report noted receipts of A$3.7m (A$7.3m for six months) and operating cash outflow of A$3.7m. Bronchitol® sales were A$1.9m for the quarter and A$2.2m for the six months. It was noted that COVID was making the near-term outlook uncertain. Aridol® sales were A$0.5m for the quarter and A$0.9m for the six months. PXS posted 1HFY22 net loss of A$8.8m on revenue of A$8.5m with A$2.0m received from the sale of Australian distribution rights for Bronchitol and Aridol.

Due to the early stage in clinical development of PXS's assets, we have valued the company based on failure and success as well as the risk profiles upon successful outcomes.

We have used a DCF methodology to derive our valuation of A$0.58/share. The main components of the DCF include WACC of 10.5%, made up of risk-free rate of 3.0%, 5.5% risk premium and terminal growth rate of 4.7% from FY28. We have set our target price at the same level. The key assumption in our cashflow to 2028 include:

- Bronchitol® and Aridol® generate A$10m revenue increasing to A$25m by 2028, with a COGS of 35%;
- The operating cost base is A$23m increasing at 5% pa;
- PXS-5505 in MF patients – assume 15,000 patients @ US$100k treatment cost annually, probability of success for Phase 2 is estimated at 24.6%, at Phase 3 is 47.7%, 92% on NDA (refer Figure 9), a licensing deal is entered into in 2025 with US$30m milestone payment received in 2025, 2026 and 2027, approval in 2028 with US$150m milestone payment and a further $US360m in milestone payments commercial target achieved together with 12.5% royalty on sales;
- We have not included in our valuation any contribution from other projects which becomes upside; and
- Additional capital of A$25m is raised in FY23 at A$0.20/share to accelerate clinical development of PXS-5505 and PXS-6302. We view this capital to be required post clinical results flagged for late CY22, with our pricing estimates likely to prove conservative if the results are successful.

Figure 9: Phase transition success rates

Phase transition success rates by disease area

Phase Success	Phase I to II		Phase II to III		Phase III to NDA/BLA		NDA/BLA to Approval	
	n	Phase POS	n	Phase POS	n	Phase POS	n	Phase POS
Hematology	92	69.6%	106	48.1%	82	76.8%	72	93.1%
Metabolic	136	61.8%	149	45.0%	66	63.6%	48	87.5%
Infectious disease	403	57.8%	414	38.4%	197	64.0%	156	92.9%
Others	154	63.6%	228	38.6%	90	60.0%	69	88.4%
Ophthalmology	88	71.6%	200	35.5%	82	51.2%	45	91.1%
Autoimmune	413	55.2%	471	31.4%	219	65.3%	202	94.1%
Allergy	55	56.4%	92	28.3%	34	64.7%	20	100.0%
Gastroenterology	45	46.7%	73	34.2%	35	57.1%	33	90.9%
All indications	**4414**	**52.0%**	**4933**	**28.9%**	**1928**	**57.8%**	**1453**	**90.6%**
Respiratory	179	55.9%	215	21.9%	62	64.5%	45	95.6%
Psychiatry	150	52.7%	164	26.8%	71	56.3%	57	91.2%
Endocrine	319	43.3%	293	26.6%	151	66.2%	124	86.3%
Neurology	516	47.7%	504	26.8%	226	53.1%	165	86.7%
Oncology	1628	48.8%	1732	24.6%	495	47.7%	324	92.0%
Cardiovascular	214	50.0%	252	21.0%	105	55.2%	80	82.5%
Urology	22	40.9%	40	15.0%	13	69.2%	13	84.6%

Figure 2: Phase transition success rates by disease area. The n value is the total 'Advanced or Suspended' transitions of all phases used to calculate LOA. 'POS' is the probability of successfully advancing to the next phase. The ordering of disease areas is consistent with the overall likelihood of approval from Phase I, which is analyzed later in Figure 5. Source: Biomedtracker® and Pharmapremia®, 2020

Source: Biomedtracker

Comparable companies

We have compiled a list of relevant ASX listed life science companies, with clinical programs in either the pre-clinical, Phase 1 or Phase 2 stage. The average EV is A$72m, which shows that PXS with an EV of A$34.0m is trading well below the peer group.

Figure 10: Comparable ASX listed companies

Ticker	Company name	Mkt Cap	Net cash	EV	QTR's of cash @ latest burn rate (ex rebates)	Indication	Phase
EX1	Exopharm Ltd.	39.3	9.4	29.9	12.7	Drug delivery	Commercial
NOX	Noxopharm Ltd.	100.8	16.7	84.1	2.4	Oncology	Ph1/2
BNO	Bionomics Ltd	93.4	40.4	53.0	6.0	CNS/Oncology	Ph2
BOT	Botanix Pharmaceuticals Limited	77.9	16.8	61.0	6.0	Dermatology	Ph1/2
1AD	AdAlta Ltd.	22.9	6.7	16.3	3.1	Fibrosis	Ph1/2
ATX	Amplia Therapeutics Ltd.	27.1	14.9	12.2	15.6	Fibrosis/Oncology	Ph1/2
PAB	Patrys Limited	49.4	10.8	38.6	2.4	Oncology	Pre-clinical
VBS	Vectus Biosystems Limited	49.1	3.1	46.0	2.9	Fibrosis	Ph1
RCE	Recce Pharmaceuticals Ltd.	162.1	15.8	146.3	6.0	Sepsis	Ph1/2
CHM	Chimeric Therapeutics Limited	60.9	13.4	47.5	3.4	Oncology	Ph1
PYC	PYC Therapeutics Limited	286.3	43.6	242.6	23.0	Retinitis	Pre-clinical
IVX	Invion Ltd.	96.2	13.6	82.7	19.2	Oncology	Pre-clinical
Average		**88.8**	**17.1**	**71.7**	**8.6**		
Median		**77.9**	**14.9**	**53.0**	**6.0**		
PXS	**Pharmaxis Ltd**	**51.0**	**20.9**	**30.2**	**5.2**	**Fibrosis**	**Commercial + Ph1/2**

Source: Factset as at 7th April 2022

PXS has highlighted several US listed companies that are targeting potential treatments for Myelofibrosis. The market capitalisation of these companies is well in excess of PXS.

Figure 11: Examples of other programs targeting Myelofibrosis

Company	Market cap[1]	Bourse	Asset	Description	Clinical phase
KEROS THERAPEUTICS	$0.9bn	Nasdaq	KER-050	TGF-β ligand trap	Phase 2
Constellation PHARMACEUTICALS	$1.6bn	Nasdaq	CPI-0610	BET inhibitor	Phase 3
KARTOS THERAPEUTICS	$0.7bn[2]	n.a. – private	KRT-232	MDM2 antagonist	Phase 3
geron	$0.4bn	Nasdaq	Imetelstat	Telomerase inhibitor	Phase 3
pharmaxis	$43m (A$57m)	ASX	PXS-5505	LOX inhibitor	Phase 1c/2 commenced

Notes: (1) Approximate market cap as at 31 January 2022, (2) Last round valuation

Source: Pharmaxis

Board and Senior Management Team

Figure 12: Board

Role	Name	About
Chairman	Malcolm McComas	Mr McComas has been a board member since 2003 and Chairman of the Board since 2012. Malcolm McComas is a former investment banker serving in leadership roles with global organisations (such as Grant Samuel, Citigroup and Deutsche Bank) and was previously a commercial lawyer. Mr McComas has worked with many high growth companies across various industry sectors and has experience in debt and equity finance, mergers and acquisitions and privatisations, leading more than 50 IPOs and secondary offerings. He is also a director of ALLG, ACQ, CVO and FZR.
Chief Executive Officer	Gary Phillips	Mr Phillips was appointed CEO and became a member of the Board in 2013. Prior to this he was theChief Operating Officer since June 2008, having previously served as Commercial Director from his joining of the Company in December 2003. Mr. Phillips has more than 30 years of operational management experience in the pharmaceutical and healthcare industry in Europe, Asia and Australia. From 2000 to 2003 he was the Chief Executive Officer at Novartis Pharmaceuticals Australia where he led the successful launch of breakthrough cancer medication Gilvec.
Non-Executive Director	William Delaat	Mr Delaat has been a member of the Board of Directors since June 2008. Mr Delaat has over 40 years' experience in the global pharmaceutical industry, most recently as the managing director of the Australian subsidiary of Merck & Co., a position he held from 1997 until his retirement in 2008. During his career Mr Delaat has held executive positions in both Europe and Australia for Merck and AstraZeneca. Mr Delaat is experienced in sales and marketing and has been responsible for international product launches and commercialisation of respiratory products. Mr Delaat was chairman of Medicines Australia, and the Pharmaceuticals Industry Council from 2008 to 2012.
Non-Executive Director	Neil Graham	Mr Graham was appointed to the Board of Directors on 4 May 2020. Mr Graham is an infectious diseases epidemiologist with extensive experience working in biotech and pharmaceutical companies in the development of medicines. Dr Graham's career has included senior roles overseeing pipeline development and clinical programs. Dr Graham has considerable depth of scientific expertise in immunology and inflammation and is the author of a number of books and publications including a considerable body of work on respiratory illness
Non-Executive Director	Kathleen Metters PhD	Dr Metters was employed by Merck & Co. In 2009 she was appointed to design and establish External Discovery and Preclinical Sciences, created to expand Merck's scientific network to the greater research community in academia, biotechnology, and government, building partnerships in life sciences, medicine, engineering, and information technology. Dr Metters worked in research focused on the arachidonic acid cascade which resulted in the development of SINGULAIR®, a once-daily oral therapy for asthma and allergic rhinitis. For her work on SINGULAIR®, she was one of the team of scientists who won the Prix Galien Canada 2000 for excellence in innovative research.

Source: Pharmaxis

Figure 13: Senior Management

Role	Name	About
Chairman	Gary Phillips	Refer to Board above.
Co-founder and Medical Director	Brett Charlton PhD	Dr Charlton is a co-founder of Pharmaxis and has been Medical Director since June 1998. He was a member of the Board of Directors from June 1998 to March 2006. Dr Charlton is the author of more than 60 scientific papers and has over 20 years' of experience in clinical trial design and management. Dr Charlton was founding Medical Director of the National Health Sciences Centre and established its Clinical Trials Unit. Prior to joining us, Dr Charlton 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. Dr Charlton holds an M.B.B.S. with honors from the University of New South Wales and a Ph.D. from the University of New South Wales.
Head of Drug Discovery	Wolfgang Jarolimek PhD	Dr Jarolimek has more than 20 years' experience in pharmaceutical drug discovery and has published more than 40 peer reviewed articles. From 2002 to 2010 Dr Jarolimek was Director of Assay Development and Compound Profiling at the GlaxoSmithKline Center of Excellence in Drug Discovery in Verona, Italy. From 1998 to 2002 Dr Jarolimek worked at the Neuroscience Center of Merck, Sharp and Dohme in Harlow, England, as Senior Research Scientist in the electrophysiology group. Prior to joining pharma companies, he 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. Dr Wolfgang Jarolimek holds a B.Sc. in Pharmacy and a PhD from the University of Saarbrücken, Germany.
Chief Financial Officer and Company Secretary	David McGarvey	Mr McGarvey has over thirty years' experience in overseeing the financial affairs of different Australian companies. From 1998 to 2002, Mr McGarvey served as CFO of the Filtration and Separations Group of U.S. Filter. From 1985 to 1997, Mr McGarvey served as CFO of Memtec Limited. While at Memtec, Mr McGarvey oversaw the U.S. listing of Memtec on the Nasdaq Global Market and the New York Stock Exchange and managed numerous international merger and acquisition transactions. From 1975 to 1985, Mr McGarvey 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, is a Graduate of the Australian Institute of Company Directors and is a Fellow of the Governance Institute of Australia.
Alliance Management and Medical and Regulatory Affairs	Kristen Morgan	Ms Morgan joined Pharmaxis in August 2008 as Head of Medical Affairs and has over 20 years experience in the pharmaceutical industry. Ms Morgan previously held a senior role in Medical Affairs at Sanofi-aventis, and held a commercial/sales role at GSK. Ms Morgan holds a B.Sc. 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.

Source: Pharmaxis

Queensland

Brisbane	+61 7 3334 4888
Stockbroking, Corporate Advice, Wealth Management	
Brisbane: Edward St	+61 7 3121 5677
Brisbane: Tynan Partners	+61 7 3152 0600
Brisbane: North Quay	+61 7 3245 5466
Bundaberg	+61 7 4153 1050
Cairns	+61 7 4222 0555
Gladstone	+61 7 4972 8000
Gold Coast	+61 7 5581 5777
Holland Park	+61 7 3151 8300
Kedron	+61 7 3350 9000
Mackay	+61 7 4957 3033
Milton	+61 7 3114 8600
Newstead	+61 7 3151 4151
Noosa	+61 7 5449 9511
Redcliffe	+61 7 3897 3999
Rockhampton	+61 7 4922 5855
Springfield-Ipswich	+61 7 3202 3995
Spring Hill	+61 7 3833 9333
Sunshine Coast	+61 7 5479 2757
Toowoomba Chalk Capital	+61 7 4639 1277
Townsville	+61 7 4725 5787

Northern Territory

Darwin	+61 8 8981 9555

New South Wales

Sydney	+61 2 9043 7900
Stockbroking, Corporate Advice, Wealth Management	
Sydney: Grosvenor Place	+61 2 8215 5000
Sydney: Reynolds Securities	+61 2 9373 4452
Sydney: Currency House	+61 2 8216 5111
Armidale	+61 2 6770 3300
Ballina	+61 2 6686 4144
Balmain	+61 2 8755 3333
Bowral	+61 2 4851 5555
Chatswood	+61 2 8116 1700
Coffs Harbour	+61 2 6651 5700
Gosford	+61 2 4325 0884
Hurstville	+61 2 8215 5079
Merimbula	+61 2 6495 2869
Mona Vale	+61 2 9998 4200
Neutral Bay	+61 2 8969 7500
Newcastle	+61 2 4926 4044
Orange	+61 2 6361 9166
Port Macquarie	+61 2 6583 1735
Scone	+61 2 6544 3144
Wollongong	+61 2 4227 3022

Australian Capital Territory

Canberra	+61 2 6232 4999

Victoria

Melbourne	+61 3 9947 4111
Stockbroking, Corporate Advice, Wealth Management	
Brighton	+61 3 9519 3555
Domain	+61 3 9066 3200
Geelong	+61 3 5222 5128
Hawthorn	+61 3 9900 4350
South Yarra	+61 3 9006 9955
Southbank	+61 3 9037 9444
Traralgon	+61 3 5176 6055
Warrnambool	+61 3 5559 1500

Western Australia

West Perth	+61 8 6160 8700
Stockbroking, Corporate Advice, Wealth Management	
Perth	+61 8 6462 1999

South Australia

Adelaide	+61 8 8464 5000
Stockbroking, Corporate Advice, Wealth Management	
Exchange Place	+61 8 7325 9200
Norwood	+61 8 8461 2800
Unley	+61 8 8155 4300

Tasmania

Hobart	+61 3 6236 9000