EDISON

ASLAN Pharmaceuticals

Initiation of coverage

Novel treatments for worldwide unmet needs

Pharma & biotech

We are initiating coverage on ASLAN Pharmaceuticals, a clinical-stage drug developer focusing on in-licensing drugs with a high prevalence in Asia that are orphan indications in the West. The company's lead asset is the pan-HER inhibitor varlitinib, which is in clinical trials for biliary tract cancer (BTC, pivotal) and gastric cancer (GC, Phase II/III), both of which are widely prevalent in Asia. The company has also planned a Phase II trial of ASLAN003 targeting AML via the novel mechanism of inducing blast differentiation. We initiate at NT$9.5bn or NT$72.87 per share.

Year end	Revenue (NT$m)	PBT* (NT$m)	EPS* (NT$)	DPS (NT$)	P/E (x)	Yield (%)
12/15	0.0	(403)	(7.32)	0.0	N/A	N/A
12/16	373.0	(247)	(2.35)	0.0	N/A	N/A
12/17e	0.0	(1,093)	(8.81)	0.0	N/A	N/A
12/18e	0.0	(1,109)	(8.52)	0.0	N/A	N/A

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

Varlitinib: A pan-HER inhibitor for solid tumours

Inhibitors of the HER class of growth factor receptors have been some of the earliest and most successful targeted therapies, including Herceptin and Erbitux among others. The goal of pan-HER inhibition is to prevent tumour cells from adapting to treatment by shifting to another receptor as the driver. Varlitinib inhibits the whole class of proteins and inhibited an array of tumour types in early trials.

Lead clinical trials: Pivotal BTC, Phase II/III GC

Following strong responses in biliary tract cancer and gastric cancer in open label Phase Is, ASLAN initiated ongoing pivotal clinical studies in these indications (in second and first line, respectively). These diseases are more common in Asia by 10-20 fold or more depending on the region, and these clinical trials are enrolling broadly across Asia and the US. Interim results for GC are expected in 2018, and pivotal results for BTC are expected in 2019.

ASLAN003: Turning AML cells back into normal

ASLAN003 is an inhibitor of dihydroorotate dehydrogenase (DHODH), a protein important for DNA synthesis. Drugs of this class have previously been approved for the treatment of inflammatory disorders because they inhibit the growth of immune cells, but new preclinical data have found that DHODH inhibitors may be able to force AML cancer cells to differentiate into normal blood cells. A Phase II clinical study was initiated in late 2017.

Valuation: Initiated at NT$9.5bn or NT$72.87/share

We arrive at an initial valuation of NT$9.5bn or NT$72.87/share based on a risk-adjusted NPV analysis. We currently model commercialisation of varlitinib and ASLAN003 in the US, Europe and Asia. We assume a 30% probability of success for BTC and 20% for GC, based on the limited efficacy data to date. The company ended Q217 with NT$2.12bn, which we expect to be enough to finance the company through the Phase II readouts for varlitinib and eventual licensing.

7 November 2017

Price	**NT$39.35**
Market cap	**NT$5.2bn/ US$171.3m**
	NT$30.36/US$
Net cash (NT$bn) at June 2017	1.84
Shares in issue	130.1m
Free float	50.9%
Code	6497
Primary exchange	Taipei
Secondary exchange	N/A

Share price performance

%	1m	3m	12m
Abs	-12.2	-0.6	N/A
Rel (local)	-14.2	-3.2	N/A
52-week high/low	NT$55.8	NT$33.5	

Business description

ASLAN Pharmaceuticals is a Singapore based drug developer targeting Asia prevalent diseases. It has varlitinib in pivotal clinical trials for biliary tract cancer and gastric cancer, and will be advancing ASLAN003 to Phase II trials for acute myeloid leukaemia.

Next events

ASLAN004 Phase I initiation	2018
Varlitinib first-line BTC results	2018
Varlitinib GC interim results	2018

Analysts

Nathaniel Calloway	+1 646 653 7036
Maxim Jacobs	+1 646 653 7027

healthcare@edisongroup.com

Edison profile page

ASLAN Pharmaceuticals is a research client of Edison Investment Research Limited

Investment summary

Company description: In-licensing for Asia-prevalent diseases

ASLAN is a pharmaceutical company focused on in-licensing early-stage assets for diseases with a high prevalence in Asia that are orphans in the West. This allows the company to quickly progress these assets through clinical trials in Asia. The goal then is then to out-license rights to the EU and Japan while commercialising in the US and other Asian geographies. The company's lead programme is varlitinib, a pan-HER inhibitor in a pivotal trial for biliary tract cancer (BTC) and Phase II/III for gastric cancer (GC). Initial readouts for these trials are planned for 2018. It also has an ongoing Phase II clinical trial of ASLAN003, an inhibitor of dihydroorotate dehydrogenase, which is being tested for acute myeloid leukaemia, a novel indication for this class of drug. The company also has the preclinical ASLAN004 (IL-4/IL-13 inhibitor) for inflammatory and oncology indications and ASLAN005 for solid tumour indications, as well the Modybody antibody fragment platform.

Valuation: NT$9.5bn or NT$72.87 per share

We arrive at an initial valuation of ASLAN of NT$9.5bn or NT$72.87 per share based on a risk-adjusted NPV analysis of the commercialisation value of its assets. We value varlitinib at NT$6.9bn based on a 20-30% probability of success and commercialisation throughout the US, Europe and Asia. We are encouraged by the early response rates in BTC and the FDA's lenience with clinical trial design for a response rate primary end point. We value ASLAN003 at NT$864m, because we assign a lower probability of success (10%) on the basis of an untested mechanism of action, and we only expect commercialisation in the US and Europe. We expect to update our valuation with the advancement of ASLAN004 to the clinic (expected in late 2017) and clinical results from the ongoing trials.

Financials: Runway to 2019 and potential out-licensing

ASLAN had a comprehensive loss of NT$270m during Q217, which was almost entirely driven by R&D spending of NT$210m. We expect a slight acceleration of spending in the coming periods (loss of NT$1.1bn in 2017 and 2018) due to the advancement of varlitinib and ASLAN003. The company ended the quarter with NT$2.12bn in cash, which we will expect to provide a runway through the pivotal BTC trial for varlitinib and its potential out-licensing in the EU and Japan in 2019. We model that the company will need NT$2.5bn in additional financing needed to reach profitability in 2021 (included as debt for illustrative purposes), although we expect this to be offset through out-licensing payments.

Sensitivities: Typical of early-stage drug development

The risks facing ASLAN are common to drug developers and are largely clinical in nature. The company has performed several early-stage clinical trials of varlitinib, but a statistical improvement in an approval end point has not been established, although this is typical for drugs at this early stage. The broader class of ErbB inhibitors to which it belongs has had mixed results in BTC, although Herceptin has been approved for GC. BTC is an exceptionally difficult disease to treat with short period of survival, only a few months in the second line where varlitinib is being tested. On this basis however, the FDA agreed to an end point of response rate for the BTC trial, which is more lenient than survival end points. ASLAN003 is higher risk because its mechanism of action is untested in AML, although the class of drug has been approved in the past, albeit for inflammatory indications. Despite limited options for all these indications, there are a high number of ongoing clinical trials and there may be future competition. Finally, there is risk that ASLAN will not be able to find a global partner willing to license these assets.

Leveraging regional variation to speed drug development

ASLAN was founded in 2010 and is headquartered in Singapore with a corporate presence in Taiwan, Australia, Hong Kong and Shanghai. The company became Singapore's first publicly listed biotech company when it went public in a $33m (NT$996m) IPO in June 2017 on the Taipei Stock Exchange, bringing the total amount of capital raised since inception to $130m (NT$2.9bn).

The company's strategy is to leverage its access to Asian clinical trial populations to advance in-licensed assets in the clinic. This development strategy has strengths across multiple classes of drugs, but in particular for drugs to treat disorders that are uniquely prevalent in Asia. For instance, there are certain tumour types that have a much higher prevalence in Asia, whereas they are orphan indications in the West. This enables facile clinical trial enrolment for drugs with significant market opportunities worldwide. This method has been successfully employed previously by major drug companies. For instance, the majority of patients for the Phase III trial of Herceptin (tastuzumab, Roche) were Asian most of which were drawn from clinical trial sites throughout China, Japan, Korea and Taiwan.[1] Although Asian populations can be leveraged for these studies, the focus is not exclusively on commercialising in these Asian markets. The clinical trials are specifically designed with US and European regulatory agencies in mind and with their input, and they include sufficient western patients for these regulatory bodies. ASLAN has stated that it intends to out-license these drugs in the EU and Japan, while commercialising in the US and other Asian markets.

The company has five development programmes across nine indications and one fully out-licensed asset. The company's lead programme is varlitinib, a pan-HER tyrosine kinase inhibitor (inhibits downstream HER1, -2, -3, and -4 signalling) with biliary tract cancer and gastric cancer as lead indications. The company has also initiated a Phase II clinical trial for the dihydroorotate dehydrogenase (DHODH) inhibitor ASLAN003 in acute myeloid leukaemia. Bristol-Myers Squibb recent reacquired the rights to ASLAN002, a dual inhibitor of c-MET and Recepteur d'Origine Nantais (RON). Interest in RON was in part the motivation to in-license the preclinical RON inhibitor ASLAN005. ASLAN004 is an IL-4 and IL-13 inhibitor in preclinical testing for inflammation and oncology indications. And finally the company has in-licensed the technology behind the Modybodies platform, a novel method of developing heavy chain only antibody fragments.

Exhibit 1: ASLAN pipeline

Drug	Class	Mechanism	In-licensing partner	Out-licensing partner	Indication	Stage
Varlitinib (ASLAN001)	Small molecule	Pan-HER inhibitor	Array BioPharma	Hyundai Pharm (Korea)	2nd line biliary tract cancer	Pivotal, China Pivotal
					1st line gastric cancer	Phase II/III
					1st line biliary tract cancer	Phase II
					Breast cancer	Phase II
					Colorectal cancer	Phase II
					Hepatocellular carcinoma	Phase Ib
ASLAN002 (out-licensed)	Small molecule	MET/RON inhibitor	Bristol-Myers Squibb	Bristol-Myers Squibb (worldwide)	Gastric cancer	Phase II
ASLAN003	Small molecule	DHODH inhibitor	Almirall		AML	Phase II
ASLAN004	Antibody	IL-4/IL-13 inhibitor	CSL		Inflammation	Preclinical
					Oncology	Preclinical
ASLAN005	Antibody	RON inhibitor	A*STAR		Oncology	Preclinical
Modybodies	Antibody fragments	Various	Nanyang Technological University		Oncology	Lead generation

Source: ASLAN

1 Bang Y, et al. (2010) Trastuzumab in combination with chemotherapy versus chemotherapy alone for treatment of HER2-positive advanced gastric or gastro-oesophageal junction cancer (ToGA): a phase 3, open-label, randomised controlled trial. *Lancet* 376, 687-697.

Varlitinib: Expanding on a proven mechanism

ASLAN is developing varlitinib (ASLAN001, formerly ARRY-543) for the treatment of solid tumours and has ongoing clinical trials investigating the drug for biliary tract cancer (BTC), gastric cancer (GC), and hepatocellular carcinoma (HCC). It has orphan status for cholangiocarcinoma (CC, a subset of BTC see below) and GC. The drug is a tyrosine kinase inhibitor (TKI) that inhibits proteins across epidermal growth factor receptor class of receptor tyrosine kinases (termed ErbB), or a so-called pan-HER inhibitor. The drug was initially discovered by Array BioPharma, whom ASLAN entered into a partnership with in 2011. The original agreement stipulated that ASLAN out-license the asset following Phase II results, although we expect that this agreement is being renegotiated now that ASLAN has stated it intends to develop the drug through pivotal trials and retain certain rights. We expect composition of matter patents to protect the drug until 2029 following patent term extensions. In 2015, ASLAN out-licensed the rights of the drug in South Korea to Hyundai Pharma for undisclosed royalties and milestones.

The logic and history of pan-HER inhibition

The ErbB receptors were some of the first proteins that were successfully drugged as part of the move towards targeted therapies. The ErbB class has four members, EGFR (also known as HER1), HER2, HER3, and HER4, which have all been variously associated with cancer. These proteins drive tumour cell growth when overexpressed or mutated. The approval of Herceptin in 1998 was both pioneering for the role of targeted therapies in the clinic as well as setting a high watermark for their commercial success. Herceptin targets HER2, and the majority of its market is driven by HER2+ breast cancer (approximately 30%, also approved for gastric cancer), and it had sales of CHF6.8bn in 2016. The main limitation of Herceptin is that it is associated with cardiomyopathy and ventricular dysfunction, and can lead to an increase in cardiac adverse events.

There have also been several drugs developed to target EGFR-driven cancers. These drugs fall into two classes: monoclonal antibodies similar to Herceptin that drive receptor internalisation and immune targeting such as Erbitux (cetuximab, Merck KGaA) and Vectibix (panitumumab, Amgen); and small molecule TKIs such as Tarceva (erlotinib, Roche/Astellas) and Iressa (gefitinib, AstraZeneca), which prevent the receptor from engaging its downstream targets. The adverse event profile of the TKI class is characterised by diarrhoea and rash in a significant fraction of patients (generally the 20-50% range), although grade 3 or higher reactions are generally uncommon (less than 10%).

There have been several programmes targeting the development of TKIs that can inhibit the activity of multiple ErbB proteins. The logic behind these drugs is that multiple targeting can drive efficacy across a broader range of cancers, including those with more complex genotypes. For instance, it is known that HER4 can be drugged to inhibit the proliferation of NSCLC cells.[2] Additionally, the development of new oncogenic drivers from this class is a known resistance mechanism to treatment. For instance, expression of HER4 is a known mechanism driving resistance to HER2 inhibition in breast cancer.[3]

Lapatinib (branded as Tykerb, Novartis) is the first TKI to target multiple ErbB proteins. Lapatinib was approved for HER2+ breast cancer (either after progression on Herceptin or in combination with aromatase inhibitor letrozole). The drug inhibits both EGFR and HER2, although inconsistently

2 Starr A, et al (2006) ErbB4 increases the proliferation potential of human lung cancer cells and its blockage can be used as a target for anti-cancer therapy. *Int. J. Can.* 119, 269-274.

3 Canfield K, et al. (2015) Receptor tyrosine kinase ERBB4 mediates acquired resistance to ERBB2 inhibitors in breast cancer cells. *Cell Cycl.* 14, 648-655.

across breast cancer cell lines.[4] This in part may be able to explain the modest response rate of the treatment: a 9.8% improvement, although those patients that do respond, respond well, with a median 8.5 month improvement in time to progression (HR=0.57, p=0.00013). The drug had peak sales of $378m in 2012.

Nerlynx (neratinib) is the first true pan-HER inhibitor to be approved, and effectively targets EGFR, HER2, and HER4 (HER3 cannot be targeted by a kinase inhibitor because it lacks kinase activity). It was developed by Puma Biotechnology and approved in June 2017 for extended breast cancer adjuvant therapy in HER2+ patients. A significant limitation to this drug is severe diarrhoea: 95% of patients in clinical trials experience diarrhoea, 40% at grade 3. The approved usage of the drug requires prophylactic diarrhoea medication (loperamide) up to three times a day. Besides varlitinib, the only other clinical programmes investigating pan-HER inhibitors that we are aware of are dacomitinib from Pfizer (Phase III) and poziotinib from Spectrum and Hanmi (Phase II complete, recent data), both for NSCLC.

Biliary tract cancer

Biliary tract cancer (BTC) is a particularly aggressive and lethal form of cancer that afflicts the gallbladder or bile ducts connecting the liver and pancreas to the small intestine. The disease is divided into several sub-indications that are most accurately delineated as: intrahepatic cholangiocarcinoma (ICC), extrahepatic cholangiocarcinoma (ECC), gallbladder cancer (GBC), and cancer of the ampulla of Vater (CAV). However, statistics for these indications and for BTC as a whole can be difficult to interpret because reporting of these sub-indications are frequently and inconsistently grouped together (like ICC with liver cancer and CAV with gastrointestinal cancer or ECC). ICC represents only approximately 8% of BTC cases in the US,[5] but has the worst prognosis of only a 15% five-year survival rate, compared to 19% for GBC and 30% for extrahepatic CC.[6] In each type, the survival rate for metastatic disease is vanishingly small at approximately 2%. CAV is exceptionally rare (5,625 cases in the US from 1973-2005), but has a better prognosis sand is typically surgically treated.[7]

Exhibit 2: Estimated incidence rates of BTC in select countries

	Raw incidence (per 100,000 person-years)			
Region	ICC	ECC	GBC	Total
United States	0.3	2.2	1.5	3.9
China	5.4	0.9	3.0	9.3
Japan	3.6	5.5	9.0	18.2
Korea	5.6	3.4	7.6	16.6

Source: Extrapolated from Globocan; American Cancer Society, Cancer information Service, National Cancer Center Japan; Annual Report of Cancer Statistics 2014, National Cancer Center Korea, Shin et al.;[8] Chen et al.[9] Note: incidence rates are raw and not age adjusted.

BTC is rare in the West: the American Cancer Society estimates 11,740 new cases of ECC and GBC in the US in 2017 (3.6 per 100,000), roughly split 60%/40%. East Asia has higher rates of this disease than other regions (Exhibit 2). North-eastern Thailand has the highest rate in the world, with 96 per 100,000 men of ICC alone driven by the presence of parasitic liver flukes which are

4 Konecny GF, et al. (2006) Activity of the dual kinase inhibitor lapatinib (GW572016) against HER-2-overexpressing and trastuzumab-treated breast cancer cells. *Can. Res.* 66, 1630-1639.

5 Rizvi S and Gores GJ (2013) Pathogenesis, Diagnosis, and Management of Cholangiocarcinoma. *Gastroint.* 145, 1215-1229.

6 American Cancer Society.

7 Talamini MA, et al. (1997) Adenocarcinoma of the ampulla of Vater. A 28-year experience. *Ann. Surg.* 225, 590-600.

8 Shin HR, et al. (2010) Comparison of Incidence of Intrahepatic and Extrahepatic Cholangiocarcinoma - Focus on East and South-eastern Asia. *Asian Pac. J. Can. Prev.* 11, 1159-1166.

9 Chen W, et al. (2016) Cancer Statistics in China, 2015. *CA Cancer* 66, 115-132.

endemic to the region.[10] Other risk factors associated with increased incidence of BTC in Asia include cirrhosis (from hepatitis or otherwise) and gallbladder or bile duct stones. These issues are further exacerbated by aging populations in some countries such as Japan.

There are limited treatment options for patients diagnosed with BTC, and it is rarely diagnosed at an early stage.[11] Locally advanced and metastatic tumours are typically treated with chemotherapy, gemcitabine and cisplatin or other combinations, and are associated with a progression free survival of 8.0 months and overall survival of 11.7 months.[12] 5-Fluorouracil and derivatives are typically second line agents, with a 7.7% response rate, progression free survival of 3.2 months, and overall survival of 7.2 months.[13] There are no approved targeted therapies for the treatment of BTC in the US or Europe. Several studies however have found increased ErbB proteins in BTC. EGFR overexpression is found in 20-30% of CC and up to 39% of GBC. HER2 amplification occurs in 12-15% of GBC,[14] but the expression profile in CC varies wildly depending on the study. There is less information on HER3 and HER4 but one study found overexpression in 12% and 56-63% of CCs for the two proteins respectively, and expression levels correlate with pathologic features of the disease.[15,16] There have been several attempts to target ErbB receptors for BTC, with mixed results (Exhibit 3), and nothing has been approved.

Exhibit 3: Studies targeting ErbB receptors for BTC

Study	Drug	Target	Details	Other treatment	n	ORR	PFS (m)	Notes
Lee[17]	Erlotinib	EGFR	1st line metastatic	gem + ox	135	30%	5.8	p=0.087
	Control		1st line metastatic	gem + ox	133	16%	4.2	
Gruenberger[18]	Cetuximab	EGFR	1st line advanced or metastatic	gem + ox	30	63%	8.8	
Malka[19]	Cetuximab	EGFR	1st line advanced	gem + ox	76	23%	6.1	
	Control		1st line advanced	gem + ox	74	23%	5.5	
Javle[20]	Herceptin + Perjeta	HER2	HER2 amp/oe refractory metastatic	N/A	8	38%	4.2	
		HER2	HER2 mut, refractory metastatic	N/A	3	33%	2.8	
Peck[21]	Lapatinib	EGFR/HER2	2nd+ line advanced	N/A	9		2.6	Terminated for futility

Source: Various. Notes: ORR=overall response rate, PFS=progression free survival, gem=gemcitabine, ox=oxaliplatin, amp/oe=amplified or overexpressed, mut=mutant.

10 Shaib Y and El-Serag HB (2004) The Epidemiology of Cholangiocarcinoma. *Semin. Liver Dis.* 24, 115-125.

11 Valle JW, et al. (2016) Biliary cancer: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up. *Ann. Oncol.* S5, v28-v37.

12 Valle J, et al. (2010) Cisplatin plus Gemcitabine versus Gemcitabine for Biliary Tract Cancer. *N. Eng. J. Med.* 362, 1273-1281.

13 Lamarca A, et al. (2014) Second-line chemotherapy in advanced biliary cancer: a systematic review. Ann. Oncol. 25, 2328-2338.

14 Milind J, et al. (2015) HER2/neu-directed therapy for biliary tract cancer. *J. Hematol. Oncol.* 8, 58.

15 Ito Y, et al. (2001) Expression and clinical significance of the erbB family in intrahepatic cholangiocellular carcinoma. *Pathol. Res. Pract.* 197,95-100.

16 Yang X, et al. (2014) Characterization of EGFR family gene aberrations in cholangiocarcinoma. *Oncol. Rep*. 32, 700-708.

17 Lee J, et al. (2012) Gemcitabine and oxaliplatin with or without erlotinib in advanced biliary-tract cancer: a multicentre, open-label, randomised, phase 3 study. *Lancet Oncol.* 13, 181-188.

18 Gruenberger B, et al. (2010) Cetuximab, gemcitabine, and oxaliplatin in patients with unresectable advanced or metastatic biliary tract cancer: a phase 2 study. *Lancet Oncol.* 11, 1142-1148.

19 Malka D, et al. (2014) Gemcitabine and oxaliplatin with or without cetuximab in advanced biliary-tract cancer (BINGO): a randomised, open-label, non-comparative phase 2 trial. *Lancet Oncol.* 15, 819-828.

20 Javle MM, et al. (2017) Pertuzumab + trastuzumab for HER2-positive metastatic biliary cancer: Preliminary data from MyPathway. *J. Clin. Oncol.* 35, s4 402.

21 Peck J, et al. (2012) HER2/neu May Not Be an Interesting Target in Biliary Cancers: Results of an Early Phase II Study with Lapatinib. *Oncol.* 82, 175-179.

There are numerous ongoing BTC clinical trials (Exhibit 4). The only other Phase III programme to our knowledge is the IDH1 inhibitor ivosidenib being developed by Agios for CC. We expect this drug to largely be limited to ICC because IDH1 mutations are generally limited to this type.[22] Agios presented data on this compound from a Phase I dose-escalation expansion trial in IDH1+ CC patients with multiple prior therapies in June 2017. In these data, 5% of the 73 evaluable patients had a partial response and 56% had stable disease. The median progression free survival was 3.8 months.

Exhibit 4: Selection of Phase II and III BTC trials

Drug	Company	Stage	Mechanism	Indication	Asian trial presence
Varlitinib	ASLAN	Pivotal	Pan-HER	BTC	China, Japan, Korea, Taiwan, Singapore
Ivosidenib	Agios	Phase III	IDH1 inhibitor	CC	Korea
Aliqopa (copanlisib)	Bayer	Phase II	PI3K inhibitor	BTC	N/A
Amcasertib	Sumitomo Dainippon	Phase II	NAGOG inhibitor	Hepatocellular carcinoma and CC	N/A
Apatinib	Jiangsu HengRui	Phase II	VEGF inhibitor	BTC	China
ARQ 087	ArQule	Phase II	FGFR inhibitor	ICC	N/A
CAP7.1	CellAct	Phase II	Topo II inhibitor	Lung Cancer and BTC	N/A
CX-4945	Senhwa Biosciences	Phase II	CK2 inhibitor	CC	Korea, Taiwan
Erdafitinib	Janssen/Otsuka	Phase II	FGFR inhibitor	NSCLC, oesophageal cancer, urothelial cancer, CC	China, Korea, Taiwan
INCB54828	Incyte	Phase II	FGFR inhibitor	CC	Korea, Taiwan, Thailand
Keytruda (pembrolizumab)	Merck	Phase II	PD-1 inhibitor	BTC	N/A
Lenvima (levantinib)	Eisai	Phase II	VEGF inhibitor	BTC	Japan
Merestinib	Eli Lilly	Phase II	c-Met inhibitor	BTC	Korea, Japan, Taiwan
Nerlynx (neratinib)	Puma	Phase II	Pan-HER	Solid tumours, including BTC	N/A
Opdivo (nivolumab)	Bristol-Myers Squibb	Phase II	PD-1 inhibitor	BTC	N/A
Sprycel (dasatinib)	Bristol-Myers Squibb/Otsuka	Phase II	Bcr-Abl, Src family inhibitor	ICC	N/A
Stivarga (regorafenib)	Bayer/Amgen	Phase II	multiple TKI	BTC	N/A
Sulfatinib	Hutchison China Meditech	Phase II	multiple TKI	BTC	China
Votrient (pazopanib)	Novartis	Phase II	multiple TKI	BTC	N/A
Zepsyre (lurbinectedin)	PharmaMar	Phase II	RNA polymerase inhibitor	Solid tumours, including BTC	N/A

Source: Clinicaltrials.gov

Phase Ib BTC interim results

ASLAN published data from a Phase Ib open label dose ranging clinical trial of varlitinib for BTC at ASCO in June 2017. It reported on the results of 15 evaluable patients (out of 27 enrolled at the time) with metastatic CC that received varlitinib in combination with doublet chemotherapy (cisplatin with 5-fluorouracil or capecitabine). There were three partial responses (20%) and 10 stable diseases (67%). This is encouraging compared to historical rates (7.7% response rate and 49.5% disease control rate).[13] Adverse events in the ASLAN study were consistent with previous clinical experience with varlitinib and chemotherapy, as well as other TKIs. 37% of patients had diarrhoea, 11% grade three or above, but were well controlled with loperamide. It is worth noting that in this trial the dose of varlitinib was not optimised, and there is potential for an increased response once the optimal dose is found for this combination (as well as increased AEs). The trial is ongoing, with a target completion date of December 2017.

Gastric cancer

Gastric cancer (GC) is one of the most common cancers in the world, behind lung, breast and prostate, and was the most common cause of cancer death in the US in the first half of the 20th

22 Borger DR, et al. (2012) Frequent Mutation of Isocitrate Dehydrogenase (IDH)1 and IDH2 in Cholangiocarcinoma Identified Through Broad-Based Tumor Genotyping. *Oncologist* 17, 72-79.

century.[23] The rate throughout western countries has been on a consistent decline since this time, and there are currently 7.3 new cases of GC and 3.2 deaths per year per 100,000 in the US.[24] However, rates of the disease are dramatically higher in parts of Asia. Japan has the highest rate of gastric cancer in the world at 85.3 per 100,000 (non-age adjusted). Rates are also high in China (29.7) and Korea (64.4). The number one risk factor for the development of GC is *H. pylori* infection, which is associated with a six-fold higher risk GC.[25] Other risk factors include smoking and diets rich in preserved meats and vegetables. All of these factors are more common in Asia compared to the West.

The five-year survival rate for GC is 30%, but as low as 5% for metastatic disease.[26] Early stage disease can frequently be treated surgically or with radiation, but metastatic disease typically requires combination chemotherapy starting with cisplatin and 5-fluorouracil or derivatives (doublet chemotherapy). This may be expanded to irinotecan or docetaxel-based combinations in later lines.

Herceptin is approved for the treatment of HER2+ GC, which constitutes roughly 20% of advanced disease cases. It is associated with a 47% overall response rate (compared to 35% with chemotherapy alone) and 2.5 month survival benefit (HR=0.73, p=0.0038) in the first line when combined with doublet chemotherapy. By comparison, EGFR inhibitors appear to be contraindicated for gastric cancer, despite a correlation with prognosis:[27] trials of cetuximab and panitumumab showed lower overall survival in the active arms.[28] Lapatinib has failed to show a statistically significant improvement in overall survival but has shown an improvement in overall response rate when combined as a second line therapy in HER2+ GC (27% vs 9%, p<0.001).[29]

The only other targeted therapies approved by the FDA for gastric cancer are the VEGF inhibitor Cyramza (ramucirumab, Eli Lilly) and the PD-1 inhibitor Keytruda (pembrolizumab, Merck). Keytruda was only recently approved (in September 2017), and only for third-line therapy, although we expect a label expansion into earlier lines in the future. There is an ongoing first-line Phase III trial. Also, the PD-1 inhibitor Opdivo (nivolumab, Bristol-Myers Squibb) has a NDA submitted for gastric cancer. There is significant development interest for this indication both in the US and in Asia. There are currently 72 industry sponsored clinical trials registered on clinicaltrials.gov enrolling in the US, and 39, 20, and 34 in China, Japan, and Korea respectively.

Other clinical results

Phase II breast cancer study

The largest clinical validation of varlitinib to date comes from a Phase II study of the drug in breast cancer which the company presented in February 2017. The study enrolled 50 HER2+ patients that had previously progressed on Herceptin. The study consisted of two arms that compared varlitinib combined with capecitabine verses lapatinib and capecitabine. The study did not result in a statistically significant increase in the endpoints of overall survival or progression free survival (and neither value was reported by the company). There were trends toward increased responses in the

23 CDC

24 SEER

25 Helicobacter and Cancer Collaborative Group (2001) Gastric cancer and Helicobacter pylori: a combined analysis of 12 case control studies nested within prospective cohorts. *Gut* 49, 347-353

26 American Cancer Society

27 Nicholson RI, et al. (2001) EGFR and cancer prognosis. *Eur. J. Oncol.* 37, s4 9-15.

28 Kanat O, et al. (2015) Targeted therapy for advanced gastric cancer. *World J. Gastrointest. Oncol.* 7, 401-410.

29 Bang YJ. (2013) A randomized, open-label, phase III study of lapatinib in combination with weekly paclitaxel versus weekly paclitaxel alone in the second-line treatment of HER2 amplified advanced gastric cancer (AGC) in Asian population: Tytan study. *J. Clin. Oncol.* 31, 11.

varlitinib arm and patients experienced increased tumour shrinkage (36.4% vs 17.8%, p=0.075) and a higher overall response rate (60% vs 46%, p not reported). Although this study failed to statistically demonstrate superiority to lapatinib, a key take-away is that varlitinib appeared to show at least as much (and potentially more) activity as lapatinib, and we can therefore conclude that varlitinib should have meaningful efficacy in humans. Additionally, ASLAN reported that the rate of grade 3 diarrhoea was 12.5% (no cases of grade 4 were observed). This is comparable to previous studies of lapatinib + capecitabine (14%) and capecitabine alone (10%). This puts varlitinib in a similar profile to other TKIs, as opposed to dramatically higher rates of diarrhoea for the pan-HER inhibitor Nerlynx (40% grade 3).

Exhibit 5: Comparison of varlitinib and lapatinib in second line breast cancer

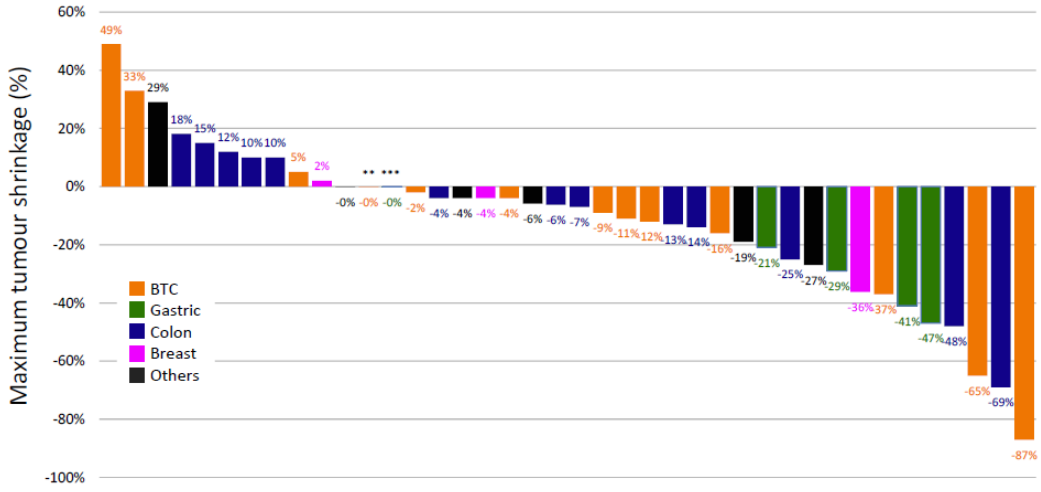
	ASLAN study			Tykerb pivotal Phase III		
.	Varlitinib + capecitabine	Lapatinib + capecitabine	p	Lapatinib + capecitabine	Capecitabine	p
n	50 total			198	201	
Tumour shrinkage	36.40%	17.80%	0.075			
ORR	60%	46%		23.7%	13.9%	0.017
PFS	N/R	N/R		27.1	18.6	0.00013
OS	N/R	N/R		75.0	64.7	0.21
Diarrhoea grade ≥ 3	12.50%	N/R		14%	10%	

Source: ASLAN, Tykerb label, Cameron et al.[30] Note: N/R=not reported.

Phase I all-comers studies

ASLAN has a series of two ongoing exploratory dose-ranging studies investigating varlitinib for the treatment of an array of solid tumours (the difference between these studies being primarily the combination chemotherapies on the protocol). These studies are very important for the direction of the company because they provided insight into the array of indication varlitinib could have potential efficacy. The company has reported the results from the first 40 patients to complete six cycles of therapy (approximately six months) from these studies. The study showed 20 partial responses and 73% stable disease overall. This level of disease control is very encouraging, as the majority of these patients had had two prior lines of therapy, there was no pre-screening for the status of EGFR or HER2 expression status, and the varlitinib dosing was not optimised (300-500mg).

Exhibit 6: Waterfall of Phase I tumour responses



Source: ASLAN

30 Cameron D, et al. (2010) Lapatinib Plus Capecitabine in Women with HER-2–Positive Advanced Breast Cancer: Final Survival Analysis of a Phase III Randomized Trial. *The Oncologist* 15, 924-934.

Ongoing clinical studies

The company is currently sponsoring no less than 10 ongoing clinical trials (Exhibit 7). The company's most advanced clinical programme is the pivotal clinical trial for second line BTC (Treetopp). The 120-person trial is not of the traditional pivotal study design and will have objective response rate (ORR) as the primary end point, which the company indicates was chosen following guidance from the FDA. This is in contrast to the more common progression free survival or overall survival end points (although these will also be measured). This is likely in response to the exceptional difficulty in designing a clinical trial for an indication with such a short expected period of survival. Results are expected in 2019. The company is also investigating BTC in the first line setting in a Phase Ib study. Also recently, following discussions with the Chinese FDA, the company expanded a Phase IIa programme in China into a pivotal trial for approval there (more details such as total enrolment to be announced). Other BTC trials are early stage and are investigating varlitinib in other chemotherapy combinations or as a monotherapy.

In addition to the BTC trials, the company also has an ongoing Phase II/III GC trial. This study will provide an interim readout on the 40 patients from the Phase II portion in 2018, after which the programme will expand into a Phase III with OS as the primary end point. Patients in this trial will be selected on the basis of their EGFR and HER2 expression status, and will only enrol patients with EGFR and HER2 expression but not HER2 amplification. This class of patients do not otherwise undergo treatment with Herceptin.

Finally, the company announced in September 2017 that a Phase Ib investigator-sponsored study examining varlitinib for the treatment of hepatocellular carcinoma (HCC) had been initiated. There is little in-human data regarding targeting ErbB receptors for HCC (a previous trial saw no benefit in OS or PFS from erlotinib),[31] and we see this trial as largely exploratory.

Exhibit 7: Varlitinib clinical trials

Target	Stage	Location	Enrolment	Next readout	Regimen	Primary end point
2nd line BTC (TreeTopp)	Pivotal	US, Japan, China, Asia Pac	120	2019	varlitinib + cap vs cap	ORR
1st line EGFR/HER2+ GC	Phase II/III	China, EU, and Asia Pac	40	2018	varlitinib + mFOLFOX6 vs mFOLFOX6	OS
2nd line BTC	Pivotal*	China	*	2018	varlitinib + cap	ORR
1st line BTC	Phase II		40	2020	varlitinib + cap	ORR
2nd line BTC	Phase IIa	Korea, Singapore, Taiwan	25	2017	monotherapy	ORR
1st line BTC	Phase Ib/II	Korea, Singapore, Taiwan	175	2018	varlitinib + gem + cis	ORR
Adjuvant BC	Phase I/II	Singapore	55	2018	Varlitinib + carb + pac	CRR
2nd line HER3+ HCC	Phase Ib	Singapore			monotherapy	MTD
Doublet therapy dosing	Phase Ib	Taiwan	42	2017	varlitinib + cis + 5-FU or varlitinib + cis + cap	DLT
Solid tumours	Phase Ib	Singapore	18	2018	varlitinib + mFOLFOX6 or varlitinib + cap + ox	MTD
Solid tumours/BTC	Phase I	Japan	42	2017	monotherapy, varlitinib + cap	DLT
HER2+ BC brain metastasis	Pilot	Singapore			Varlitinib + cap	

Source: ASLAN, clinicaltrials.gov. Note: *Started as 25 person Phase IIa, expanding into pivotal trial, BC=breast cancer, BTC=biliary tract cancer, GC=gastric cancer, cap=capecitabine, mFOLFOX6 = 5-fluorouracil + leucovorin + oxaliplatin, gem=gemcitabine, cis=cisplatin, carb=carboplatin, pac=paclitaxel, 5-FU=5-fluorouracil, ox=oxaliplatin, HCC=hepatocellular carcinoma, ORR=objective response rate, OS=overall survival, MTD=maximum tolerated dose, DLT=dose limiting toxicities.

ASLAN003: reversing AML

ASLAN are currently investigating ASLAN003 (formerly LAS186323) for the treatment of acute myeloid leukaemia (AML) and has planned a Phase II clinical trial. ASLAN licensed global rights to the drug from Almirall in 2012 and renegotiated in 2016 to include global rights. The agreement

31 Zhu AX, et al. (2015) SEARCH: A Phase III, Randomized, Double-Blind, Placebo-Controlled Trial of Sorafenib Plus Erlotinib in Patients With Advanced Hepatocellular Carcinoma. *J. Clin. Oncol.* 33, 559-566.

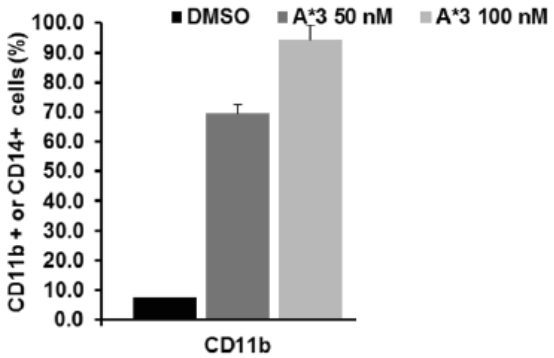
includes undisclosed milestones and royalties. The drug will have composition of matter protection through 2032 (after expected patent term extensions).

ASlAN003 is an inhibitor of dihydroorotate dehydrogenase (DHODH), the rate limiting enzyme in the biosynthesis of pyrimidines. DHODH inhibitors have previously been investigated for immunomodulatory properties, although the mechanism is not entirely understood. Arava (leflunomide) and Aubagio (teriflunomide) are DHODH inhibitors, both owned by Sanofi, which have been approved for rheumatoid arthritis and multiple sclerosis respectively. They are thought to work by selectively preventing growth of quickly dividing lymphoid cells, which depend more on DHODH than other tissues.[32] ASLAN003 was initially licensed by ASLAN with the intent on pursuing the drug for rheumatoid arthritis, and the company performed two Phase I trials of this molecule in healthy patients (although the detailed results have not been released).

Interestingly, there is an increasing body of evidence the DHODH inhibition could be effective for the treatment of cancer. First there is a reasonable expectation that the same inhibition of growth seen in other rapidly dividing cells would extend to cancer. Pyrimidine biosynthesis has been identified as an adaptive response to the DNA damage associated with chemotherapy in breast cancer cells.[33] DHODH appears to be the rate limiting enzyme for the growth of PTEN mutated cancer cells,[34] which is common in an array of tumours.[35]

But DHODH is also implicated in the differentiation of cancer cells. DHODH inhibitors are potent teratogens in animal models and inhibition of DHODH is associated with abnormal development of the neural crest. This same mechanism was found to inhibit the growth of melanoma cells.[36] Subsequently it was found that DHODH inhibition could induce the differentiation AML blasts into normal blood cells in mouse models, and this translated into increased survival.[37] The company announced in June 2017 that it had replicated this result, and that ASLAN003 induced the differentiation of AML cell lines in a preclinical study (Exhibit 8). The company has initiated a Phase II study of the molecule for AML in late 2017. To our knowledge it is the only DHODH inhibitor in development for cancer.

Exhibit 8: ASLAN003 induces differentiation in AML cell lines



Source: ASLAN. Note: A*3=ASLAN003, AML blast differentiation measured by presence of CD11b or CD14 as markers of differentiation.

32 Bar-Or A, et al. (2014) Teriflunomide and its mechanism of action in multiple sclerosis. *Drugs*. 74, 659-674.

33 Brown KK, et al. (2017) Adaptive Reprogramming of De Novo Pyrimidine Synthesis Is a Metabolic Vulnerability in Triple-Negative Breast Cancer.

34 Mathur D, et al. (2017) PTEN Regulates Glutamine Flux to Pyrimidine Synthesis and Sensitivity to Dihydroorotate Dehydrogenase Inhibition.

35 Yen Y and Shen WH (2008) PTEN: a new guardian of the genome. *Oncogene* 27, 5443-5453.

36 White RM, et al. (2011) DHODH modulates transcriptional elongation in the neural crest and melanoma. *Nature* 471, 518-522. *Cancer Disc.* 7, 1-9.

37 Sykes DB (2016) Inhibition of Dihydroorotate Dehydrogenase Overcomes Differentiation Blockade in Acute Myeloid Leukaemia. *Cell* 167, 171-186. *Cancer Disc.* 7, 380-390.

There are approximately 21,380 patients with AML in the US (4.2/100,000) according to SEER data, and a similar incidence rate in Europe. Historically, it has been very difficult to develop new treatments for this disease, although recently there have been a series of new approvals: Vyxeos (daunorubicin and cyterabine liposomes, Jazz), Rydapt (midostaurin, Novartis), Idhifa (enasidenib, AbbVie), and the reapproval of Mylotarg (gemtuzumab ozogamicin, Pfizer), all in 2017. Additionally, AML has always been an area of intense clinical development and there are currently 31 industry sponsored Phase III clinical trials on clinicaltrials.gov.

Other assets

ASLAN004

ALSAN004 is a monoclonal antibody directed against the interleukin 13 receptor α 1 (IL13Rα1), a receptor for interleukins 4 and 13 (IL-4 and IL-13). ASLAN licensed the asset in 2014 from CSL, and recently secured manufacturing for the drugs to enable progress into clinical trials. IL-4 and IL-13 underlie an array of inflammatory disorders, but are of particular importance in the pathophysiology of allergy and asthma. The receptor targeted by ASLAN004, IL13Rα1, is present on the surface of macrophages and regulates the balance between their pro-inflammatory (M1) and anti-inflammatory (M2) subtypes. ASLAN has announced that it intends to start a Phase I clinical trial of ASLAN004 in 2018, and that it is exploring the drug for the treatment of both inflammatory disorders and cancers with macrophage driven pathology such as cutaneous T-cell lymphoma. Sanofi recently got a similar drug approved, Dupixent (dupilumab), which inhibits IL4Rα, a protein in the same receptor complex as IL13Rα1. The drug is approved for atopic dermatitis and is in Phase III for asthma.

ASLAN002 and ASLAN005

Aslan previously licensed AsiaPac rights to the c-MET and RON inhibitor ASLAN002 from Bristol-Myers Squibb, and advanced the drug through Phase I. The company was able to demonstrate that the drug altered biomarkers for bone turnover in cancer patients and may prevent cancer mediated bone loss.[38] This is a process mediated by the secretion of macrophage stimulating protein (MSP) from certain cancers, for which RON is the receptor on an array of tissues. MSP is also implicated in supressing the immune response in these tumours by preventing macrophage engagement. After this trial was complete, Bristol-Myers Squibb exercised an option to reacquire global rights to the drug for $10m and future milestones in July 2016.

Recognising the potential for RON inhibition both for the prevention of cancer driven osteoporosis and macrophage activation, ASLAN in-licensed the RON inhibitor ASLAN005 from Singapore's Agency for Science, Technology and Research in 2016. The drug is in preclinical development.

Sensitivities

The hurdles that ASLAN faces are typical for a development stage pharmaceutical company and are largely clinical in nature. Varlitinib is currently being progressed for BTC and GC, and efficacy in these indications has not been established to a level of statistical certainty. However, the compound appears to be active and the mechanism of action is well understood. Other drugs targeting EGFR/HER2 in these indications have had mixed results and it is unclear at this time how much pan-HER activity will improve outcomes. BTC is an exceptionally aggressive disease, and it is likely that this has complicated the results in previous clinical trials. This risk is offset in part because of

38 Andrade K, et al. (2017) RON kinase: A target for treatment of cancer-induced bone destruction and osteoporosis. *Science. Trans. Med.* 9, eaai9338.

the acceptance by the FDA to take response rates in lieu of survival end points for the current study. ASLAN003 is higher risk, because targeting DHODH for AML has not been previously tested in the clinic. A number of treatments for AML have recently been developed, but historically, there have been significant difficulties developing drugs for this indication. ASLAN also faces a degree of commercial risk. There are a large number of ongoing clinical trials for BTC, GC, and AML, which may increase competition in the future. Finally, the company will require at least NT$2.5bn in additional capital to reach profitability, and if the company is not able to meet these needs through the licensing of its assets in certain territories, it may require other dilutive forms of financing.

Valuation

We arrive at an initial valuation of NT$9.5bn or NT$72.87 per share based on a risk-adjusted NPV analysis of the commercialisation potential of ASLAN's assets. Our model is based on certain assumptions regarding these assets, the target markets, and the eventual parameters of commercialisation. We use a 12.5% discount rate, which is our standard for pre-commercial companies, through expected patent expiration. We acknowledge that the company intends to out-license these assets in certain territories, but our valuation incorporates commercialisation details to encapsulate the value to any potential partners. We currently only include varlitinib, ASLAN003, and royalties from ASLAN002 in our model, although we may add further assets to our calculations as they enter the clinic.

For illustrative purposes we group our valuation into regions: US + Europe (considering the EU 28), and Asia, in which we model Japan, Korea, and China. For China in particular, we only consider persons covered under the urban insurance schemes (roughly 35% of the population) to be a viable market. We assume these countries will all have lower prices than the US: 40% lower for Europe, 50% lower for Japan and Korea, and 80% lower in China; after which we assume 30% reduction in net sales for discounts. For each asset we assume a COGS of 15%, which includes a 5% manufacturing cost and 10% in assumed royalties to partners. We assume a cost of selling of 10% plus $5m in fixed costs per year, per region.

Exhibit 9: Valuation assumptions

Drug	Indication	Clinical trial patients	Development $/patient	US launch pricing	Penetration
Varlitinib	BTC	120	$75k	$16,000 x 4 mo.	50%, 25% in China
	GC	415	$75k	$16,200 x 9 mo.	30%, 20% in China
ASLAN003	AML	240	$100k	$110,000/course	10%
ASLAN002	BC	N/A	N/A	$16,600 x 7 mo.	15%
	GC	N/A	N/A	$16,600 x 7 mo.	20%

Source: Edison Investment Research

We have assigned a 30% probability of success for varlitinib in BTC and a 20% probability of success for GC. Response rates for BTC were encouraging from the Phase Ib clinical trial and all comers studies compared to historical controls, and we are encouraged by the FDA's acceptance of response rate for the end point of the pivotal clinical trial. This is balanced by historical difficulty in this indication and previous failures of all ErbB receptor targeting drugs. Currently, there are no data to support the specific indication of first line GC in EGFR/HER2 expressing (but not amplified) tumours, as results in GC from the all comers trial may have been driven by HER2 over-expressors, where Herceptin is already approved.

We assume a launch pricing for varlitinib in the US of around $16,000 per month, which is approximately a 50% premium over the median solid tumour cancer drugs (adjusted for 2% per year price growth). We believe that this premium is justified based on the limited availability of treatment options and the expected short duration of treatment, especially for BTC at only four months. We believe that the high unmet medical need will drive high penetration of up to 50% for

BTC. We forecast lower penetration in China than other regions due to the increased reliance on cash for medical expenses in that region. We assume royalties of 20% from Hyundai for the commercialisation of the drug in Korea. We also assume a lower than average development cost for varlitinib at $75,000 per patients due to the availability of Asian patients for these indications, and $40,000 per patient for the Chinese pivotal trial. We currently model that only a single pivotal trial will be needed for BTC approval (two for GC), although this will depend on the totality of the data from the ongoing study. If we amend this in the future this would result in a delay in approval to approximately 2022, and $9m in additional clinical trial expense. We currently do not include treatment in the first line setting in our model, although we may add this following the results from the first line BTC study expected in 2018.

Our probability of success for ASLAN003 is low at 10% because of the untested mechanism of action for this compound. We only model commercialisation of ASLAN003 in the US and Europe, because lower rates of AML in Asia limit its market in these regions, and the resulting value at this stage. However, we may include Asian commercialisation at a later date as the programme progresses. We model the market being first-line patients unfit for other treatment with a launch pricing of $110,000 per course (at launch in 2024, similar to Idhifa, adjusted for price growth), although details such as the precise target demographic and treatment duration are currently unknown, so these details may change. We model clinical trial sizes based on recent approvals.

We model ASLAN002 for the purposed of calculating royalties, which we assume at 5% of sales, and we conservatively only model royalties from sales in the US and Europe. We also include three milestones triggered at Phase III results ($10m), approval ($20m), and $500m in sales ($20m)

Exhibit 10: Valuation of ASLAN

Program	Indication	Region	Clinical stage	Prob. of success	Launch year	Peak sales ($m)	Margin/royalties	rNPV (NT$m)
Varlitinib	2nd line BTC	US + Europe	Phase II/III	30%	2020	267	59%	3,236
		East Asia	Phase II/III	30%	2020	195	53(58%	1,986
		R&D						(349)
	1st line GC	US + Europe	Phase II/III	20%	2021	175	57%	841
		East Asia	Phase II/III	20%	2021	302	54(60%	1,430
		R&D						(243)
ASLAN003	1st line AML	US + Europe	Phase II	10%	2022	296	59%	1,011
		R&D						(147)
ASLAN002 Royalties	1st line BC + GC	US + Europe	Phase II	15%	2022	876	5%	456
Unallocated costs								(586)
Total								7,635
Net cash and equivalents (Q217) ($m)								1,847
Total firm value ($m)								9,482
Total basic shares (m)								130.1
Value per share ($)								72.87

Source: ASLAN reports, Edison Investment Research

Financials

ASLAN reported a comprehensive loss of NT$270m for Q217, driven primarily by R&D spending of NT$210m. We expect this R&D spending to continue to increase to NT$869m in 2017 and NT$880m in 2018 with the progress of the varlitinib and ASLAN003 clinical trials. We also expect the company to initiate the Phase I clinical study of ASLAN004 during this period, and we may increase our R&D spending estimates if the company progresses this programme to Phase II as well. The company had NT$373m in revenue in 2016 associated with the licensing deals with Hyundai Pharm and Bristol-Myers Squibb. The company ended Q217 with NT$2.12bn in cash and equivalents. The company has a loan of SG$10m (NT$272m) from the Singapore Economic Development Board (6%, 25% repayable on a licensing and 100% repayable on a Phase III approval). The company has enough cash to provide a runway into 2019, through the expected

Phase II readouts for BTC and GC in 2018. We expect the company to seek out-licensing partners for varlitinib in Japan and the EU at that time, which will significantly offset future cash flow needs, although in lieu of this deal we record NT$2.5bn in illustrative debt to account for future development costs. We may adjust these financing schedules in the future to reflect other clinical or business development activities.

Exhibit 11: Financial summary

NT$k	2015	2016	2017e	2018e	2019e
Year end 31 December	IFRS	IFRS	IFRS	IFRS	IFRS
INCOME STATEMENT					
Revenue	0	373,018	0	0	0
Cost of Sales	0	(4,038)	0	0	0
Gross Profit	0	368,980	0	0	0
R&D	(210,471)	(425,296)	(869,061)	(880,446)	(752,365)
SG&A	(223,690)	(224,721)	(244,442)	(249,331)	(861,517)
EBITDA	(384,537)	(232,716)	(1,081,990)	(1,097,864)	(1,581,969)
Normalised operating profit	(386,191)	(235,167)	(1,080,243)	(1,096,517)	(1,580,622)
Amortisation of acquired intangibles	0	0	0	0	0
Exceptionals	0	0	0	0	0
Share-based payments	(47,970)	(45,870)	(33,260)	(33,260)	(33,260)
Reported operating profit	(434,161)	(281,037)	(1,113,503)	(1,129,777)	(1,613,882)
Net Interest	(33,376)	(16,932)	(12,512)	(12,512)	(12,512)
Joint ventures & associates (post tax)	0	0	0	0	0
Exceptionals	16,910	5,644	0	0	0
Profit Before Tax (norm)	(402,657)	(246,455)	(1,092,755)	(1,109,029)	(1,593,134)
Profit Before Tax (reported)	(450,627)	(292,325)	(1,126,015)	(1,142,289)	(1,626,394)
Reported tax	0	0	0	0	0
Profit After Tax (norm)	(402,657)	(246,455)	(1,092,755)	(1,109,029)	(1,593,134)
Profit After Tax (reported)	(450,627)	(292,325)	(1,126,015)	(1,142,289)	(1,626,394)
Minority interests	0	0	0	0	0
Discontinued operations	0	0	0	0	0
Net income (normalised)	(402,657)	(246,455)	(1,092,755)	(1,109,029)	(1,593,134)
Net income (reported)	(450,627)	(292,325)	(1,126,015)	(1,142,289)	(1,626,394)
Basic average number of shares outstanding (m)	55	105	124	130	137
EPS - basic normalised (NT$)	(7.32)	(2.35)	(8.81)	(8.52)	(11.66)
EPS - diluted normalised (NT$)	(7.32)	(2.35)	(8.81)	(8.52)	(11.66)
EPS - basic reported (NT$)	(8.19)	(2.78)	(9.08)	(8.77)	(11.90)
Dividend (NT$)	0.00	0.00	0.00	0.00	0.00
BALANCE SHEET					
Fixed Assets	5,200	19,201	20,527	20,527	20,527
Intangible Assets	430	2,727	2,727	2,727	2,727
Tangible Assets	2,919	12,437	12,437	12,437	12,437
Investments & other	1,851	4,037	5,363	5,363	5,363
Current Assets	890,962	1,718,671	1,688,397	594,490	1,593,447
Stocks	0	0	0	0	0
Debtors	0	41,867	0	0	0
Cash & cash equivalents	889,728	1,673,906	1,685,499	591,592	1,590,549
Other	1,234	2,898	2,898	2,898	2,898
Current Liabilities	(65,984)	(123,061)	(177,861)	(180,471)	(260,050)
Creditors	(33,043)	(123,061)	(177,861)	(180,471)	(260,050)
Tax and social security	0	0	0	0	0
Short term borrowings	0	0	0	0	0
Other	(32,941)	0	0	0	0
Long Term Liabilities	(2,066,865)	(269,692)	(282,204)	(294,716)	(2,807,228)
Long term borrowings	(279,491)	(269,692)	(282,204)	(294,716)	(2,807,228)
Other long term liabilities	(1,787,374)	0	0	0	0
Net Assets	(1,236,687)	1,345,119	1,248,859	139,830	(1,453,304)
Minority interests	0	0	0	0	0
Shareholders' equity	(1,236,687)	1,345,119	1,248,859	139,830	(1,453,304)
CASH FLOW					
Op Cash Flow before WC and tax	(384,537)	(232,716)	(1,081,990)	(1,097,864)	(1,581,969)
Working capital	(6,269)	48,749	96,667	2,609	79,579
Exceptional & other	16,848	3,184	(9,019)	(9,817)	(9,817)
Tax	0	0	0	0	0
Net operating cash flow	(373,958)	(180,783)	(994,341)	(1,105,072)	(1,512,208)
Capex	(1,095)	(12,094)	(1,747)	(1,347)	(1,347)
Acquisitions/disposals	0	(2,627)	0	0	0
Net interest	0	0	0	0	0
Equity financing	1,053,660	1,031,496	996,495	0	0
Dividends	0	0	0	0	0
Other	(260)	(2,186)	(1,326)	0	0
Net Cash Flow	678,347	833,806	(919)	(1,106,419)	(1,513,555)
Opening net debt/(cash)	53,083	(610,237)	(1,404,214)	(1,403,295)	(296,876)
FX	(15,027)	(37,794)	0	0	0
Other non-cash movements	0	(2,035)	0	0	0
Closing net debt/(cash)	(610,237)	(1,404,214)	(1,403,295)	(296,876)	1,216,679

Source: ASLAN reports, Edison Investment Research

Contact details	Revenue by geography
83 Clemenceau Avenue #12-03 UE Square Singapore 239920 +65 6222 4235 http://aslanpharma.com	N/A

Management team

Chairman and CEO: Carl Firth	CMO: Bertil Lindmark
Dr Firth co-founded ALSLAN in 2010 and served as its CEO since inception. Previously, he was head of Asia Healthcare at Bank of America Merrill Lynch, supporting public and private financing of healthcare companies across the region and advising on M&A transactions. Prior to joining the banking industry, Carl worked for AstraZeneca for 10 years in various commercial and R&D roles, including regional business development director, Asia Pacific, and director of new product development, China.	Dr Lindmark has been at ASLAN since 2015. He was previously executive director of research and development and member of the board of directors at Almirall, a European pharmaceutical company with global reach, where he led the global R&D team of more than 500 R&D staff across three sites, focusing on respiratory, gastrointestinal, dermatology and neuroscience. He secured EU and US approval of several important new drugs, including Eklira/Tudorza, Constella and Eklira/formoterol, and was instrumental in the US$2bn sale of Almirall's respiratory franchise to AstraZeneca.
COO: Mark McHale	**CBO: Jeff Tomlinson**
Dr McHale is one of the co-founders of ASLAN. Previously, he was head of molecular sciences at AstraZeneca Respiratory & Inflammation, and in this role supported small molecule and therapeutic antibody projects from target identification to Phase 2a. Mark was a core member of the respiratory strategy research team for five years and personally led all new target identification in asthma. In 2006, he led a US$136m investment in the AZ/Dynavax collaboration to produce inhaled TLR9 agonists for the treatment of asthma and led preclinical/ Phase 1 projects.	Jeff Tomlinson is also a co-founder of ASLAN Pharmaceuticals. He held multiple senior business development roles including chief business officer at Active Pass Pharmaceuticals, Senior VP business development at Pharmacopae Biosciences and director of business development for GeneLogic. Jeff was at GlaxoSmithKline (UK and US) for five years as international research project management and technical sales.

Principal shareholders	(%)
Alnair Investment	6.78
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Chih-I Hsieh	0.04

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

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

New York +1 646 653 7026
295 Madison Avenue, 18th Floor
10017, New York
US

Sydney +61 (0)2 8249 8342
Level 12, Office 1205
95 Pitt Street, Sydney
NSW 2000, Australia