EDISON

NeuroVive Pharmaceutical

Company update

Two new trials and likely out-licensing in 2018

Pharma & biotech

NeuroVive has made progress on multiple fronts over the past few months with both its core asset portfolio and non-core projects for out-licensing. Notable developments in the core portfolio include positive feedback from the EMA on the next Phase IIb trial with NeuroSTAT (traumatic brain injury, TBI) and orphan drug designation for KL1333 (genetic mitochondrial diseases) in Europe. Also, the lead compound has been selected in the NVP015 programme for genetic mitochondrial diseases with complex I dysfunction. In addition, investors had a first glimpse of the preclinical data on NVP022, which, together with NV556, targets NASH and both are in portfolio for out-licensing. Our valuation is SEK1.38bn or SEK26.3/share (vs SEK27.0/share previously).

Year end	Revenue (SEKm)	PBT* (SEKm)	EPS* (SEK)	DPS (SEK)	P/E (x)	Yield (%)
12/15	2.5	(89.6)	(3.00)	0.0	N/A	N/A
12/16	0.0	(70.7)	(1.72)	0.0	N/A	N/A
12/17e	0.6	(75.7)	(1.61)	0.0	N/A	N/A
12/18e	0.6	(92.2)	(1.80)	0.0	N/A	N/A

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

Developing Phase IIb design for NeuroSTAT

NeuroVive has recently received positive EMA feedback on the design of the upcoming Phase IIb study with NeuroSTAT. In our view, the design of a trial involving brain trauma patients is somewhat unique, as TBIs tend to be very diverse in presentation. The challenge here is to select relevant patient subpopulation, as homogenous as possible, to capture NeuroSTAT's efficacy, while at the same time reflecting real world practice. NeuroVive has been working on inclusion criteria and end points to evaluate NeuroSTAT's efficacy in improving TBI outcomes. Feedback from both the EMA and the FDA is crucial in this setting, in our view. The recently announced collaboration with the University of Florida to develop biofluid-based biomarkers in TBI should also add to robustness to the clinical trial design.

KL1333 granted orphan drug designation

KL1333 has received orphan drug designation in MELAS in Europe after positive opinion from the EMA in November 2017. The designation would allow for 10 years of market exclusivity, among other benefits. NeuroVive plans to initiate a Phase Ib trial in 2018. The company's partner, Yungjin Pharm, which initiated its own Phase I trial with KL1333, reported that the first part had been completed successfully with PK data in line with expectations and no serious side effects.

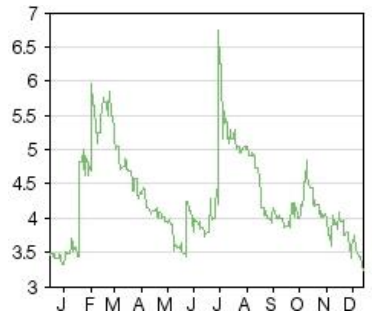
Valuation: rNPV SEK1.38bn or SEK26.3/share

We value NeuroVive at SEK1.38bn or SEK26.3/share vs SEK1.39bn or SEK27.0/share previously. Positive effects from rolling our model forward and US$/SEK exchange rate were offset by a lower net cash and a small modification of our NVP015 project. NeuroVive's initiation of the Phase IIb trial with NeuroSTAT and initiation of a Phase I study with KL1333 in Europe and/or the US (Yungjin is running a Phase I study in South Korea) are the near-term R&D-related events. Potential out-licensing of NV556 could be a substantial trigger for the share price.

14 December 2017

Price	**SEK3.24**
Market cap	**SEK170m**
	SEK8.47/US$
Net cash (SEKm) at end-Q317 + SEK5.3m raised in November 2017	40.7
Shares in issue (including November issue)	52.3m
Free float	80%
Code	NVP
Primary exchange	Nasdaq Stockholm
Secondary exchange	OTCQX

Share price performance



%	1m	3m	12m
Abs	(17.8)	(15.8)	(6.4)
Rel (local)	(17.9)	(17.7)	(12.9)
52-week high/low	SEK6.8	SEK3.2	

Business description

NeuroVive Pharmaceutical is a Swedish biopharmaceutical company with deep expertise in mitochondrial medicine. It employs a dual strategy: it develops a core portfolio of assets for orphan diseases and seeks to out-license proprietary products for non-orphan indications. NeuroSTAT (neurotrauma, Phase IIb ready) and KL1333 (mitochondrial diseases) are the most advanced assets.

Next events

Start of NeuroVive's Phase Ib with KL1333	2018
NeuroVive initiation of NeuroSTAT Phase IIb	H218
Out-licensing deal for NV556	2018

Analyst

Jonas Peciulis +44 (0)20 3077 5728

healthcare@edisongroup.com

Edison profile page

Targeting NASH with NV556 and NVP022

NV556 – a novel cyclophilin inhibitor

NeuroVive is finalising a preclinical data package and has recently reiterated that a potential out-licensing deal could happen around mid-2018. NV556 is a novel cyclophilin inhibitor originating from NeuroVive's sangamide class compounds, which are derivatives of sanglifehrin that inhibit cyclophilin. According to findings by NeuroVive and other researchers, cyclophilin inhibition in NASH can be beneficial in three ways:

- **Direct antifibrotic effect** on collagen synthesis and export due to cyclophilin B inhibition.
- **Preservation of liver cell mitochondrial integrity** by inhibiting mitochondrial cyclophilin D.
- **Anti-inflammatory effect** in liver fibrosis via CD147 due to cyclophilin A inhibition.

In preclinical models, NV556 appears to target fibrosis specifically and prevent liver tumour development, while metabolic and inflammatory biomarkers were not affected in the STAM model, but liver enzymes improved in the MCD model (both mice models are widely used for NASH studies). We provided a more detailed discussion about NV556 in our initiation report.

NVP022 – protonophore, 'mild' mitochondrial uncoupler

Until recently, few details had been disclosed about NVP022, one of the early projects in the portfolio for out-licensing. It had been reported simply that it targeted NASH, but via a completely different mitochondrial metabolic pathway and could be complementary to NV556. The new data were presented at the Liver Meeting organised by the American Association for the Study of Liver Diseases (AASLD), on 20-24 October 2017.

NVP022 is a protonophore, which acts as a 'mild' liver-targeted uncoupler. Protonophores can transport protons across mitochondria membranes and disrupt the proton gradient that is needed to produce ATP in mitochondria (we provided more detailed background about mitochondria function in our initiation report). By disrupting the proton balance, the energy is lost as heat, while lack of ATP supply forces the mitochondria respiration to increase in order to compensate the lack of ATP supply (uncoupling effect). This results in the increase in basal metabolic rate. Another known uncoupling agent, dinitrophenol (DNP), has maximum effect on mitochondrial respiration and in the past has been used for weight loss; however, it was easy to overdose it, resulting in significant risk of side effects due to inefficient ATP production and overheating.

Mitochondrial protonophores have been shown in the past to positively affect NASH and diabetes biomarkers. To overcome this undesirable maximum uncoupling effect, NeuroVive modelled NVP022, which is a 'mild' uncoupler and delivered primarily to the liver, limiting exposure to other organs. The new preclinical *in vitro* data show that NVP022 has a mild uncoupling effect specifically in liver cells and *in vivo* studies show that the drug is efficiently transported to the liver. Next steps are animal efficacy studies.

Financials and valuation

NeuroVive's Q317 results were largely in line with our expectations. R&D-related expenses during 9M17 were SEK22.8m, while total operating costs were SEK56.8m. We estimate full 2017 R&D costs at SEK31.4m with total opex landing at SEK75.7m. NeuroVive's cash was SEK35.4m at end-Q317 (no debt). On 3 November 2017, NeuroVive announced a private placement of SEK5.3m with Floyd Associates Europe Limited. The SEK3/share price implied a 25% discount to the prior day's

close. While the placement was small, in our view, the key benefit was a new strategic investor coming on board, which could provide support to NeuroVive going forward.

We expect a cash positon of SEK27.9m by end-2017. NeuroVive does not provide guidance but, according to our model and based on current R&D plans, the cash reach is into Q118. We estimate that the company's need for additional funds in 2018 is around SEK64m, which we include as illustrative long-term debt in our financial forecasts. Notably, we do not take into account revenues from any potential licensing-related income in our financial forecasts. NeuroVive indicated that it will seek financing in early 2018, which could come in various forms including new capital, but also non-dilutive funding. In October 2017, NeuroVive, in collaboration with Lund University, was awarded a SEK2.5m grant for the research of NVP024 in liver cancer.

Our updated valuation of NeuroVive is marginally lower at SEK1.38bn or SEK26.3/share compared to SEK1.39bn or SEK27.0/share previously. Positive effects from rolling our model forward and beneficial US$/SEK exchange rate movements were offset by lower net cash position and a small modification of our assumptions for the NVP015 project. The latter relates to the fact that NeuroVive recently guided that the expected launch in the US and European markets is in 2024, while we previously assumed it would be in 2023. We therefore delayed the launch to 2024. We maintain all our other R&D assumptions, as described in our initiation report. As previously, in our valuation we include the clinical-stage NeuroSTAT (traumatic brain injury) and KL1333 (genetic mitochondrial disorders) and the advanced preclinical products. We exclude NVP025 (mitochondrial myopathy) and NVP022 (NASH) for the time being as both are at an early stage.

Exhibit 1: NeuroVive sum-of-the parts valuation

Product	Launch	Peak sales* ($m)	NPV ($m)	NPV/share ($)	Probability	rNPV ($m)	rNPV/share ($)
NeuroSTAT	2024	454	304.1	5.8	15%	36.3	0.7
KL1333	2023	574	587.0	11.2	10%	53.5	1.0
NVP015	2024	875	737.1	14.1	5%	28.7	0.5
NV556	2026	1,716	179.2	3.4	8%	35.1	0.7
NVP024	2029	702	30.4	0.6	3%	5.7	0.1
Net cash			3.3	0.1	100%	3.3	0.1
Valuation			**1,841.2**	**35.2**		**162.5**	**3.1**
			SEKm	**SEK**		**SEKm**	**SEK**
NeuroSTAT			2,576.1	49.2	15%	307.6	5.9
KL1333			4,971.8	95.0	10%	452.8	8.7
NVP015			6,243.5	119.3	5%	243.3	4.7
NV556			1,518.0	29.0	8%	296.9	5.7
NVP024			257.4	4.9	3%	48.1	0.9
Net cash			27.9	0.5	100%	27.9	0.5
Valuation			**15,594.7**	**298.0**		**1,376.6**	**26.3**

Source: Edison Investment Research. Note: WACC = 12.5% for product valuations. Peak sales reached six years after launch. SEK8.47/US$ vs SEK8.09/US$ previously.

Exhibit 2: Financial summary

SEK000s	2015	2016	2017e	2018e
December	IFRS	IFRS	IFRS	IFRS
PROFIT & LOSS				
Revenue	2,502	14	576	576
Cost of Sales	0	0	0	0
Gross Profit	2,502	14	576	576
Research and development	(12,200)	(12,000)	(31,442)	(58,585)
EBITDA	(89,066)	(69,868)	(75,001)	(92,027)
Operating Profit (before amort. and except.)			(90,266)	(70,989)
Intangible Amortisation	0	0	0	0
Exceptionals	(1,200)	(1,121)	0	0
Other	0	0	0	0
Operating Profit	(91,466)	(72,110)	(75,142)	(92,185)
Net Interest	665	265	(600)	0
Profit Before Tax (norm)	(89,601)	(70,724)	(75,742)	(92,185)
Profit Before Tax (reported)	(90,801)	(71,845)	(75,742)	(92,185)
Tax	0	0	0	0
Profit After Tax (norm)	(89,601)	(70,724)	(75,742)	(92,185)
Profit After Tax (reported)	(90,801)	(71,845)	(75,742)	(92,185)
Average Number of Shares Outstanding (m)		30.1	42.0	51.4
EPS - normalised (ore)	(300.43)	(172.27)	(160.92)	(180.19)
EPS - normalised (SEK)	(3.00)	(1.72)	(1.61)	(1.80)
EPS - normalised (SEK)	(3.04)	(1.75)	(1.61)	(1.80)
Dividend per share (SEK)	0.0	0.0	0.0	0.0
Gross Margin (%)	100.0	100.0	100.0	100.0
EBITDA Margin (%)	N/A	N/A	N/A	N/A
Operating Margin (before GW and except.) (%)			N/A	N/A
BALANCE SHEET				
Fixed Assets	75,369	84,645	86,774	86,807
Intangible Assets	74,904	71,151	73,233	73,233
Tangible Assets	316	274	321	354
Investments	149	13,220	13,220	13,220
Current Assets	99,558	94,901	28,867	1,000
Stocks	0	0	0	0
Debtors	528	0	0	0
Cash	96,662	93,251	27,867	0
Other	2,368	1,650	1,000	1,000
Current Liabilities	(20,148)	(12,413)	(10,170)	(10,170)
Creditors	(20,148)	(12,413)	(10,170)	(10,170)
Short term borrowings	0	0	0	0
Long Term Liabilities	0	0	0	(64,351)
Long term borrowings	0	0	0	(64,351)
Other long term liabilities	0	0	0	0
Net Assets	154,779	167,133	105,471	13,286
CASH FLOW				
Operating Cash Flow	(67,885)	(57,614)	(65,108)	(92,027)
Net Interest	665	237	(600)	0
Tax	0	0	0	0
Capex	(245)	(139)	(187)	(190)
Acquisitions/disposals*	0	0	(11,035)	0
Financing	138,406	77,332	13,575	0
Other	(23,977)	(23,227)	(2,028)	0
Dividends	0	0	0	0
Net Cash Flow	46,964	(3,411)	(65,384)	(92,218)
Opening net debt/(cash)	(49,698)	(96,662)	(93,251)	(27,867)
HP finance leases initiated	0	0	0	0
Other	0	0	0	0
Closing net debt/(cash)	(96,662)	(93,251)	(27,867)	64,351

Source: NeuroVive's accounts, Edison Investment Research. Note: *Related to the disposal of a subsidiary in 2017, the net effect of which was neutral on cash flows.

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