hardman&co

Pharmaceuticals & Biotechnology

Source: Eikon Thomson Reuters

Market data	
EPIC/TKR	**OXB**
Price (p)	990
12m High (p)	1032
12m Low (p)	263
Shares (m)	65.7
Mkt Cap (£m)	650.4
EV (£m)	635.6
Free Float	63%
Market	LSE

Description

Oxford BioMedica (OXB) is a UK-based biopharmaceutical company specialising in cell and gene therapies developed using lentiviral vectors – gene-delivery vehicles based on virus particles. In addition to vector development and manufacture, OXB has a pipeline of therapeutic candidates and undertakes innovative pre-clinical R&D in gene-medicine.

Company information

CEO	John Dawson
CFO	Stuart Paynter
Chairman	Lorenzo Tallarigo
	+44 1865 783 000
	www.oxfordBioMedica.co.uk

Key shareholders

Directors	0.3%
Vulpes	17.7%
M&G	17.7%
Aviva	5.0%
Hargreaves Lansdown	3.7%

Diary

Aug-18	Interims

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Oxford BioMedica

Gene-therapy for Parkinson's: clinical progression

OXB is a specialist advanced-therapy lentivirus vector biopharma company. It offers vector manufacturing and development services, and also has a proprietary drug pipeline. In addition to LentiVector® service contracts, OXB receives royalties on commercial therapies developed by its partners using the LentiVector platform. A partnership deal structure was established with Novartis for Kymriah™ in 2017, and was followed by a collaboration and licence agreement with Bioverativ Inc in February 2018. The latest deal, on 6 June 2018, is the first involving OXB's proprietary platform: it will advance the Parkinson's disease gene-therapy to the clinic.

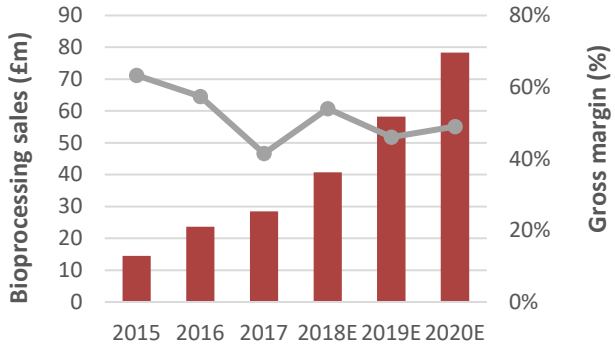
- **Strategy**: OXB has four strategic objectives: delivery of process development (PD) services that embed its technology in partners' commercial products; commercial manufacture of lentiviral vector; out-licensing of proprietary candidates; and investment in R&D and the LentiVector platform.
- **New licensing deal:** In the second deal of 2018, OXB has out-licensed its Parkinson's gene-therapy candidate (formerly ProSavin, now AXO-Lenti-PD) to Axovant Sciences, Inc (AXON) for a potential total $842.5m/£624.1m (up-front $30m/£22m). This is potentially a large market, with significant unmet need.
- **Valuation:** Our sum-of-the-parts valuation has been upgraded following the deal with Axovant. The new estimated group enterprise value is £616m (cf. £316 previously) with a risk-adjusted valuation of £9.60 per share (cf. £4.47 previously), of which £1.24 can be attributed directly to this deal.
- **Risks:** The mid-term sales model and the ability to pay off debt, are dependent on successful progress of partners' clinical trials and commercialisation of LentiVector-enabled products, for receipt of bioprocessing milestones and royalty payments. All gene-therapy candidates are subject to significant clinical risk.
- **Investment summary:** OXB is at a very interesting juncture. Heavy investment in state-of-the-art GMP manufacturing facilities for production of gene-therapy vector has resulted in supply agreements with Novartis, Bioverativ and AXON, on top of existing partnerships, positioning the group on the road to significant bioprocessing service income, milestones, and royalties.

Financial summary and valuation

Year-end Dec (£m)	2015	2016	2017	2018E	2019E	2020E
Sales	15.91	27.78	31.49	43.80	58.20	79.30
EBITDA	-11.73	-6.78	-2.63	15.25	15.73	25.51
Underlying EBIT	-13.35	-10.45	-7.00	10.82	10.89	20.20
Reported EBIT	-14.08	-11.32	-5.67	9.76	9.72	18.94
Underlying PTP	-16.25	-15.34	-15.88	6.44	6.82	16.17
Statutory PTP	-16.98	-20.31	-11.76	5.38	5.65	14.90
Underlying EPS (p)	-23.91	-21.00	-21.19	15.26	15.47	31.55
Statutory EPS (p)	-25.33	-29.95	-14.56	13.64	13.69	29.62
Net (debt)/cash	-17.90	-19.05	-22.54	-2.69	-4.90	5.23
Shares issued (m)	0.14	17.50	0.39	19.40	0.10	0.10
P/E (x)	-	-	-	-	-	31.3
EV/sales (x)	-	-	-	-	-	24.9

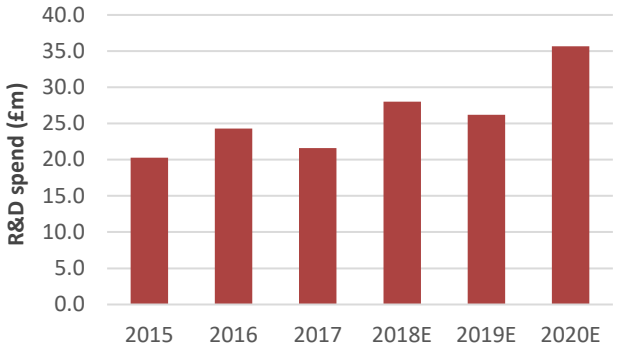
Source: Hardman & Co Life Sciences Research

Sales and gross margin



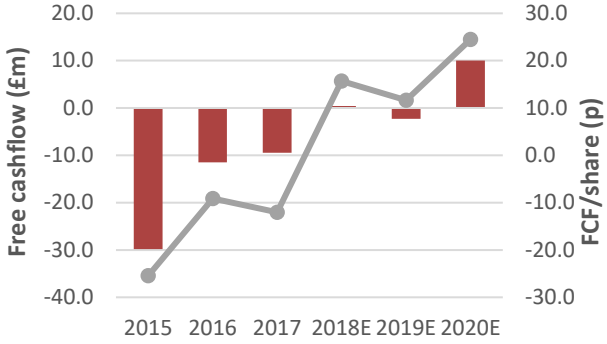
- Sales are from bioprocessing and process development fees. Gross income includes other income such as development milestones.
- Royalties are receivable once partnered therapies reach the market and are included in 'other income'.
- The gross margin is forecast to trend in an upward direction medium-term, as existing bioprocessing capacity is fully utilised and more manufacturing capacity comes on stream.

R&D



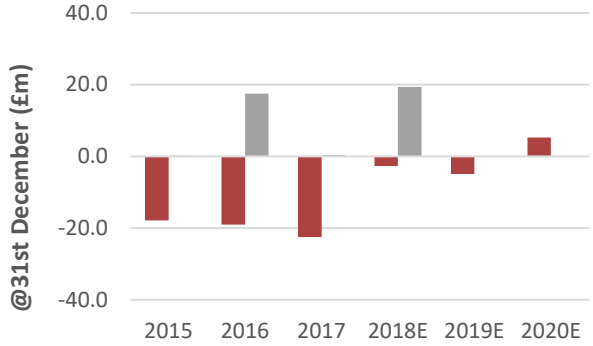
- Increased R&D spend is driven by investment in process development and the LentiVector platform technology.
- OXB's new partner, AXON, will fund all development of the Parkinson's disease gene-therapy, AXO-Lenti-PD.
- Process development for external customers is costed through the R&D line.

Free cashflow and FCF/share



- OXB is expected to turn cash-generative from an operational standpoint in 2018 and again in fiscal 2020.
- Actual cash fluctuates, dependent on the timing of receipt of up-fronts, milestones and royalties.
- Free cashflow will be affected by the investment being made to increase bioprocessing manufacturing capacity.

Net debt and capital increases



- At 31 December 2017, OXB had net debt of -£22.5m, composed of £14.3m cash and £38.8m debt.
- On 9 March 2018, the company raised new funds of £19.3m (net) through a Placing of shares at 11.75p for investment in manufacturing capacity.
- $30m/£22m was received in June 2018 from AXON following the signing of a licensing agreement.

Source: Company data; Hardman & Co Life Sciences Research

Licensing deal with Axovant

OXB's Strategy

OXB's strategy is to out-license its proprietary assets once they are ready for clinical development. OXB-102 (formerly ProSavin) has been ready for partnering for several years, but OXB has been focused more on securing PD deals in order to strengthen its balance sheet. Now that it has achieved two such deals, OXB is in a position to focus some resources on its proprietary pipeline. OXB-102 is the most advanced of these candidates, and potentially the most exciting.

Last week's announcement that OXB-102 had been out-licensed to Axovant Sciences, inc. (NASDAQ:AXON), for a total of up to $842.5m, highlights the potential of the programme. While undoubtedly less risky, and less costly, than in-house progression, out-licensing was not necessarily always the preferred route, given that ProSavin had formed the core of OXB's historical activities. In fact, OXB announced at its 2017 year-end that it would progress OXB-102 to the clinic itself by the end of 2018 in the event that a partner had not been secured. Other suggestions have included the spin-out of the Parkinson's programme to a special purpose vehicle (SPV), similar to OcQuila – the SPV recently established for three Ocular candidates. However, while an SPV would have allowed greater control, it would have been more resource-intensive for OXB than the out-licensing deal.

New deal with AXON

The new deal is an out-licensing agreement, whereby OXB will receive licensing fees as AXON hits clinical, regulatory and sales milestones, and also royalties, should AXO-Lenti-PV reach the market. As with the Bioverativ deal, it includes the potential for either party to put in place a clinical supply agreement. It also includes potential to put in place a commercial supply agreement if AXO-Lenti-PV is approved, thus ensuring OXB derives value in the long term. The up-front payment ($30m/£22m) includes a $5m prepayment for the batch of OXB-102 vector that OXB originally prepared, in readiness for a Phase I trial, following the upgrade from ProSavin.

AXON is a specialist neurology biotech company and a member of the Roivant family of companies, which focus on reducing the time and cost of drug development. AXON's Phase III clinical trial in Alzheimer's was discontinued in 2017, thus releasing net cash of ca.$100m at its 2017 year-end for investment into AXO-Lenti-PV.

OXB deals 2013-2018

Term	Novartis deal 1	Novartis deal 2	Novartis deal 2 extension	Bioverativ	Axovant
Type	Collaboration	Collaboration/licensing	Manufacturing	Collaboration/licensing	Licensing
Year	2013	2014	2017	2018	2018
Duration	1 year	3 years	3-5 years	unknown	unknown
Up-front	N/A	$14m	$10m	$5m	$30m (incl. $5m designated for manufacturing)
MS, incentives, service payments	$4m	$76m	$90m min.	$100m max (reg. & sales MS)	$812.5m max. (dev., reg. & sales MS)
Process development	Yes	Yes	Yes	Yes	**Yes – separately funded by Axovant**
Clinical supply	Yes	Yes	Yes	**Potential**	**Potential**
Commercial supply	No	**No**	Yes	No	**Potential**
Royalty	No	Yes	Yes	Yes	Tiered: 7%-10%

MS: milestone payments; reg: regulatory; dev: clinical development
Source: Company announcements; Hardman & Co Life Sciences Research

Gene-therapy for Parkinson's

Parkinson's disease

Parkinson's is a progressive, incompletely understood, disease characterised by involuntary tremors and slow and inflexible movement. Symptoms result from reduction of dopamine production as nerve cells in the brain's *substantia nigra* degenerate. Without sufficient dopamine, nerves communicate sporadically, leading to reduced movement control. Global point prevalence estimates range from 6-10 million people, including 1.5 million across Europe and the US, and there are likely to be many undiagnosed cases. Most Parkinson's sufferers are over the age of 50, and dementia is common in late-stage disease; dementia is now the biggest cause of death in the UK, and as such, there is high and increasing pressure for new treatments.

Standard-of-care

There is no cure for Parkinson's disease. Symptoms are managed with a combination of supportive therapies, medication, and sometimes, surgery. Levodopa (L-dopa) has been the gold standard for >40 years: this is an amino acid precursor of dopamine, administered as a tablet, that crosses the blood-brain barrier to stimulate dopamine receptors. It does, however, lead to intermittent stimulation and associated motor complications, and becomes less effective with disease progression, since the reduction of dopaminergic neurons decreases drug processing ability. Other in-market medications include dopamine agonists and monoamine oxidase-B inhibitors. Alternative approaches in advanced disease include implant devices that deliver deep brain stimulation (DBS); these can have severe side effects, which include seizures.

Innovative approaches

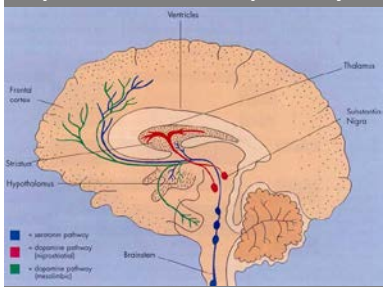
Allosteric modulation of ion channel receptors in the brain is one new approach being trialled for treatment of Parkinson's disease. SAGE Therapeutics is running a Phase II trial of its small molecule drug candidate, SAGE-217, in Parkinson's disease, which targets the $GABA_A$ receptor. It is hoped that this will help regulate the neurons that produce dopamine, without the side effects of traditional ion channel drugs. Another allosteric modulator biotech, the Swiss company Addex Therapeutics, is soon to enter a pivotal trial with its lead small molecule, Dipraglurant-IR, in Parkinson's disease. This negatively modulates the glutamate receptor mGluR5.

Candidate gene-therapies

AXO-Lenti-PD (ProSavin v2.0)

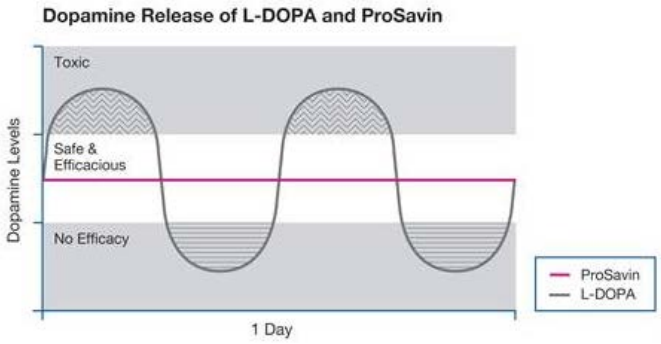
AXO-Lenti-PD (formerly OXB-102) is a Phase I/II gene-therapy whose lower potency precursor, OXB-101/ProSavin, was very promising in a Phase I/II trial completed in 2012. It delivers therapeutic genes directly to the brain, increasing dopamine production and compensating for that lost due to the disease. Single treatments could last years. AXO-Lenti-PD is designed to overcome the limitations of L-dopa by creating a consistent and long-term supply of dopamine through genetic modification of brain cells. It is a lentiviral vector system derived from equine infectious anaemia virus (EIAV), which is injected directly to the striatum, reducing the need for functional dopaminergic cells.

Dopamine/serotonin pathways



Source: Google images

L-dopa vs. ProSavin: therapeutic effect on dopamine levels



Source: Oxford BioMedica

AXO-Lenti-PD has three components: the vector genome construct, the packaging construct, and the envelope construct. The vector construct contains the three genes that encode enzymes necessary for dopamine production: tyrosine hydroxylase (TH) and cyclohydrolase 1 (CH1), which convert tyrosine to levodopa, and amino acid decarboxylase (AADC), which converts levodopa to dopamine. Modified Long Terminal Repeat (LTR) sequences at each end ensure that the vector is self-inactivating – a safety measure that prevents replication once administered.

AXO-Lenti-PD (formerly OXB-102) vector genome construct

Source: Oxford BioMedica

Clinical development history

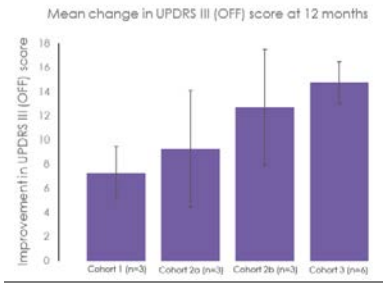
ProSavin was the first gene-therapy to enter trials for Parkinson's disease. A summary of its development history is presented in the table below. The OXB-102 vector was re-engineered for more efficient delivery of genes, and the genes were reordered to ensure equal expression.

AXO-Lenti-PD development history

Milestone	Year	Notes
Initiation of Phase I/II study	2007	Trial IDs: NCT00627588 & NCT01856439. Bilateral, intra-striatal delivery; 15 patients. x3 doses: low ($1.9x10^7$ transducing units) to high ($1x10^8$ units), assessed in separate cohorts.
Completion of Phase I/II study	2012	Met primary endpoints (number & severity of adverse events; efficacy *via* motor responses using UPDRS scores at six months).
Pre-clinical evaluation of OXB-102 completed	2013	Efficacy testing demonstrated higher transfection efficacy and potency five times that of ProSavin.
Dose escalation study material manufactured	2014	Manufacturing of study doses completed in anticipation of Phase I/II trial.

UPDRS-III: Unified Parkinson's disease rating scale
Source: Hardman & Co Life Sciences Research

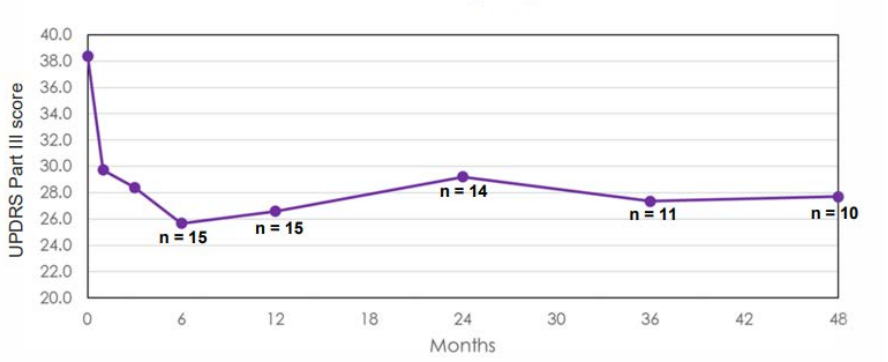
Improved motor response with increasing dose of OXB-101



Source: Oxford BioMedica

Importantly, following successful completion of the Phase I/II trial of OXB-101 (the original lower potency version of OXB-102), follow-up of the 15 patients illustrated a sustained response in the order of years. At four years, eight of the surviving 10 patients retain a baseline UPDRS-III score better than baseline (in contrast to a typical Parkinson's patient, whose score could be expected to worsen by 3-4 points each year). A single treatment with even the lower potency version of the therapy demonstrated effectiveness, and improvement was associated with increasing dose.

Mean UPDRS-III (OFF) score in follow-up study



Source: Oxford BioMedica

New Phase I/II trial of AXO-Lenti-PD

AXON has said it plans to begin a Phase I/II trial of the therapy by the end of 2018. This is likely to be a dose escalation and expansion study for identification of the dose for a potential pivotal trial. Dosing is constrained by the volume of vector that can be infused, but the upgraded OXB-102 vector is at least five times more potent than ProSavin, permitting lower infusion volumes for the same transfection efficiency. Treatment is invasive, being carried out via MRI-guided infusion to the brain, so there will not be a sham-surgery control. Exogenous L-dopa will still be needed – at 1000 milligrams per day.

Competition

Since 2004, there have been at least 10 gene-therapy trials completed in Parkinson's disease. The most advanced in terms of progress through trials is VY-AADC, which is being developed by the US neurology specialist biotechnology company, Voyager Therapeutics (NASDAQ:VYGR). Unlike AXO-Lenti-PD, Voyager's candidate delivers only the gene for AADC, which requires orally administered L-dopa to synthesise dopamine. Also unlike AXO-Lenti-PD, it is delivered using AAV vectors – these can only carry a smaller amount of genetic material compared with Lentivirus-based vectors, and do not integrate into the chromosome of the human cell. There have been some complications with developing AAV vectors for gene-therapies given that some patients have pre-existing immunity, which can limit transduction. Taken together, these suggest that AXON-Levi-PD is best-in-class and therefore eligible for expedited regulatory review.

Deal financials

This deal is important for OXB for a number of reasons. It fulfils management's stated strategy to have its more advanced internal R&D programmes externally funded, and it removes any burden on OXB management for both the future financing of the AXO-Lenti-PD programme and the running of trials, although it will be consulted and will also provide manufacturing services. Overall, this deal with AXON follows the usual industry format for licensing agreements:

- An up-front payment of $30m/£22m: $25m/£18m is being recognised through the P&L account in fiscal 2018; the remaining $5m/£4m is a pre-payment for manufacturing services.
- Development milestones of up to $55m/£41m, which are likely to be paid from 2019.
- Regulatory approval and sales milestones of up to $757.5m, split among regulatory approvals (probably US, EU) and lump payments on reaching certain sales milestones, at which point the royalty rate changes.
- The up-front cash payment is worth 36p per share, risk-adjustment to the development milestones is worth ca.19p per share, and the risk-adjusted NPV of the sales milestones and royalty stream is worth 75p per share, making a total risk-adjusted deal value of ca.130p per share.

Tiered royalties

7% on annual net sales < **$1B**
8% on annual net sales ≥ **$1B** and < **$2.5B**
9% on annual net sales ≥ **$2.5B** and < **$4B**
10% on annual net sales ≥ **$4B**

Source: Axovant Sciences, Inc.

Precedent deals

There have been a number of deals involving Parkinson's drugs in recent years, with only one other a genuinely new approach: a gene-therapy collaboration for several central nervous system (CNS) disorders between VYGR and Genzyme (Sanofi). This was worth a similar headline total to the OXB-AXON deal, at $845m, and consisted of an up-front payment of $100m (cash and equity) plus development and sales milestones and tiered royalties. For undisclosed reasons, Genzyme returned its rights to the Parkinson's programme in October 2017 – VYGR had intended to begin a pivotal trial by the end of 2017, but it does not yet appear to have been initiated yet, with VYGR now estimating a mid-2018 start.

Recent Parkinson's transactions

Date	Acquiror/Licensor	Acquiree/Licensee	Type	Drug	Approach	Stage	Total value ($m)
Jun'18	Axovant	Ox. BioMedica	Lic.	AXO-Lenti-PD	Gene therapy	Ph.I/II	843
Mar'18	Lundbeck	Prexton	Acqn.	Foligurax	mGluR4 agonist	Ph.II	1,112
Jul'17	Mitsubishi Tanabe	NeuroDerm	Acqn.	miscellaneous		Ph.III	1,095
Oct'16	Sunovion	Cynapsus	Acqn.	APL130277	apomorphine s/l	Ph.III	635
Jan'16	Acorda	Biotie	Acqn.	Zadenant (SYN115)	adenosine A2a antag.	Ph.III	363
Feb'15	Genzyme (Sanofi)	Voyager	Str.all.	VY-AADC01	Gene therapy	Ph.Ib	845
Apr'10	Aton	Bristol-Myers Squibb	Acqn.	Lodosyn (carbidopa)	MAO antag.	Lic.	67

Acqn. = full acquisition; Lic. = licensing deal; Str.all. = strategic alliance
s/l = sub-lingual
Source: Hardman & Co Life Sciences Research

It is difficult to make a direct comparison among the deals because most were a complete company acquisition. However, the headline value of the OXB deal, $842.5m, plus tiered royalties, places it very much in the right ball park. This deal also compares favourably with a number of deals (acquisitions, licensing agreements, strategic alliances) that have taken place in the CNS field in the last four years. Of the eight deals considered most appropriate, the average value was $670m, with a median of $1,255m (range: $70m to $2,365m).

Financials and investment case

Valuation update

Following the out-licensing of OXB-102 (now AXO-Lenti-PD) to AXON, we have revisited our sum-of-the-parts valuation (last updated in September 2017 following the FDA's approval of Kymriah – see our report entitled '*New era for cell and gene therapies*')[1]. We have updated our original DCF for OXB-102 (outlined in our initiation of coverage of OXB in March 2017) and the peer-based valuation of the services/manufacturing part of the business, and have also increased forecast sales of Kymriah in 2018 to reflect Novartis's 1Q earnings announcement in April 2018. Our new sum-of-the-parts valuation is £9.60/share (market capitalisation of £631m). Changes to our assumptions are highlighted below, along with the original assumptions, which are re-stated for convenience.

AXO-Lenti-PD DCF

Unchanged assumptions

- AXO-Lenti-PD licensed initially to treat advanced or refractory disease only.
- Initial potential annual addressable market of 36.2k patients (where patients progress to advanced disease after eight years) in the US and Europe.
- AXO-Lenti-PD is demonstrated to have ProSavin's safety and preliminary efficacy profile, and to achieve 50% penetration in the addressable market (due to its high cost-effectiveness: a single treatment *vs.* the costs of standard Parkinson's disease treatment and after-care, estimated at $25bn p.a. globally).
- Regulatory approval estimated for 2024, with rapid sales growth from the following year.

Updated assumptions

- **Probability to market:** We have increased the likelihood of the therapy reaching the market from 2% to 10%, based on the fact that OXB-102 will now definitely be progressed into Phase I/II.
- **Royalty payments:** Previously, we assumed a 10% flat royalty payment to OXB from partnered sales. We have updated our royalty model for the Parkinson's programme to reflect the tiers disclosed by AXON. This did not make a substantial difference to the total estimated royalty payments to patent expiry.
- **Treatment price:** Our price estimate per treatment has been increased from $100,000 to $200,000 to reflect the high prices commanded by recently approved gene-therapies (such as Luxterna, $425,000 per treatment). This is a conservative estimate because the reimbursement environment on launch of AXO-Lenti-PD is a major unknown.
- **Milestone payments:** The potential milestone payments from AXON on an estimated development and approval timeline have been included; these are spread relatively far into the future and discounted at the WACC (10%). They add only around 25p/share to the AXO-Lenti-PD NPV.

[1]http://www.hardmanandco.com/docs/default-source/company-docs/oxford-biomedica-documents/12.09.17-new-era-for-cell-and-gene-therapies.pdf

Conclusion and risks

We arrive at an updated NPV of £1.24/share for the AXO-Lenti-PD candidate, compared with our previous estimate of 9p/share. Note that, apart from the up-front payment already received, this is subject to significant risk - most importantly, in clinical development (particularly in Phase III). Moreover, the timing of milestone payments and market launch are hard to estimate and depend greatly on whether AXON can achieve priority review or breakthrough designation (for expedited processing) from the FDA. Unlike indications of currently approved cell and gene-therapies, Parkinson's disease is a large market and a disease in which patients decline relatively slowly – trials are, therefore, likely to be larger and require a longer follow-up period than those for paediatric cancers or rare diseases.

AXO-Lenti-PD royalty summary	
Pre-tax NPV (£m)	740
Tax rate	20%
Post-tax NPV (£m)	592
Probability to market	10%
Risk-adjusted NPV (£m)	85
NPV/share (£)	**1.24**

Spot rate used for currency
Up-front payment ($30m/£22m) included in final NPV (not risk-adjusted)
Source: Hardman & Co Life Sciences Research

Peer-to-peer comparison

The difficulty in arriving at a valuation for OXB's integrated service and manufacturing business is that there are few direct comparators; the companies below, however, do provide a benchmark. On this basis, we apply an EV/sales multiple of 6x (the current average of the peers in the table below) to OXB's bioprocessing business, updated from the original 4x, now that it is being validated by three strong partnerships. This implies an EV of ca.£635m based on FY 2018 forecasts, for this part of OXB alone. Given that OXB is currently trading at around 14x EV/sales, this is a conservative estimate, which can be revisited as manufacturing contracts progress through clinical and commercial milestones.

Comparative valuation (m)						
Company	**Curr**	**Mkt cap**	**Net cash**	**EV**	**2018E sales**	**EV/sales**
Abcam	GBP	2,586	90	2,496	225	11.1x
Lonza	CHF	20,256	-3,800	24,056	6,005	4.0x
Merck KGaA	EUR	10,771	-10,234	21,005	14,959	1.4x
MolMed	EUR	214	16.5	197	22.1	8.9x
OXB	GBP	650	14.9	636	43.8	14.5x

All figures in local currency
Share prices taken at close of business on 13 June 2018
Source: Hardman & Co Life Sciences Research

Sum-of-the-parts valuation

Pulling all this together, the group's current valuation is £9.60/share (market capitalisation of £631m), compared with our previous valuation of £4.47/share (market capitalisation of £294m). Note that the company undertook a 50-for-1 share consolidation on 30 May 2018.

In the near term, achieving the new more specialised and greater manufacturing capacity will be key. This, in turn, has the potential to drive a very satisfactory long-term royalty stream. These are closely linked and, taken together, on our estimates, represent 96% of the group enterprise value. While we see clear value in the LentiVector platform and the proprietary drug candidates that it generates, the very early-stage nature of this business means that most of the NPV is eroded by the low probability of these products reaching the market. In conclusion, Hardman & Co estimates that OXB has a risk-adjusted valuation of £9.60/share per share.

Summary valuation	
OXB	**£m**
Bioprocessing (EV/sales 6.0x)	263
Novartis royalty stream – risk-adjusted	273
Proprietary portfolio (AXO-Lenti-PD) – risk-adjusted	80
Group EV	**616**
Net cash/(debt)	15
Market capitalisation	631
Shares in issue (m)	66
Valuation/share (p)	**9.60**

Source: Hardman & Co Life Sciences Research

Changes to forecasts

We last updated our forecasts following OXB's announcement of its 2017 full-year results, described in our report '*Supply to meet demand*', published 20th March 2018[2]. These updates included anticipated increases in gross income associated with the Bioverativ deal and expected increases in costs related to personnel and infrastructure.

Following the AXON deal on 6 June, gross income has been increased from 2018 to account for the AXON up-front payment and the anticipated $55m milestones, on an estimated clinical development timeline. Minor increases in the cost base are also highlighted in the relevant financial tables in the following section.

[2] http://www.hardmanandco.com/docs/default-source/company-docs/oxford-BioMedica-documents/20.03.18-supply-to-meet-demand.pdf

Profit & Loss

- **Gross revenues:** In 2018 and 2019, gross revenues (the sum of bioprocessing revenue, PD fees, licensing fees (up-fronts, milestones and royalties), and grants) has increased due to the $30m AXON up-front and the first milestone payment. The $5m bioprocessing pre-payment is accrued in 2018 and 2019.
- **Gross margin:** Our gross margin, and all other cost lines, is based on group sales, and is, therefore, 10%-20% higher than the reported gross margin, which is calculated from gross revenues that includes up-fronts, milestones and royalties, all of which are lumpy and high (near 100%) margin. This better reflects the underlying cost base of the business and allows comparisons between companies.

Profit & Loss account

Year-end Dec (£m)	2015	2016	2017	2018E	2019E	2020E
GBP:EUR	1.38	1.18	1.14	1.14	1.14	1.14
GBP:USD	1.53	1.35	1.29	1.29	1.29	1.29
Gross revenues	**18.77**	**30.78**	**39.36**	**71.00**	**77.20**	**105.80**
Bioprocessing + PD	14.44	23.60	28.46	40.74	58.25	78.31
Additional income	3.54	3.80	3.03	3.03	0.00	1.00
Group sales	**15.91**	**27.78**	**31.49**	**43.80**	**58.20**	**79.30**
COGS	-5.84	-11.84	-18.44	-20.15	-31.43	-40.44
Gross profit	**10.07**	**15.94**	**13.05**	**23.65**	**26.77**	**38.86**
Gross margin	63.3%	57.4%	41.4%	54.0%	46.0%	49.0%
SG&A	-6.01	-5.09	-6.31	-12.05	-8.73	-9.52
R&D	-20.27	-24.30	-21.61	-28.03	-26.19	-35.69
EBITDA	**-11.73**	**-6.78**	**-2.63**	**15.25**	**15.73**	**25.51**
Depreciation	-1.26	-3.34	-4.11	-4.21	-4.63	-5.09
Amortisation	-0.36	-0.34	-0.26	-0.21	-0.21	-0.21
Other income	2.86	3.00	7.87	27.25	19.04	26.55
Underlying EBIT	**-13.35**	**-10.45**	**-7.00**	**10.82**	**10.89**	**20.20**
EBIT margin	83.9%	37.6%	-22.2%	24.7%	18.7%	25.5%
Share-based costs	-0.73	-0.87	-0.97	-1.07	-1.17	-1.27
Exceptional items	0.00	0.00	2.30	0.00	0.00	0.00
Stat. operating profit	**-14.08**	**-11.32**	**-5.67**	**9.76**	**9.72**	**18.94**
Net interest	-2.90	-4.89	-8.88	-4.38	-4.07	-4.03
Forex gain/loss	0.00	-4.11	2.79	0.00	0.00	0.00
Pre-tax profit	**-16.25**	**-15.34**	**-15.88**	**6.44**	**6.82**	**16.17**
Exceptional items	0.00	0.00	0.00	0.00	0.00	0.00
Reported pre-tax	-16.98	-20.31	-11.76	5.38	5.65	14.90
Tax payable/credit	3.96	3.67	2.74	3.58	3.35	4.56
Underlying net income	**-12.29**	**-11.67**	**-13.12**	**10.03**	**10.16**	**20.73**
Statutory net income	-13.02	-16.64	-9.02	8.96	9.00	19.46
Ordinary 50p shares						
Period-end (m)	51.49	61.76	62.15	65.70	65.70	65.70
Weighted average (m)	51.40	55.56	61.91	65.70	65.70	65.70
Fully-diluted (m)	53.51	58.00	67.03	70.92	71.02	71.12
U/lying basic EPS (p)	**-23.91**	**-21.00**	**-21.19**	**15.26**	**15.47**	**31.55**
Stat. basic EPS (p)	-25.33	-29.95	-14.56	13.64	13.69	29.62
U/l fully-diluted EPS (p)	**-22.96**	**-20.12**	**-19.57**	**14.14**	**14.31**	**29.15**
Stat. fully-diluted EPS (p)	-24.33	-28.70	-13.45	12.64	12.67	27.37
DPS (p)	0.0	0.0	0.0	0.0	0.0	0.0

Source: Hardman & Co Life Sciences Research

- **R&D:** OXB-102 clinical trial costs have dropped out now that they will be funded by AXON, but R&D spend is expected to increase over the forecast period due to ongoing process development and scale-up activities.
- **EBITDA:** The deal has significantly increased OXB's EBITDA in 2018, which is now £15.3m (prior forecast was £0.4m). Underlying EBIT is now positive from 2018.

Balance sheet

- **Net cash:** The deal has strengthened significantly the balance sheet, with forecast FY 2018 net debt of -£2.69m, compared with our previous net debt estimate of -£20.4m.
- **Loan facilities:** The long-term debt is the GBP equivalent of the $55m Oaktree loan that was agreed in 2017. The coupon is approximately 11%. We have not made any assumptions about a debt restructuring in our forecasts.

Balance sheet

@31 December (£m)	2015	2016	2017	2018E	2019E	2020E
Shareholders' funds	10.89	12.62	6.70	35.06	44.16	63.72
Cumulated goodwill	0.00	0.00	0.00	0.00	0.00	0.00
Total equity	10.89	12.62	6.70	35.06	44.16	63.72
Share capital	25.74	30.88	31.08	0.66	0.66	0.66
Reserves	-14.85	-18.26	-24.38	34.40	43.50	63.06
Provisions/liabilities	4.42	3.94	14.20	12.11	6.05	0.30
Deferred tax	0.00	0.00	0.00	0.00	0.00	0.00
Long-term loans	27.26	34.39	36.86	36.86	36.86	36.86
Short-term debt	0.00	0.00	0.00	0.00	0.00	0.00
less: Cash	9.36	15.34	14.33	34.18	31.97	42.10
less: Deposits	0.00	0.00	0.00	0.00	0.00	0.00
Invested capital	**33.21**	**34.95**	**40.48**	**46.90**	**52.15**	**55.84**
Fixed assets	24.40	27.51	25.37	31.03	36.36	37.33
Intangible assets	1.74	1.33	0.10	-0.12	-0.33	-0.55
Inventories	2.71	2.20	3.33	4.77	6.82	9.17
Trade debtors	*7.37*	*1.97*	*5.71*	*6.85*	*8.22*	*9.86*
Other debtors	*3.56*	*4.94*	*11.93*	*11.93*	*11.93*	*11.93*
Tax liability/credit	*2.72*	*3.00*	*2.78*	*2.76*	*3.58*	*3.35*
Trade creditors	*-3.59*	*-1.58*	*-3.68*	*-3.68*	*-3.68*	*-3.68*
Other creditors	*-5.70*	*-4.43*	*-5.05*	*-6.64*	*-10.74*	*-11.57*
Debtors less creditors	4.37	3.90	11.68	11.22	9.30	9.88
Invested capital	**33.21**	**34.95**	**40.48**	**46.90**	**52.15**	**55.84**
Net cash/(debt)	**-17.90**	**-19.05**	**-22.54**	**-2.69**	**-4.90**	**5.23**

Source: Hardman & Co Life Sciences Research

Cashflow

- **Other income:** The AXON up-front fee carries a 100% margin and flows through the P&L, suggesting that OXB will be temporarily cash-generative in fiscal 2018, at the free cashflow level, despite markedly increased capex.
- **Capex:** Investment in the new manufacturing facilities is expected to see capital expenditure leap in 2018 and 2019, estimated at an additional £8m p.a. over maintenance capex, with the balance being spent in fiscal 2020. We have not changed our capex forecasts since the previous deal (with Bioverativ) was announced.

Cashflow

Year-end Dec (£m)	2015	2016	2017	2018E	2019E	2020E
Underlying EBIT	-13.35	-10.45	-7.00	10.82	10.89	20.20
Depreciation	1.26	3.34	4.11	4.21	4.63	5.09
Amortisation	0.36	0.34	0.26	0.21	0.21	0.21
Inventories	*-1.30*	*0.50*	*-1.13*	*-1.44*	*-2.05*	*-2.35*
Receivables	*-5.78*	*4.03*	*-10.73*	*-1.14*	*-1.37*	*-1.64*
Payables	*2.98*	*-3.28*	*2.73*	*0.00*	*0.00*	*0.00*
Change in working capital	-4.09	1.25	-9.13	-2.58	-3.42	-3.99
Exceptionals/provisions	0.95	-0.75	10.27	1.84	-0.75	-0.75
Disposals	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.00	0.35	1.27	0.00	0.00	0.00
Company op. cashflow	**-14.87**	**-5.93**	**-0.22**	**11.94**	**8.15**	**16.78**
Net interest	-1.46	-3.21	-10.76	-4.38	-4.07	-4.03
Tax paid/received	3.24	4.08	3.51	2.76	3.58	3.35
Operational cashflow	**-13.08**	**-5.06**	**-7.47**	**10.32**	**7.66**	**16.09**
Capital expenditure	-16.72	-6.46	-1.97	-9.87	-9.96	-6.06
Sale of fixed assets	0.00	0.00	0.00	0.00	0.00	0.00
Free cashflow	**-29.80**	**-11.52**	**-9.44**	**0.45**	**-2.31**	**10.03**
Dividends	0.00	0.00	0.00	0.00	0.00	0.00
Acquisitions	0.00	0.00	0.00	0.00	0.00	0.00
Disposals	0.00	0.00	0.00	0.00	0.00	0.00
Other investments	0.00	0.00	0.00	0.00	0.00	0.00
Cashflow after invests.	**-29.80**	**-11.52**	**-9.44**	**0.45**	**-2.31**	**10.03**
Share repurchases	0.00	0.00	0.00	0.00	0.00	0.00
Share issues	0.14	17.50	0.39	19.40	0.10	0.10
Currency effect	-1.44	-7.13	-2.79	0.00	0.00	0.00
Loans/cash acquired	0.00	0.00	8.36	0.00	0.00	0.00
Change in net debt	**-31.10**	**-1.15**	**-3.48**	**19.85**	**-2.21**	**10.13**
Hardman FCF/share (p)	-25.45	-9.11	-12.06	15.70	11.65	24.49
Opening net cash	13.20	-17.90	-19.05	-22.54	-2.69	-4.90
Closing net cash	**-17.90**	**-19.05**	**-22.53**	**-2.69**	**-4.90**	**5.23**

Source: Hardman & Co Life Sciences Research

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The full detail is on page 26 of the full directive, which can be accessed here: http://ec.europa.eu/finance/docs/level-2-measures/mifid-delegated-regulation-2016-2031.pdf

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