Healthcare Equipment & Services

Source: Eikon Thomson Reuters

Market data

EPIC/TKR	**AVO**
Price (p)	**42.5**
12m High (p)	62.1
12m Low (p)	31.0
Shares (m)	200.4
Mkt Cap (£m)	85.2
EV (£m)	78.7
Free Float*	60%
Market	AIM

**As defined by AIM Rule 26*

Description

AVO is developing next-generation proton therapy systems for use in radiation treatment of cancers. The first system is expected to be installed in Harley Street, London, during 2019; it will be operated through a JV with Circle Health.

Company information

Exec. Chairman	Michael Sinclair
CEO	Nicolas Serandour

+44 203 617 8728
www.advancedoncotherapy.com

Key shareholders

Board & Management	11.4%
Yantai CIPU	23.1%
DNCA Investments	6.2%
Brahma AG	4.1%
Barrymore Investments	4.1%
AB Segulah	3.3%

Diary

2Q'19	2018 finals
2H'19	Harley Street ready

Analysts

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ADVANCED ONCOTHERAPY

Commercialising a breakthrough technology

Advanced Oncotherapy's (AVO) goal is to deliver an affordable and novel proton beam therapy (PBT) system, based on state-of-the-art technology developed originally at the world-renowned CERN. 2018 was characterised by achievement of a number of technical milestones, the successful integration of all the module types that constitute the LIGHT accelerator, and acceleration of the proton beam to an energy of 52MeV, sufficient to treat superficial tumours. With LIGHT, its breakthrough PBT technology, AVO is aiming to replicate the commercial success of MRI by opening new untapped markets with an innovative financing strategy.

- **Strategy:** AVO is developing a compact and modular PBT system at an affordable price for the payor, financially attractive to the operator, and generating superior patient outcomes. AVO benefits from the technology know-how developed by ADAM, in Geneva, and relies on a base of world-class suppliers.

- **Adoption of PBT:** Expensive construction of high specification buildings to house high cost machines has limited the rate of adoption of PBT, in a similar manner to that seen with MRI. AVO is aiming to change these dynamics with a lower priced modular system that is easier to install in existing clinical facilities.

- **Turn-key solution:** Coupled with its technical advantages, the LIGHT system lends itself to leasing and vendor financing arrangements, an important pre-requisite for the sales ramp-up. Under this model, customers will benefit from a lower upfront capital outlay, which provides them with further flexibility.

- **Risks:** In 2018, the more complex technical challenges were overcome and progress towards a fully functional accelerator is underway in preparation for CE marking. Execution risk remains, but establishment of an innovative financing package for providing LIGHT to potential customers has lowered this risk.

- **Investment summary:** AVO's market capitalisation of £85m equates only to the amount invested into LIGHT to date, which does not reflect either the enormous technical challenges that have been overcome, or the market potential. DCF analysis of the LIGHT prospects generates an NPV of at least 288p a share (fully-diluted). The disconnect between fundamental and market valuations offers an investment opportunity which will reduce as AVO complete its financing plan.

Financial summary and valuation

Year end Dec (£m)	2017	2018E	2019E	2020E	2021E	2022E
Sales	0.0	0.0	0.0	21.5	65.5	111.5
Gross profit	0.0	0.0	0.0	1.9	11.4	27.6
Administration costs	-12.9	-14.0	-13.7	-14.0	-14.3	-14.6
EBITDA	-12.6	-13.6	-14.3	-11.6	-5.0	8.1
Underlying EBIT	-12.9	-14.0	-14.7	-14.2	-7.6	5.5
Statutory EBIT	-14.5	-17.0	-18.0	-18.4	-10.8	2.6
Underlying PTP	-14.9	-14.3	-15.4	-15.7	-9.4	3.7
Statutory PTP	-16.5	-17.3	-18.6	-19.8	-12.7	0.8
Underlying EPS (p)	-15.6	-7.6	-7.0	-5.7	-3.3	1.9
Statutory EPS (p)	-18.9	-9.7	-8.8	-7.4	-4.6	0.8
Net (debt)/cash	-9.2	-1.6	0.9	-6.8	-14.4	-17.7
EV/EBITDA	-7.5	-6.4	-5.9	-7.9	-20.1	12.7

Source: Hardman & Co Life Sciences Research

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Proton beam therapy

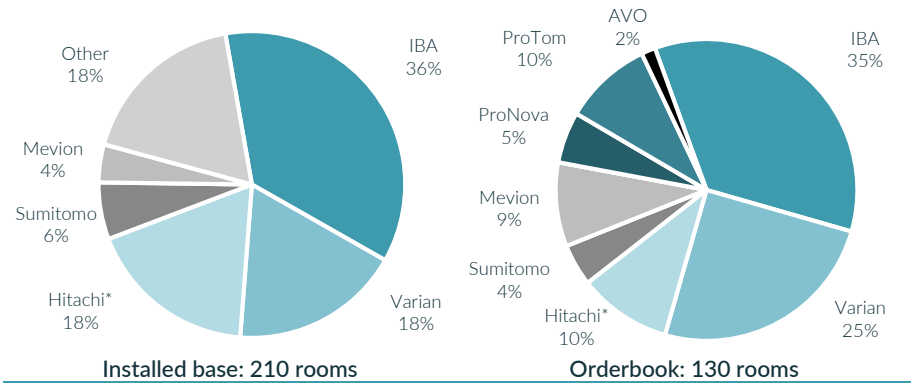
Impact of a new technology

There are 81 specialist PBT centres globally operating 210 treatment rooms…

…with a further 130 rooms under construction

Proton beam therapy (PBT) is a medical technology which has seen significant development and a wider adoption over the last few years, with an estimated 81 specialist centres operating ca.210 treatment rooms worldwide (source: PTCOG). A further 45 centres/130 rooms are currently under construction. One possible reason for the relatively initial slow adoption of this technology is the prohibitive cost of building a purpose-built centre to house the equipment, the high cost of the PBT system, and the need to train physicians. AVO is addressing all of these issues with its novel LIGHT system and using a different approach to funding it.

PBT treatment rooms – April 2019



**Hitachi + Mitsubishi*

Source: PTCOG, Hardman & Co Life Sciences Research

Development of PBT base is following a similar pattern to that seen with MRI

In many ways, development of the installed base for PBT is following a similar development path to that seen with the introduction of Magnetic Resonance Imaging (MRI) in the late seventies. Both technologies are characterised by the same dynamics:

- need to have a purpose-built facility to house the equipment;
- high capital cost of the equipment; and
- reliance on the buy-in and training of specialist physicians.

However, history shows that all of these issues were overcome with MRI, which is now a widely used diagnostic tool available almost anywhere, at a price that is currently nearly one-tenth of that when it was first introduced. In this report, we analyse:

- the extent to which MRI and PBT markets are following the same evolution?
- how the MRI discipline gained popularity, and what can be learnt for PBT?
- the extent to which AVO's LIGHT system fills a gap in the market and helps to accelerate market adoption of PBT; and
- the extent to which a new financing approach can transform the market and help AVO and its customers generate attractive returns.

AVO is building the right foundations for making the LIGHT project successful, with a high-calibre team, CERN-based science, and the right approach and partners. An important step to support this was the recent £12.3m financing in the form of a loan (£10.0m) and equity (£2.3m by Subscription) package.

Analogy between MRI and PBT

Striking analogy between the commercial development of MRI and PBT

MRI and PBT share the fact that both technologies, despite being for different markets (diagnostic vs. therapeutic), share a complex history with contributions from a variety of scientific disciplines in the fields of physics, mathematics, chemistry, engineering, computer science and medicine. The scientific breakthroughs were enormous, to the extent that some of the visionaries involved in the evolution of each technology received the Nobel Prize for their contributions.

PBT: from then to now

Both techniques based on breakthrough science

The origins of PBT started many years ago with the vision of physicists and scientists to combine several scientific disciplines in a complex medical device. The technology is the result of the combination of breakthrough technologies discovered by eminent scientists, starting with Roentgen (Nobel Prize 1901 for the production and detection of X-rays in 1895) and Ernest Rutherford (Nobel Prize 1908 for the discovery of proton in 1919). Meanwhile, William Bragg (Nobel Prize 1915) discovered a physical phenomenon called the "Bragg-Peak" (1903).

The Bragg-Peak serves as the foundation of PBT. It is a physical phenomenon that concentrates the killing energy of protons onto the tumour, allowing greater precision and higher doses compared with traditional radiation such as X-rays, while minimising the damaging effect on surrounding tissue.

In 1931, the American physicist Ernest Lawrence (Nobel Prize 1939) invented the cyclotron, which accelerates charged particles to energy levels sufficiently high for treating tumours. This led Robert Wilson from Harvard University to propose the use of a proton beam for medical applications. Subsequently, chest and lung tumours were effectively treated in animal models at the University of California, Berkley in 1948, and ultimately in humans in 1954. With the advent of better imaging technologies, including CT, MRI and PET, it became possible to better match the location of the tumour with the Bragg-Peak where most of the radiation is deposited, making PBT a more practical treatment option. In 1990, the first hospital-based proton treatment centre was built at Loma Linda University Medical Center, in California, but it took a further 11 years for the second to open in the US. Since then, the number of PBT centres has grown greatly to the current level of 81 specialist PBT centres worldwide, operating ca.210 treatment rooms. With the current global capacity limited to only 60,000 cancer patients per year, these PBT centres can only treat a very small fraction of the cancer patients worldwide. This lack of accessibility is compounded by the inability of current suppliers to meet the fast-growing demand.

Three phases to the commercial development of PBT…

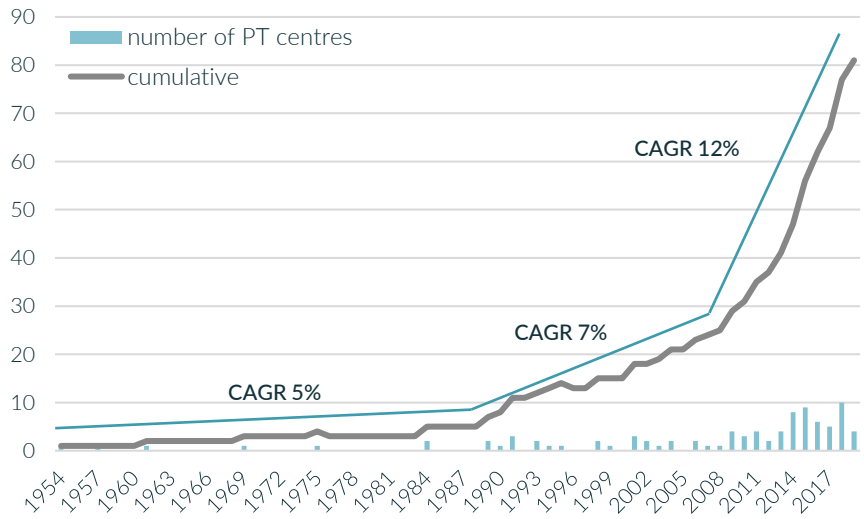
The following graph shows the annual addition of specialist PBT centres and the cumulative total worldwide. It suggests that there have been three phases in adopting the technology.

Between the opening of the first PBT centre in 1954 and 1988 (5% CAGR), there was a slow uptake in the number of centres, reflecting the use of the technology mainly for research purposes. The second period is between 1989 and 2008 (7% CAGR), when interest in the technology grew along with increasing evidence of the efficacy of PBT in treating cancer. The period between2009 and 2018 has seen much greater uptake of the technology with a CAGR of 12%.

…with the latest phase showing the fastest rate of growth (12%)

Already in 2019, four new centres have started operating with a possible 20 new PBT centres expected to open as the year progresses, representing ca.50 rooms. Asia and the US are the main drivers.

Number of PBT centres in operation



Source: Hardman & Co Life Sciences research, PTCOG

MRI: a slow start before the prospects exploded

Background

MRI is a method of producing extremely detailed pictures of body tissues and organs without the need for radiation (X-ray). It all started with the discovery of nuclear magnetic resonance (NMR) in 1938 by Isidor Rabi (Nobel Prize 1944) and it took until the 1950s for the discovery of chemical shift and spin-spin coupling, followed in 1973 by the first NMR image of vials of water being recorded and published by Paul Lauterbur (Nobel Prize 2003, shared with Mansfield). The (nuclear) MRI discipline was born.

To commercial success

MRI was initially limited to research use…

…until the advantages of the technique were fully understood

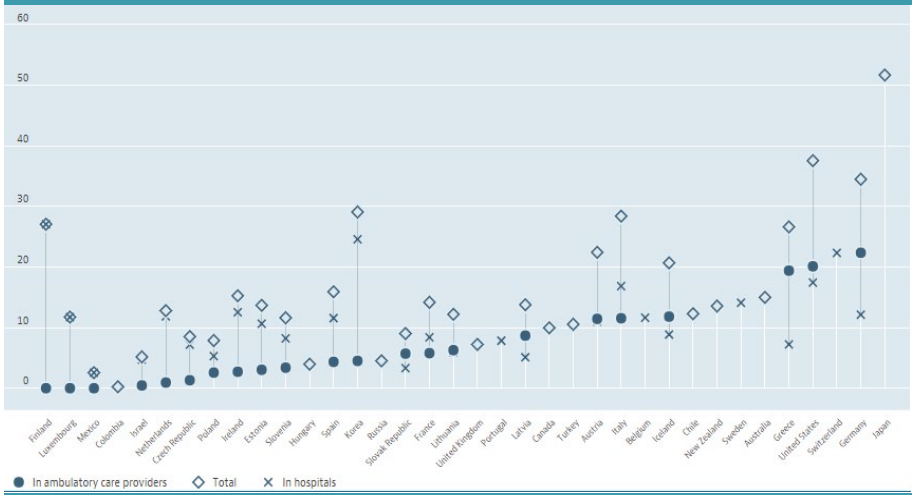
Initially, its use was restricted to academic research laboratories. However, this changed during the seventies, when the first detailed *in vivo* images of a human finger (1975), hand (1976), thorax (1977), and head (1978) were demonstrated. The development of MRI has been possible through many improvements, such as the 'line scan imaging' by Peter Mansfield, which allows images to be captured in minutes rather than hours; this led to the first full-body scanner in 1977. The first commercial MRI scanner was launched in 1983 (Toshiba) and subsequent improvements in the size of the magnets led to commercialisation of the first 1.5 Tesla whole-body clinical MRI system (General Electric) in 1985. Herein, MRI scans have become routine diagnostic procedures. The use of MRI has also continued to expand, thanks to the development of contrast media. However, and despite these advances, MRI remained a niche business until the mid-1990s. In 1993, there were fewer than 10 MRI scanners per million inhabitants in the US according to OECD data. At this point, the advantages of MRI started to be recognised and the use of MRI rocketed. Not only were the pictures extremely detailed and accurate, but they were generated without the use of radiation, thereby eliminating the risk of radiation-induced cancer. In contrast, exposure to radiation during a CT scan is the equivalent of about 100 X-rays.

MRI has unequivocal diagnostic advantages and $50bn is spent annually on scans

MRI is now considered as the best option for imaging the brain, spinal cord, liver, bowel and bone. It has unequivocal advantages for the diagnosis of certain medical conditions, e.g. plaques associated with multiple sclerosis. It is now estimated that $50bn is spent on almost 40m MRI scans p.a. in the US.

The sale of MRI machines is a giant global business opportunity worth $5.0bn p.a., led by General Electric and Siemens. Therefore, the full utility of MRI has evolved over a 40-year period to a point where it is routinely used when scans of the brain or knee are required, for an affordable price (ca.$500-1,000), and can now be undertaken in a mobile MRI centre/vehicle.

MRI scanners per million population



Source: OECD data 2017

Potential lessons for PBT

What MRI achieved

The market adoption of MRI suffered initially from four main challenges, all of which have now been addressed:

1. Technical challenges

The improvement of the MRI machines with the use of smaller and more powerful magnets led to the commercialisation of the first 1.5 Tesla whole-body clinical MRI system (General Electric) in 1985. This was the starting point for developing more efficient machines which are easier to install. In addition, not all hospitals have the space to house an MRI scanner; this has led to the use of mobile scanners that can be located in car parks or taken to the workplace.

Mobile MRI unit

Source: Fairford Medical

2. Cost

Significant reduction in cost of machines over a 30-year period

At its outset, MRI technology came at a high cost, reflecting the considerable development costs involved. In 1984, the price of an MRI machine was ca.$1.2m (ca.$3.0m in 2018 dollars). Today, the price starts at ca.$0.15m for a 1.5T machine moving up to between $0.4m and $0.5m for the most advanced models (price does not include remodelling, installation and ongoing maintenance costs), which is 10x cheaper than 30+ years ago! Also, there is the opportunity to purchase a second-hand/refurbished machine at even lower prices.

3. Large upfront commitment of capital

Given the market needs and the long lead times for ordering and installing new MRI machines, the market for purchasing a second-hand/refurbished machine at even lower prices has successfully developed; this has created an attractive opportunity for operators to avoid the large upfront cash outlays. In the 1980/90's, the MRI market was not mature enough to support this leasing and second-hand market.

4. Attractiveness of the technology

An MRI scan has become a routine diagnostic procedure

MRI technology needed to get the buy-in from the medical community in an already competitive market with established technologies such as X-ray and CT-scan: "the world cannot be changed without changing our thinking". These words from Albert Einstein are particularly true with the introduction of new technologies. In particular, MRI images need to be interpreted by specialists and scans cannot be performed on patients that have 'unfixed' metal in their body. Nevertheless, MRI scans have gradually become part of routine diagnostic procedures as the use of contrasting agents opened up the opportunity to diagnose new health disorders such as swelling or inflammation.

PBT is facing similar challenges and opportunities to MRI

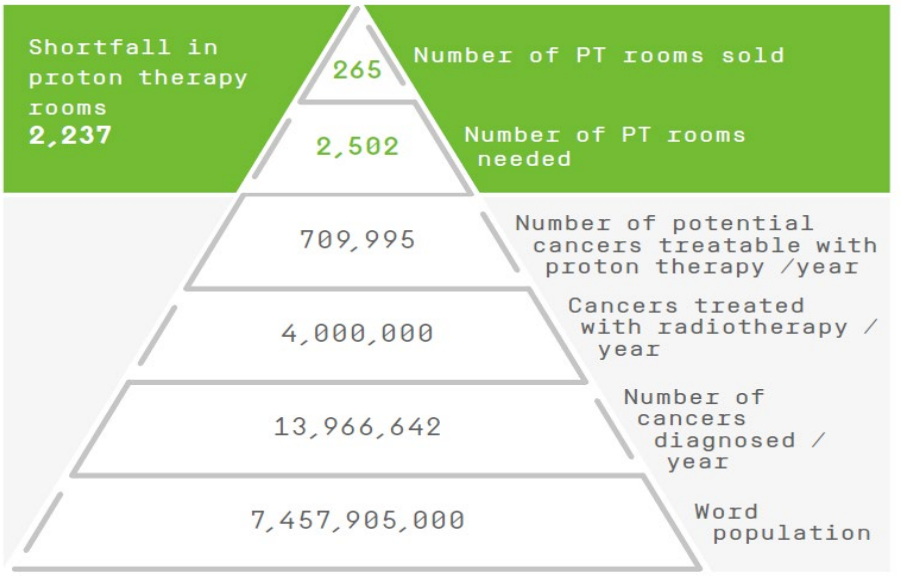
PBT has advantages over existing radiotherapy procedures…

There are many advantages of PBT over traditional radiotherapy, notably the delivery of radiation with pinpoint accuracy with little impact on surrounding tissues, making treatment very effective, yet with less collateral organ damage.

…but few patients are benefiting currently due to the lack of treatment rooms

It is believed that at least nearly 18% of the patients treated with radiotherapy could have benefited from PBT, whereas less than 1% are currently doing so. This implies the need for more than 2,500 PBT rooms, whereas only 210 are currently installed and in operation. This will lead to a dramatic increase in the number of centres and treatment rooms needed worldwide.

Estimated number of proton therapy rooms needed worldwide



Source: IBA, 2017 annual report

The numbers above should be seen as conservative if the pricing differential between PBT and X-rays is reduced. Scientists and radiation oncologists have indeed commented:

> *"If the costs of existing proton facilities were to come down, then all radiotherapy will be delivered using proton technologies within the next 10 years."*
>
> *Jay Loeffler, Prof Radiation Oncology, Harvard Medical School*

> *"If the costs were the same, there would be no debate. Less radiation to healthy tissue is always better for the patient."*
>
> *Leonard Arzt, executive director of the National Association for Proton Therapy*

The key is to overcome the challenges to unlock the potential

The MRI and PBT markets target different end-users (MRI is a diagnostic tool, whereas PBT is a therapeutic treatment) and this could lead to a slower PBT adoption. However, and despite the strong unmet medical need and the uptake of new PBT orders observed over the last few years, the prospects of the PBT market have been hindered by the same challenges facing the MRI industry in the 1990's, namely technical and financial constraints.

How to unlock the potential of PBT through a 'Blue Ocean Strategy'?

Therefore, the opportunity exists for new players to enter a 'new' market currently inaccessible to old-generation technology vendors, provided their PBT systems:

- are less cumbersome and easier to install in existing clinical facilities;
- generate attractive returns with quick paybacks;
- do not imply a large cash outlay upfront;
- are optimised for the physicians; and
- are "connected" by allowing physicians to work together across various geographies and benefit from training programmes.

We believe that the ambition of AVO is to address all of the above through a 'Blue Ocean Strategy' as defined by W. Chan Kim and Renée Mauborgne. This Blue Ocean strategy is not just based on price but also on the ability of AVO to market a product that provides significant clinical advantages.

AVO's position with LIGHT

Product offering: LIGHT

AVO expects LIGHT to result in a significantly lower treatment cost vs. currently available PBT systems

AVO aims to deliver not only the next-generation proton accelerating system with unique characteristics, but also a complete proton solution and workflow design that provides everything a hospital or clinic would require. Much of this has been determined following specific requests from radiotherapists/physicians. The core of the LIGHT solution is the first linear accelerator of proton beam, generated through a complete modular system to an energy level suited to customers' needs. It has been designed to offer optimal energy and charge control, with the smallest beam size, and without the need for field or energy modifying hardware such as range-shifters or apertures and multi-leaf collimators, currently used in conventional PBT systems. Taking into account the reduced building constraints, AVO expects LIGHT to result in an average treatment cost per patient per annum that is at a fraction of the prices charged with the most competitive PBT systems on the market today (i.e. a fraction of the average cost of $117,000/£90,000 per person).

Facilitating installation and reducing technical constraints

Installation

Flexible system that can be incorporated into an existing building

Installation costs in a new building are increased if large volumes of heavy equipment – such as those associated with competing circular accelerators – have to be installed, sometimes by constructing the building around the equipment after installing it. A linear and modular PBT accelerator, such as LIGHT, with a lower weight and reduced shielding requirements, is a clear step forward in the PBT paradigm. It allows installation of easily handled modules using, for example, service lifts. It is also clear that a modular design allows installation in existing buildings in the centre of large cities. The less onerous building work required to house and install the LIGHT system is best exemplified through the Harley Street project, where the £10m refurbishment cost being borne by the freeholder (the Howard de Walden Estate) is much less than the building cost observed in other PBT sites.

The LIGHT design avoids the need to build new and large PBT facilities, as is the case with circular accelerators, which are time consuming and costly. The modularity of the LIGHT system also lends itself – beyond easier installation – to high-volume production and economies of scale, which are relevant in the context of gaining market shares and enhancing the returns of operators and AVO.

Shielding requirement

Less need for expensive and cumbersome shielding

The shielding requirements are also significantly reduced. Existing PBT systems use Energy Selection Systems (ESS or absorbers) to control the beam energy and hence the location of radiation within the body. Due to the need to use ESS, the process of energy modulation in legacy circular accelerators is highly inefficient (i.e. efficiency of up to 10%). This means that a significant level of unwanted radiation is generated, resulting in very cumbersome and expensive shielding walls around the accelerators. On the other hand, and due to its linear design, the electronic control of the beam energy in the LIGHT system obviates the need for radiation-inducing ESS. This results in a reduction in the radiation shielding requirements and a reduction in the footprint with a concomitant reduction in the amount of land needed.

Designed to generate attractive return for operators

Current average cost is approaching $20m-$25m per treatment room, excluding construction costs

Currently, the cost of a PBT machine coupled with a single therapy room can range from $25m (one-room PBT system) to more than $80m (for a multi-room PBT system), and this does not capture the construction work needed. The cost of remodelling an existing structure or having a new purpose-built facility is very high and often the most important project hurdle for operators. There is no secret in the fact that greater adoption will push prices down, which is a key reason for AVO adopting a high-volume strategy. Such an approach has been possible by the modularity of the LIGHT system. Each module or part of LIGHT can be manufactured by external partners of the company, which can be assembled subsequently on the assembly site at Daresbury, UK.

LIGHT has been designed to reduce the implied treatment cost…

…opening up the opportunity to treat more patients

This modularity, coupled with the reduced footprint and lower shielding requirements for its LIGHT system, offers significant cost advantages. By targeting a cost reduction of all key PBT project items – from the purchase, maintenance and running of the equipment to the building – LIGHT has been designed to reduce the implied treatment cost to a much more affordable level for payors. This opens up the opportunity to treat more patients (i.e. hypofractionation) and generate quicker returns.

Power transformer delivered to the STFC site at Daresbury

Source: STFC on Twitter, 16 January 2019

The 'vendor financing' opportunity

PBT is suitable for a vendor financing arrangement

Under such a financing structure, a PBT system can be delivered to customers with a limited upfront cash commitment by involving a funding vehicle in exchange of annual fees. Further details can be found in the next section (see page 12).

Optimised for the needs of physicians

The users of PBT systems are looking for equipment:

- which can better target moving organs;
- that allows the cancer treatment to conform more to the irregular shape of the tumour; and
- is more automated and easier to use.

A solution designed to better treat moving targets

In proton therapy, the energy of protons implies two interconnected clinical factors:

- how deep within the body protons will stop; and hence
- where most radiation is deposited within the body.

This is due to the Bragg-Peak effect. A high-energy proton beam will allow the treatment of a deep-seated tumour whereas a low-energy proton beam is suited for superficial tumours. The energy of protons is measured in MeV (Mega-electron Volts) and typically ranges from 50MeV to 230 MeV. The ability to change energy is therefore a key clinical parameter.

LIGHT deposits pulses of radiation up to 200x per second…

…60-100x faster than circular accelerators…

The LIGHT system is designed to change the proton energy, where each pulse of protons stops and deposits radiation, up to 200 times per second. This means that LIGHT is ideally suited for the treatment of moving organs. Lung, pancreas and liver cancers are particularly sensitive to movement (e.g. due to breathing) and they are among the leading causes of deaths. Last year, in the US, there were 224,000 deaths from lung cancer, 53,000 from pancreatic tumours and 39,000 from liver tumours. The 5-year conditional relative survival rates in lung, pancreatic and liver tumours are 67%, 70% and 70%, respectively[1]. These three tumours as well as head and neck tumours (which is a major target today for PBT) represent a need of 2.6m patients by 2025. So LIGHT is not only ideally suited for motion tracking, but it is also well placed for targeting a large set of tumours.

A solution that delivers a better proton beam quality

…with great accuracy…

…limiting damage to adjacent healthy tissue

Protons are delivered on a pulse-by-pulse basis up to 200 times per second in three dimensions (vertical, horizontal and longitudinal); each pulse having millions of protons, which will deposit their killing energy precisely to the tumour. Due to its linear design, LIGHT can deliver both large and small spots of protons allowing, respectively, the rapid filling of large targets (tumours) with radiation, and the precise deposit of radiation on the edge of the tumour near surrounding healthy critical organs. In addition, the LIGHT solution provides a large-field scanning system (up to 30x40cm^2 or an irradiation volume of 30 litres), which significantly removes the need to change the patient position during a treatment session (providing a significant overall reduction in treatment time), and permits treatment of multiple targets simultaneously (e.g. often present in lung geometries).

[1] Globoscan 2018, WHO, SEERStat

A more automated and user-friendly solution

LIGHT is an entire solution. Beyond its novel proton accelerator, it includes all the medical hardware and software necessary to deliver the optimal treatment for patients. These include the treatment chair, the robotic arm that moves and aligns the chair and the patient to the proton beam as well as the imaging systems such as the CT scanner and multi-planar X-rays, which provide the relevant information for locating the tumour and setting the best treatment plan. AVO uses the treatment plan and oncology information systems of RaySearch, a well-established market leader in the PBT software arena, to fully support the LIGHT system and enhance patient experience and management.

On the cloud capabilities

AVO is committed to the training of both physicians and engineers from an early stage. Lack of training has been a major hurdle in the commercial deployment of new technologies in selected geographies. As an illustration, and to facilitate this process, AVO is working on treatment planning software to be hosted "on the cloud". This is expected to facilitate remote training and improve clinical outcomes, resulting in the acceleration of the clinical ramp-up and pipeline. This strategy requires access to academic institutions, which provides pools of talent and ideas.

Conclusion – a fully integrated solution

LIGHT is a fully integrated solution designed to overcome many of the known challenges

AVO aims to deliver not only the next-generation proton accelerating system but also a product that addresses most of the challenges in the PBT market; the same challenges that have been successfully resolved in the MRI industry. At the clinical level, the LIGHT solution will provide all the software suite to ensure an optimal treatment plan, specific to each patient, based on state-of-the-art imaging. The system is expected to: (i) be priced competitively against the current leading systems using cyclotrons; (ii) generate significant cost savings through the entire PBT cost structure (tackling most importantly the building costs which can represent up to 65% of an entire PBT project cost); (iii) result in treatment cost that is a fraction of the prices charged today for PBT; and (iv) gain market share rapidly. This is further detailed in the financial section of this report.

Financing the opportunity

AVO is pursuing an innovative business model…

The commercial success of AVO's PBT system may come not only from its technical advantages, but also from providing customers with a privileged access to financing partners, which will allow a reduced creditor risk and a fast ramp-up. This vendor financing partnership is being pursued by the company; it involves a financing vehicle which buys LIGHT from AVO and installs the equipment in the hospital/clinic, with no upfront capital outlay for the operator, in return for leasing payments over a specific period of time.

An innovative financing approach

What are the challenges?

…which puts less demand on the purchasing clinics/hospitals…

Because it is a new and not yet widely used modality, the empirical evidence base for proton therapy has been slow to mature. While more and more cancer indications are recommended by the American Society for Radiation Oncology (ASTRO), the cost associated with the installation and use of PBT is one of the main challenges that has affected the rate of market adoption. As an example, the estimated cost of the new facility at University College Hospital London (UCLH), which will also house the three-room PBT centre, is estimated at £250m, and the five-storey basement took two years to excavate before construction could start. Services are expected to commence in 2020-21. This demonstrates that the quantum of investment needed to build and install a PBT centre is a major hurdle for prospective customers, and unaffordable for most small to mid-size cancer centres unless alternative sources of funding are available. Furthermore, the financing of the working capital requirement needs to be carefully assessed and may hinder the commercial progress of AVO if it is not carefully considered.

Structure of down-payments

Our research indicates that the current cost of setting up a multi-room PBT centre is in the order of $60-$80m – this is for the PBT equipment alone and excludes the construction costs. Payments are usually made on a staged basis to reflect the manufacturing and installation cycle, along the following lines:

- 5% to 25% on signing the contract;
- 50% to 75% between the commencement of manufacturing and the commencement of installation; and
- 20% to 25% when the system is fully commissioned and validated.

Vendor financing strategy

…through a vendor financing strategy…

By partnering with a preferred financial partner recommended by AVO, hospitals would be able to face a decreased burden from the successive down-payments described above.

Our understanding is that the providers of the vendor financing will probably be different in each territory.

Advantages for all parties

…which has advantages for all the parties involved

The vendor financing arrangement would provide many advantages for the manufacturer (AVO), the purchaser (hospital/clinic), and the providers of finance:

- Significantly reduces the upfront consideration for customers, ultimately increasing the pipeline of customers who can afford LIGHT and accelerating the sales ramp-up for AVO. The purchaser is able to buy LIGHT, which it would otherwise be unlikely to be able to afford.
- Speeds up the procurement process as the customer does not need to search for financing.
- Embeds the financing within the total solution, as opposed to add-on packages.
- Establishes a firm business relationship with the customers.
- The provider of the loan earns a competitive rate of interest, which is usually higher than that available from other opportunities.
- During the underwriting and funding process, AVO receives an approximation of the credit worthiness of the customer.

LIGHT forecasts

Central case

Our central case assumes a modest reduction (ca.30%) in price over time

We published our model for LIGHT forecasts on 12 March 2018. Apart from further consideration about funding, our assumptions are largely unchanged. Outcomes from this model are carried through to our financial forecasts for the company on the following pages. In the event that there is a slower ramp-up in sales and patient treatments, the peak margin would be later than 2024. Alternatively, if there was a faster ramp-up, the peak margin may be achieved ahead of 2024.

Financial model for LIGHT – central case, low price decrease

£m	Year 1 2020	Year 2 2021	Year 3 2022	Year 4 2023	Year 5 2024	Year 6 2025	Year 7 2026	Year 8 2027	Year 9 2028	Year 10 2029	Year 20 2039
Systems sold	1	2	3	4	5	6	7	8	9	10	20
Cumulative system sold	2	4	7	11	16	22	29	37	46	56	211
Cumulative number of rooms	1	4	10	19	31	46	64	85	109	136	571
Price per three-room system	42.3	41.7	41.0	40.4	39.7	39.1	38.4	37.8	37.1	36.5	30.0
LIGHT sales	21.2	62.8	103.2	142.2	180.0	216.4	251.6	285.4	318.0	349.2	590.3
Services sales	0.0	1.1	4.5	11.0	20.5	32.8	47.7	65.0	84.5	106.1	390.9
Licensing income	0.4	1.5	3.8	7.2	11.8	17.5	24.4	32.4	41.5	51.8	217.6
Group sales	**21.5**	**65.5**	**111.5**	**160.5**	**212.3**	**266.7**	**323.7**	**382.8**	**444.0**	**507.1**	**1,198.8**
COGS LIGHT	-19.2	-52.1	-78.4	-96.7	-108.0	-129.8	-152.4	-174.1	-194.9	-215.5	-383.7
COGS services	0.0	-0.5	-1.8	-4.4	-8.2	-13.1	-19.1	-26.0	-33.8	-42.4	-156.4
COGS licensing	-0.4	-1.4	-3.6	-6.9	-11.2	-16.7	-23.2	-30.8	-39.5	-49.2	-206.7
Group COGS	**-19.6**	**-54.0**	**-83.8**	**-108.0**	**-127.4**	**-159.6**	**-194.7**	**-230.9**	**-268.2**	**-307.1**	**-746.8**
LIGHT gross profit	1.9	10.7	24.8	45.5	72.0	86.6	99.1	111.3	123.1	133.8	206.6
Services profit	0.0	0.7	2.7	6.6	12.3	19.7	28.6	39.0	50.7	63.6	234.6
Licensing profit	0.0	0.1	0.2	0.4	0.6	0.9	1.2	1.6	2.1	2.6	10.9
Group gross profit	**1.9**	**11.4**	**27.6**	**52.5**	**84.9**	**107.1**	**129.0**	**151.9**	**175.9**	**200.0**	**452.0**
Gross margin LIGHT	9%	17%	24%	32%	40%	40%	39%	39%	39%	38%	35%
Gross margin services	-	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%
Gross margin licensing	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Group gross margin	**9%**	**17%**	**25%**	**33%**	**40%**	**40%**	**40%**	**40%**	**40%**	**39%**	**38%**
Marketing costs	-1.1	-3.1	-5.2	-7.8	-9.5	-11.3	-13.3	-15.4	-17.5	-19.6	-41.9
Marketing as % sales	5.0%	5.0%	5.0%	5.5%	5.3%	5.2%	5.3%	5.4%	5.5%	5.6%	7.1%
R&D spend (non-capitalised)	-1.1	-1.6	-2.4	-3.0	-3.4	-3.9	-4.4	-4.9	-5.2	-5.6	-8.3
R&D as % sales	5.0%	2.5%	2.3%	2.1%	1.9%	1.8%	1.8%	1.7%	1.7%	1.6%	1.4%
LIGHT profit*	**-0.2**	**6.7**	**20.1**	**41.7**	**71.9**	**92.0**	**111.2**	**131.7**	**153.1**	**174.8**	**401.9**
LIGHT profit margin*	-1%	10%	18%	26%	34%	34%	34%	34%	34%	34%	34%

Excludes corporate overhead

Source: Hardman & Co Life Sciences Research

Key assumptions for central case

- After Harley Street, the next LIGHT system is modelled to be sold in 2020, and there will be on average three treatment rooms per PBT machine.
- The price of a complete system is modelled to start at ca.$55m/£42m for a three-treatment room system ($18m per room), and then reduce as manufacturing efficiencies evolve.
- The maintenance (service) cost of each treatment room is estimated to average $1.5m/£1.1m p.a.
- Gross margins on the LIGHT system will build to about 40% over a five-year period, as more systems are manufactured and installed.
- These forecasts are for the LIGHT system only and do not take account of the corporate overheads that appear in the group financial forecasts (see page 16).

Lower pricing model

Our lower pricing model allows for a sharper reduction in price (ca.45%), but offset by improved volumes

In addition to our central case, a model has been constructed whereby the cost of installing a LIGHT system falls over time at a faster rate in the same way to that seen with MRI scanners. However, the impact of this is less dramatic than might be expected, because, this scenario only affects the initial machine installation. Neither the servicing nor the licensing sales, which build up to become the core, recurring revenue for AVO, are affected by such pricing pressure.

Financial model for LIGHT – Reduced pricing model, greater volume

£m	Year 1 2020	Year 2 2021	Year 3 2022	Year 4 2023	Year 5 2024	Year 6 2025	Year 7 2026	Year 8 2027	Year 9 2028	Year 10 2029	Year 20 2039
Systems sold	1	3	4	5	7	9	11	13	15	17	35
Cumulative system sold	2	5	9	14	21	30	41	54	69	86	360
Cumulative number of rooms	1	4	13	25	40	61	88	121	160	205	973
Price per three-room system	42.3	41.3	40.4	39.4	38.5	37.5	36.5	35.6	34.6	33.6	24.0
LIGHT sales	21.2	83.2	142.8	179.3	233.1	303.3	369.6	432.0	490.7	545.4	832.2
Services sales	0.0	1.1	4.5	14.1	26.5	41.2	61.2	85.8	114.6	147.0	557.5
Licensing income	0.4	1.5	5.0	9.5	15.2	23.2	33.5	46.1	61.0	78.1	370.8
Group sales	**21.5**	**85.8**	**152.2**	**202.9**	**274.8**	**367.8**	**464.3**	**563.9**	**666.2**	**770.5**	**1,760.5**
COGS LIGHT	-19.2	-74.8	-117.1	-134.5	-158.5	-203.2	-243.9	-289.5	-333.6	-381.8	-690.7
COGS services	0.0	-0.5	-1.8	-5.8	-11.1	-17.6	-26.7	-38.2	-52.0	-68.0	-307.8
COGS licensing	-0.4	-1.4	-4.7	-9.1	-14.5	-22.1	-31.9	-43.8	-57.9	-74.2	-352.3
Group COGS	**-19.6**	**-76.7**	**-123.6**	**-149.3**	**-184.1**	**-242.9**	**-302.4**	**-371.4**	**-443.5**	**-524.0**	**-1,350.8**
LIGHT gross profit	1.9	8.3	25.7	44.8	74.6	100.1	125.7	142.6	157.0	163.6	141.5
Services profit	0.0	0.7	2.7	8.4	15.4	23.6	34.5	47.6	62.6	79.0	249.7
Licensing profit	0.0	0.1	0.2	0.5	0.8	1.2	1.7	2.3	3.0	3.9	18.5
Group gross profit	**1.9**	**9.1**	**28.6**	**53.7**	**90.8**	**124.9**	**161.9**	**192.5**	**222.6**	**246.5**	**409.7**
Gross margin LIGHT	9%	10%	18%	25%	32%	33%	34%	33%	32%	30%	17%
Gross margin services	-	60%	60%	59%	58%	57%	56%	56%	55%	54%	45%
Gross margin licensing	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Group gross margin	**9%**	**11%**	**19%**	**26%**	**33%**	**34%**	**35%**	**34%**	**33%**	**32%**	**23%**
Marketing costs	-1.1	-3.1	-5.2	-7.8	-9.5	-11.3	-13.3	-15.4	-17.5	-19.6	-41.9
Marketing as % sales	5%	4%	3%	4%	3%	3%	3%	3%	3%	3%	2%
R&D spend (non-capitalised)	-1.1	-1.6	-2.4	-3.0	-3.4	-3.9	-4.4	-4.9	-5.2	-5.6	-8.3
R&D as % sales	5%	2%	2%	1%	1%	1%	1%	1%	1%	1%	0%
LIGHT profit*	**-0.2**	**4.4**	**21.1**	**42.8**	**77.8**	**109.7**	**144.1**	**172.2**	**199.9**	**221.4**	**359.5**
LIGHT profit margin*	-1%	5%	14%	21%	28%	30%	31%	31%	30%	29%	20%

**Excludes corporate overhead*

Source: Hardman & Co Life Sciences Research

Key assumptions for lower pricing model

- The price of a complete three-room system falls ca.45% over time from ca.$55m/£42m initially to ca.$32m/£24m for a three-treatment room system.
- The LIGHT gross margin would decrease faster from its peak at 40% in the central case.
- All other sales and costs with respect to servicing and licensing, together with marketing and R&D investment, remain the same.
- Under this scenario, the long-term group gross profit margin would reduce to 23% (vs. 38% in the central scenario).

Financial forecasts

Profit & Loss

- **Drivers:** The P&L is driven entirely from our model of LIGHT forecasts.
- **SG&A:** Forecasts split SG&A into marketing spend (from LIGHT model) and administration costs (corporate overhead).
- **R&D investment:** Much of current R&D spend on LIGHT is currently being capitalised. Future R&D spend shown in the P&L account reflects the investment in system and software upgrades.
- **Profitability:** Based on our LIGHT forecasts, AVO will become profitable at both the EBITDA and EBIT level in fiscal 2022.
- **JVs:** AVO has an agreed JV with CircleHealth (49%:51%) for the operation of Harley Street. In the early years, most of the operating EBIT will be offset against financing costs.

Profit & Loss account						
Year-end Dec (£m)	2017	2018E	2019E	2020E	2021E	2022E
GBP:USD	1.354	1.289	1.312	1.312	1.312	1.312
LIGHT systems sold	0	0	1	1	2	3
Cumulative systems	0	0	0	2	4	7
Cumulative rooms	0	0	0	1	4	10
Sales	0.0	0.0	0.0	21.5	65.5	111.5
COGS	0.0	0.0	0.0	-19.6	-54.0	-83.8
Gross profit	0.0	0.0	0.0	1.9	11.4	27.6
Marketing costs	0.0	0.0	-1.0	-1.1	-3.1	-5.2
Administration costs	-12.9	-14.0	-13.7	-14.0	-14.3	-14.6
R&D (future development)	0.0	0.0	0.0	-1.1	-1.6	-2.4
Underlying EBITDA	**-12.6**	**-13.6**	**-14.3**	**-11.6**	**-5.0**	**8.1**
Depreciation	-0.4	-0.4	-0.4	-0.4	-0.4	-0.5
Amortisation	0.0	0.0	0.0	-2.2	-2.2	-2.1
Other income	0.0	0.0	0.0	0.0	0.0	0.0
Underlying EBIT	**-12.9**	**-14.0**	**-14.7**	**-14.2**	**-7.6**	**5.5**
Share-based costs	-1.5	-3.0	-3.3	-3.6	-3.9	-4.5
Share of JV profit/(loss)	0.0	0.0	0.0	-0.6	0.7	1.7
Exceptional items	0.0	0.0	0.0	0.0	0.0	0.0
Statutory EBIT	-14.5	-17.0	-18.0	-18.4	-10.8	2.6
Net interest	-2.0	-0.3	-0.7	-1.4	-1.8	-1.8
Underlying pre-tax profit	**-14.9**	**-14.3**	**-15.4**	**-15.7**	**-9.4**	**3.7**
Other financials	0.0	0.0	0.0	0.0	0.0	0.0
Extraordinary items	0.0	0.0	0.0	0.0	0.0	0.0
Statutory pre-tax profit	-16.5	-17.3	-18.6	-19.8	-12.7	0.8
Tax payable/credit	2.8	3.0	2.4	2.2	1.1	1.2
Underlying net income	**-12.1**	**-11.3**	**-12.9**	**-13.4**	**-8.3**	**4.8**
Forex gain/loss	-1.1	0.0	0.0	0.0	0.0	0.0
Statutory net income	-14.7	-14.3	-16.2	-17.6	-11.6	2.0
Ordinary 25p shares:						
Period-end (m)	72.5	169.6	224.6	247.8	254.8	261.8
Weighted average (m)	77.8	147.5	183.3	236.2	251.3	258.3
Fully-diluted (m)	91.4	161.0	218.3	264.2	272.3	272.3
Underlying basic EPS (p)	**-15.6**	**-7.6**	**-7.0**	**-5.7**	**-3.3**	**1.9**
Statutory basic EPS (p)	-18.9	-9.7	-8.8	-7.4	-4.6	0.8
Underlying fully-dil. EPS (p)	-13.3	-7.0	-5.9	-5.1	-3.1	1.8
Statutory fully-diluted EPS (p)	-16.1	-8.9	-7.4	-6.7	-4.2	0.7
DPS (p)	0.0	0.0	0.0	0.0	0.0	0.0

Source: Hardman & Co Life Sciences Research

Balance sheet

- **Fiscal 2018:** Forecasts suggest that the company had a small net debt position at 31 December 2018, with the likelihood that a short-term loan was taken on towards the end of the year.
- **Subscription:** In January, AVO completed a direct Subscription for 25.0m new Ordinary shares at a price of 40p, raising gross new funds of £10.0m. The investment round was led by DNCA Investments with £4.8m (48%). The new investment just announced is raising a further £2.3m.
- **Working capital:** There will inevitably be a build-up in debtors and creditors as the company signs contracts for LIGHT systems and places orders with its manufacturing partners for the various modules.

Balance sheet						
@31 Dec (£m)	2017	2018	2019E	2020E	2021E	2022E
Shareholders' funds	28.7	35.2	44.0	36.5	24.9	26.9
Cumulated goodwill	0.0	0.0	0.0	0.0	0.0	0.0
Total equity	28.7	35.2	44.0	36.5	24.9	26.9
Share capital	20.2	42.4	56.1	62.0	63.7	65.5
Reserves	8.4	-7.2	-12.1	-25.5	-38.8	-38.6
Provisions/liabilities	0.0	16.5	16.5	16.5	16.5	16.5
Long-term loans	0.0	0.0	13.0	23.0	23.0	23.0
Short-term debt	9.2	3.5	0.0	0.0	0.0	0.0
less: Cash	0.1	1.9	13.9	16.2	8.6	5.3
Invested capital	**37.9**	**53.3**	**59.6**	**59.8**	**55.9**	**61.1**
Fixed assets	1.2	3.9	3.9	3.9	3.9	4.0
Intangible assets	30.6	39.5	43.9	44.0	42.9	40.7
Investments	0.3	0.3	0.3	0.3	0.3	0.3
JV investment	0.0	0.0	0.0	3.0	3.0	3.0
Inventories	7.6	11.8	16.0	20.1	20.7	30.0
Trade debtors	*0.0*	*0.0*	*1.5*	*2.1*	*6.3*	*10.3*
Other debtors	*2.8*	*2.8*	*2.8*	*2.8*	*2.8*	*2.8*
Tax liability/credit	*2.9*	*3.0*	*2.4*	*2.2*	*1.1*	*1.2*
Trade creditors	*-4.0*	*-2.0*	*-1.9*	*-2.0*	*-2.1*	*-2.2*
Other creditors	*-3.5*	*-6.0*	*-9.3*	*-16.6*	*-23.0*	*-29.1*
Debtors less creditors	-1.8	-2.2	-4.4	-11.5	-15.0	-17.0
Invested capital	**37.9**	**53.3**	**59.6**	**59.8**	**55.9**	**61.1**
Net cash/(debt)	**-9.2**	**-1.6**	**0.9**	**-6.8**	**-14.4**	**-17.7**

Source: Hardman & Co Life Sciences Research

Cashflow

- **Working capital:** The strategy to facilitate vendor financing arrangements with purchasers is aimed at securing working capital. However, there will still be a working capital requirement during the ramp-up phase.
- **Harley Street:** As part of the JV arrangement with CircleHealth, AVO is committed to an investment of £3.0m in fiscal 2020.
- **Loans/capital increases:** Apart from the capital increases in January and May 2019, an allowance has been made for extra funding rounds. The £10.0m loan from Credit Suisse is also reflected in the model. An assumption has been made that future loans will be taken on against contracted orders for LIGHT.
- **Capital increases/warrants:** A further small capital increase has been allowed for in fiscal 2019. In addition, exercise of all outstanding warrants is reflected over the forecast period.

- **Cashflow breakeven:** Based on our central case LIGHT forecasts, we believe that AVO will reach operational cashflow breakeven at the end of fiscal 2023.

Cashflow						
Year-end Dec (£m)	2017	2018	2019E	2020E	2021E	2022E
Underlying EBIT	-12.9	-14.0	-14.7	-14.2	-7.6	5.5
Depreciation	0.4	0.4	0.4	0.4	0.4	0.5
Amortisation	0.0	0.0	0.0	2.2	2.2	2.1
Inventories	*-0.2*	*-4.2*	*-4.1*	*-4.2*	*-0.6*	*-9.3*
Receivables	*-2.1*	*0.0*	*-1.5*	*-0.6*	*-4.2*	*-4.0*
Payables	*4.3*	*-2.0*	*-0.1*	*0.1*	*0.1*	*0.1*
Change in working capital	2.0	-6.2	-5.7	-4.7	-4.7	-13.3
Exceptionals/provisions	-0.8	16.5	0.0	0.0	0.0	0.0
Investment in JVs	0.0	0.0	0.0	-3.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.0
Company op. cashflow	**-11.4**	**-3.3**	**-20.0**	**-16.3**	**-9.6**	**-5.2**
Net interest	-0.6	-0.6	-0.7	-1.4	-1.8	-1.8
Tax paid/received	3.1	2.8	3.0	2.4	2.2	1.1
Operational cashflow	**-8.9**	**-1.2**	**-17.7**	**-15.3**	**-9.2**	**-5.9**
Capital expenditure	-0.1	-3.1	-0.4	-0.4	-0.5	-0.5
Capitalised intangibles	-8.4	-8.9	-4.5	-2.2	-1.1	0.0
Sale of fixed assets	0.0	0.0	0.0	0.0	0.0	0.0
Free cashflow	**-17.4**	**-13.2**	**-22.5**	**-17.9**	**-10.8**	**-6.4**
Acquisitions	0.0	0.0	0.0	0.0	0.0	0.0
Dividends	0.0	0.0	0.0	0.0	0.0	0.0
Other investments	0.0	0.0	0.0	-3.0	0.0	0.0
Cashflow after investments	**-17.4**	**-13.2**	**-22.5**	**-20.9**	**-10.8**	**-6.4**
Exercise of warrants	0.0	0.0	0.0	3.2	3.2	3.2
Capital increases	7.3	20.8	25.0	10.0	0.0	0.0
Currency effect	0.0	0.0	0.0	0.0	0.0	0.0
Change in net debt	**-10.1**	**7.6**	**2.5**	**-7.7**	**-7.6**	**-3.2**
Hardman CF/share (p)	-11.4	-0.8	-9.6	-6.5	-3.7	-2.3
Opening net cash (debt)	0.9	-9.2	-1.6	0.9	-6.8	-14.4
Closing net cash/(debt)	**-9.2**	**-1.6**	**0.9**	**-6.8**	**-14.4**	**-17.7**

Source: Hardman & Co Life Sciences Research

Valuation

Only one direct competitor focused solely on PBT that is quoted

There are a number of difficulties in attempting to value AVO. First, its immediate peers that manufacture and supply PBT systems are well established MedTech companies with high levels of sales, little of which are directly for PBT machines, e.g. Varian, Hitachi and Sumitomo. Secondly, other direct PBT competitors, e.g. Mevion, are still private companies, where valuations are not available. Thirdly, some peers offer image-guided radiotherapy for cancer patients, but do not have PBT systems (e.g. Accuray and Elekta). Fourthly, the likes of Proton Partners have PBT treatment centres, but do not manufacture and supply the systems that are being used.

The following is a summary of companies operating in the field of radio-oncology:

- **Accuray:** Designs, develops and commercialises advanced radiosurgery and radiation therapy systems. The company has the only robotic radiosurgery system, CyberKnife, on the market. Its TomoTherapy systems are specifically designed for image-guided, intensity-modulated radiation therapy, with Radixact also encompassing precision treatment software. At 31 December 2018, the company had an order backlog of $482m.
- **Elekta:** Elekta is a global leader in radiation oncology and has played a leading role in its technological advancements over the last 30 years. Whilst the company is focused on treatment systems that can deliver precise and accurate radiotherapy to improve patient outcomes, it is not involved in PBT. Sales in the year to April 2019 are expected to be SEK13,300m/$1.54bn.

- **IBA:** IBA is the leading player in the manufacture and supply of PBT systems, with 45% share of treatment rooms currently in operation and 35% of those under construction (source: PTCOG). Sales in 2018 were €208m/$240m and the company has a substantial order backlog.
- **Varian Medical Systems:** Varian is a leading manufacturer of medical devices and software for treating cancer and other medical conditions with radiotherapy, stereotactic radiosurgery, stereotactic body radiotherapy, brachytherapy and proton therapy. The company is well established with annual sales of ca.$3bn, $150m (5%) being derived from Proton Solutions.
- **Proton Partners:** The company owns and runs PBT centres equipped with IBA systems. Currently, it has one centre in operation (Newport, South Wales), and two others (Bedlington, Northumberland and Reading, Berkshire) under construction, which are due to start patient treatments during 2019. It floated on the NEX in February 2019 at a high valuation (£344m), equating to about £110m per treatment centre. This highlights the potential value of Harley Street.

Peer group analysis

All of AVO's quoted peers carry much higher EVs

Despite differences in the companies' activities compared with AVO, a table of peers has been constructed to provide an informed view about the potential valuation of AVO, especially when it becomes fully de-risked over the course of the next 12-18 months. Currently, the market is valuing AVO at an EV of ca.£79m, which only equates to the amount of money invested into the project to date, and not allowing for the technical advances that have been made.

What is evident is that all of AVO's quoted peers are trading on EVs that are multiples of that commanded currently by AVO – range 4.2x to 113.2x – as can be seen in the table below.

Peer group analysis

Company	Accuray	Advanced Oncotherapy	Elekta	IBA	Proton Partners	Varian
Ticker	ARAY	AVO	EKTAb	IBAB	PPI	VAR
Currency	$	£/p	SEK	€	£/p	$
Share price	4.18	42.5	112	14.7	225.0	135
Shares in issue (m)	87.9	200.4	518.4	30.1	152.7	90.8
Market cap (l.c. m)	367.3	85.2	57,801	442.8	343.6	12,228
Mkt cap (£m)	279.3	85.2	4,606	377.2	343.6	9,299
Cash	59.4	9.9	4,541	38.7	36.0	505
Debt	-136.8	-3.5	-5,344	-85.8	-24.4	0
EV (l.c. m)	444.7	78.7	58,604	489.9	332.0	11,723
EV (£m)	338.2	78.7	1,584	417.3	332.0	8,915
Relative EV	**4.3**		**20.1**	**5.3**	**4.2**	**113.2**

Prices and currencies taken at close of business on 9 May 2019
l.c. = local currency
Source: Hardman & Co Life Sciences Research

Traditional multiple-based valuations

Alternatively, given that AVO is on the cusp of generating its first sales, comparisons can start to be made between AVO and its quoted peers based on traditional multiple-based valuation methodologies – P/E, EV/sales, EV/EBITDA. These provide further confirmation of the upside potential as AVO becomes de-risked and LIGHT system sales commence.

Peer group valuation ratios										
Company	Ticker	P/E			EV/sales			EV/EBITDA		
Year-end Dec.		2018	2019E	2020E	2018	2019E	2020E	2018	2019E	2020E
Accuray*	ARAY	-18.3	-42.0	840.0	2.0	2.0	1.9	58.9	45.6	37.3
Advanced Oncotherapy	AVO	-5.6	-6.0	-7.5	-	-	3.7	-5.8	-5.5	-6.8
Elekta*	EKTAb	47.8	38.4	34.3	11.4	9.8	8.7	18.9	16.6	13.6
IBA	IBAB	18.5	7.3	18.7	2.5	2.1	1.9	67.1	55.0	40.2
Varian Medical Systems	VAR	84.8	29.3	26.0	4.1	3.9	3.6	24.5	22.8	20.5

Ratios adjusted from reported to calendar year-end
Prices taken at close of business on 9 May 2019
Source: Hardman & Co Life Sciences Research

The market is likely to become much more appreciative of AVO over the course of the next year as the LIGHT system becomes further de-risked (application for CE marking) and the group generates its first LIGHT orders. The re-valuation process is unlikely to be a single step, but multiple small steps that each reflect the progress being made towards becoming a fully operational, profitable and cash generative company.

Discounted cashflow

A simple DCF model based on our LIGHT forecasts (see pages 14-15), together with the corporate overhead, has been generated to provide alternative guide to the valuation of AVO. The following key assumptions have been used:

- The WACC is 12%, reflecting the volatility of the share price of an AIM-listed, non-revenue generating medtech operator.
- Losses carried forward will be used to offset tax liability for four years from first sales; thereafter 17% tax has been applied.
- No risk-adjustment has been applied with respect to the probability of success or regulatory risk. This has been allowed for in the slightly higher WACC used compared with the usual 10% cost of equity.
- No allowance has been made for the residual terminal value at the end of the 20-year forecast period.
- No allowance has been made for any potential income from JV's, e.g. CircleHealth.

A DCF of the LIGHT forecasts generates a minimum NPV of 288p per share on a fully-diluted basis

Based on these assumptions, the net present value of the cashflows that could be generated from our central case forecasts for LIGHT equates to £663m or 331p per share. Allowing for the impact of exercising all the outstanding options and warrants reduces this to 288p per share. Applying the same DCF model to our LIGHT forecasts that adopt a faster erosion in pricing, but greater volumes, generates an NPV of £773m or 336p per share (fully diluted). A summary of our analysis can be seen in the following table.

DCF analysis of LIGHT forecasts		
	Central case	Reduced pricing model
NPV of cashflows (£m)	663	773
Net cash/(debt (2019)	1	1
NPV per share (basic, p)	331	386
NPV per share (fully-diluted, p)	288	336

Source: Hardman & Co Life Sciences Research

Glossary

CERN	Conseil Européen for Recherche Nucléaire
CT	Computerised tomography
DCF	Discounted cashflow
IBA	Ion Beam Applications
LIGHT	Linac Image-Guided Hadron Technology
MeV	Mega-electron Volts
MRI	Magnetic resonance imaging
PBT	Proton beam therapy
PET	Positron emission tomography
PTCOG	Particle Therapy Co-Operative Group

Notes

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