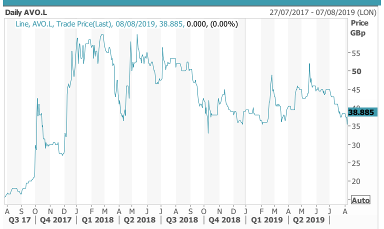
HARDMAN & CO.

Pharmaceuticals & Biotechnology



Source: Refinitiv

Market data

EPIC/TKR	**AVO**
Price (p)	**38.0**
12m High (p)	55.1
12m Low (p)	32.4
Shares (m) *pro forma*	236.7
Mkt Cap (£m)	89.9
EV (£m)	77.9
Free Float*	65%
Market	AIM

**As defined by AIM Rule 26*

Description

Advanced Oncotherapy (AVO) is developing next-generation proton therapy systems for use in radiation treatment of cancers. The first system is expected to be installed in Daresbury for CE marking. Meanwhile, Harley Street, London, is progressing to plan and will be operated via a JV with Circle Health.

Company information

Exec. Chairman	Michael Sinclair
CEO	Nicolas Serandour

+44 203 617 8728
www.avoplc.com

Key shareholders – *pro forma*

Board & Management	9.6%
Liquid Harmony	19.0%
P Glatz	6.6%
DNCA Investments	5.1%
Brahma AG	3.3%
Barrymore Investments	3.3%
Lombard Odier	3.2%
Balthisches Haus	3.2%

Diary

2H'19	Interim results
2H'19	Delivery of LIGHT modules

Analysts

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ADVANCED ONCOTHERAPY

Nearing the end-goal

AVO's 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 the achievement of a number of technical milestones, including successful integration and validation of all the module types that constitute the LIGHT accelerator, thereby de-risking the project. AVO is delivering on its schedule to have the first LIGHT machine set up in Daresbury (Cheshire) ready for treating first patients by the end of 2020, while completing the final building stage at the Harley Street site.

- **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 technology know-how developed by ADAM, a spin-off from CERN, and relies on a base of world-class suppliers.
- **LIGHT update:** At its AGM in July, management highlighted that its Daresbury site would be used not only for the integration and assembly of LIGHT, but also for the verification and validation process, which entails the treatment of a small cohort of patients. Meanwhile, Harley Street is being handed over to AVO for fit-out.
- **Financing update:** AVO has announced a Subscription of new Ordinary shares at 40p per share to raise £14.4m (gross), of which £11.0m is new capital, together with a new £4.0m loan facility from a significant shareholder. The new funds (£18.4m) will be used for progressing the verification and validation of LIGHT.
- **Risks:** What started off as a long-term vision to have a modular and affordable PBT system, based on the latest technology, is getting ever closer, with the end now in sight. While execution and commercial risks remain, the increasing probability of a successful outcome is attracting worldwide attention.
- **Investment summary:** AVO's market capitalisation of £90m equates only to the amount invested into LIGHT to date, which reflects neither the enormous technical challenges that have been overcome, nor the market potential. A DCF analysis of the LIGHT prospects generates an NPV of at least 239p per share (fully-diluted). The disconnect between fundamental and market valuations offers an investment opportunity, which will reduce as AVO completes its financing plan.

Financial summary and valuation

Year-end Dec (£m)	2017	2018	2019E	2020E	2021E	2022E
Sales	0.0	0.0	0.0	21.5	65.5	111.5
Gross profit	0.0	-1.9	0.0	1.9	11.4	27.6
Administration costs	-12.9	-15.7	-15.4	-15.8	-16.1	-16.4
EBITDA	-14.1	-21.4	-19.6	-17.3	-9.1	5.1
Underlying EBIT	-14.5	-21.8	-20.0	-20.0	-11.8	2.5
Statutory EBIT	-14.5	-21.8	-20.0	-20.5	-11.1	4.1
Underlying PBT	-16.5	-21.9	-20.7	-21.5	-13.7	0.6
Statutory PBT	-16.5	-21.9	-20.7	-22.0	-13.0	2.2
Underlying EPS (p)	-17.6	-14.0	-9.8	-7.9	-4.9	0.7
Statutory EPS (p)	-18.9	-13.4	-9.8	-8.1	-4.7	1.3
Net (debt)/cash	-9.2	-2.0	-1.1	-9.0	-15.3	-13.8
EV/EBITDA (x)	-7.0	-4.3	-4.7	-5.7	-11.6	20.4

Source: Hardman & Co Life Sciences Research

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Executive summary

2018 – a pivotal year

Significant technical milestones in 2018…

…that greatly de-risked the project

Last year, the technical risk inherent in building a complex and innovative piece of medical equipment, such as LIGHT, was greatly reduced. AVO reached the stage where the four components (the proton source, the RFQ, the SCDTLs and the CCLs) that constitute the LIGHT accelerator were integrated at its Geneva testing site, giving an accelerator capable of generating a proton beam with energies (>50MeV) required to treat superficial tumours. This represented a major milestone that greatly de-risked the entire project. Meanwhile, major advances were made with the Patient Positioning System (PPS) and the Treatment Planning System (TPS) software.

Establishing the facility at Daresbury was an important strategic decision…

…for first patient testing and regulatory approval

In addition, management took the decision to establish an assembly and testing site in the UK, and signed a lease with the UK Government's Science and Technology Facilities Council (STFC) at Daresbury. This facility will be used to assemble the first complete and operational version of the LIGHT system to full energy (230MeV) for testing and validation for regulatory approval (CE marking). Also, a small cohort of patients is expected to be treated at this integration site before the first full machine is installed in Harley Street. This strategy will allow the company to accelerate its regulatory plan for important markets outside Europe, such as the US and Chinese markets.

2019 – approaching the end-goal

AVO has made a number of announcements, highlighting that considerable progress has continued during 2019, keeping the company on schedule to have the first patient treated by the end of 2020.

AVO has indicated that a small cohort of patients (e.g. 10) will need to be treated in order to obtain CE marking

At the AGM, management highlighted the importance of the Daresbury integration facility. Although the decision to establish this assembly and testing site was largely on the basis of significantly reduced cost, the benefit of having a 'local' facility close to healthcare providers, and in partnership with SFTC, has provided the opportunity to treat a small cohort of patients directly at the integration site; this will be used to obtain regulatory approval (CE marking). This, in no way, diminishes the importance of the flagship site in Harley Street.

In addition, in its latest technology update provided in the AGM statement, the company highlighted that all the key parts and modules of the LIGHT solution have now been manufactured, with delivery of the remaining items expected to occur between now and the end of 2020. This means that the company is now entering a new, less risky, less cash-intensive phase of verification and validation, which is aimed at ensuring that each module and the entire system have been manufactured as per the specifications and the users' requirements.

Daresbury LIGHT schedule

Component*	#	Manufactured	Delivery at Daresbury
Proton source	1	✓	By end of September 2019
RFQ	1	✓	✓ Delivered
SCDTL	4	✓	By end of September 2019
CCL	13	✓	6 delivered, 7 by early 4Q'19
Patient positioning	1	✓	By end of 2019
On-site validation			Throughout 2019 and 2020
First patient treatment			By end of 2020

see Appendix (page 17)

Source: Advanced Oncotherapy AGM statement

Opportunity for FLASH radiation

The more efficient linear accelerator paves the way for using new FLASH technology

A major difference between linear accelerators (i.e. LIGHT) and conventional cyclotrons and synchrotrons (i.e. competitive circular accelerators) is that linear accelerators can be controlled electronically to produce a proton beam of a specific energy level required for targeting the tumour at the right depth within the patient's body. In contrast, the control of energy in cyclotrons is done mechanically through the use of absorbers, which results in significant unwanted radiation in the accelerator hall. Consequently, linear accelerators have been shown to be much more energy-efficient than cyclotrons, paving the way for the use of a new technique called FLASH, where the entire radiation treatment is given in one visit – as opposed to 25-30 currently needed with existing radiation techniques.

Harley Street update

Phase three, the fit-out, has started at the flagship Harley Street site

Meanwhile, the challenging development of the Harley Street site remains on schedule and has now moved on to its final stage – client fitting and preparation of the site for installation of the LIGHT accelerator.

A site visit highlighted the enormous progress that has been made

The structural work, and estimated £10m cost, has been the responsibility of the freeholder, the Howard de Walden Estate. Currently, the site is in the process of being handed over to AVO to start the fit-out phase, so that it is ready for the installation of the first commercial LIGHT system. We have had the privilege of being invited to visit the site and see the progress for ourselves. At the time of this visit, the heavy-duty lift was being installed, through which all the modules that comprise the LIGHT system will be moved from the delivery entrance to the accelerator hall in the basement, highlighting a major difference compared with conventional cyclotrons, which require a large footprint and heavy lifting equipment.

A recent BBC Horizon programme highlighted the construction size and complexity for conventional PBT centres

The different footprint required by the two types of accelerator (i.e. linear vs. circular) was put into perspective by a recent *Horizon* programme on the BBC, highlighting the enormity of the PBT installation project being undertaken at University College Hospital, London. It showed the complexity of building and installing PBT equipment, which sheds light on the benefits of having a smaller and modular system, such as LIGHT. The replay of this documentary is well worth viewing, in our opinion [1].

Commercial push

Liquid Harmony has identified 11 expressions of interest in China

While all the attention has been focused on the technical developments of LIGHT and the developments at Daresbury and Harley Street, AVO has been discretely developing a sales pipeline. In 2018, AVO signed up a new commercial partner, Liquid Harmony (Yantai CIPU), for China and a number of countries in SE Asia. Liquid Harmony has identified 11 expressions of interest in China, and the demand in other countries appears to bode well.

Considerable progress has also been made in a number of other territories. We expect commercial traction to accelerate following the appointment of Moataz Karmalawy as Chief Commercial Officer and President of the US division. Previously, he was General Manager worldwide for Particle Therapy Treatment at Varian Medical, a global leader in PBT. This appointment is a major coup for AVO and provides a considerable vote of confidence in LIGHT's attractive proposition.

[1] BBC2 Horizon programme: https://www.bbc.co.uk/iplayer/episode/m00072kd/horizon-2019-5-the-250-million-pound-cancer-cure

Financing update

Since the beginning of the year, AVO has raised ca.£44m of financing

Given the considerable de-risking of the LIGHT project, with the end-goal now very much in sight, AVO has moved to strengthen its balance sheet and fund the project.

Since the beginning of the year, AVO has raised ca.£44m of financing through a combination of equity (ca.£26.5m) and debt (£14.0m). 70% of the new equity raised has been done with the support of new investors, which highlights that the shareholder base is becoming more diversified.

Funding during 2019

Date	Equity (£m)	Debt (£m)	Comment
January 2019	10.0	-	Subscription at 40p per share
May 2019	2.4	10.0	Subscription at 40p per share
August/September 2019	14.5	4.0	Same terms; includes conversion of prev. loan
	26.5	14.0	

Source: Company announcements

Current funding round

AVO has announced £18.4m of funding through a combination of equity (£14.4m) and debt (£4.0m) to fund completion of the verification and validation of LIGHT in Daresbury.

Equity

The equity funding is a combination of new capital, loan conversion and the issue of shares in lieu of salary/fees to certain directors. All the shares will be issued at 40p, consistent with previous equity issues in 2019.

Current round of equity financing

Shares at 40p	Number (m)	Funds raised (£m)
New money	27,567,500	11.02
Loan + interest conversion	5,984,162	2.39
Conversion of fees/salaries by directors/advisors	2,433,340	0.97
Total	35,985,002	14.39

Source: Advanced Oncotherapy

In December 2018, AVO took out a loan with one of its existing shareholders, Philippe Glatz, to provide some short-term working capital. The outstanding capital (£2.25m), together with accrued interest, has been converted into Ordinary shares in this funding round.

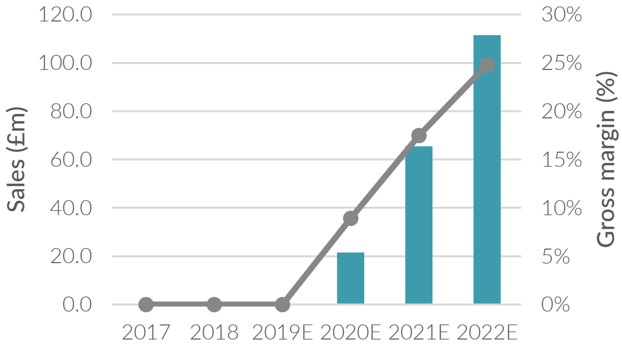
In addition, some of the company directors and former directors/advisors have elected to receive their salary/fees in shares on the same terms.

More importantly, AVO will receive £11.0m (gross) of new capital. This will be completed across August (£8.5m) and September (£2.5m).

Loan

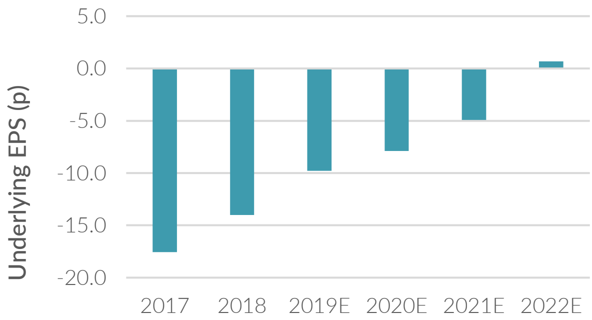
Additionally, AVO has taken out a new loan with Nerano Pharma Ltd, a company owned and controlled by a significant existing shareholder, Seamus Mulligan. It has been drawn down immediately and will attract interest at 12% p.a., paid annually. In the event that interest is accrued and repaid at Term, it will be at a rate of 15% p.a.

Sales



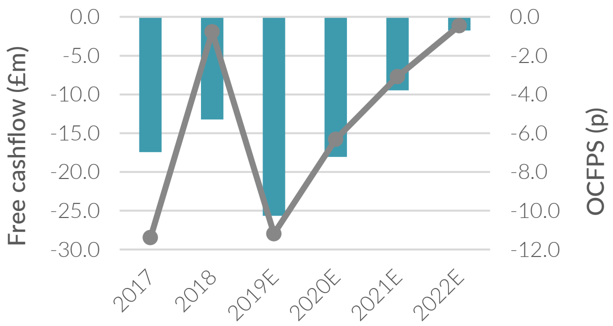
- First sales (bars in chart to the left) expected in 2020 through the JV with Circle Health, AVO's JV partner for Harley Street
- We anticipate gross margin (line in chart to the left) to increase with the number of machines sold
- Gross margin projected to stabilise at around 35%-40% from 2023

Underlying EPS



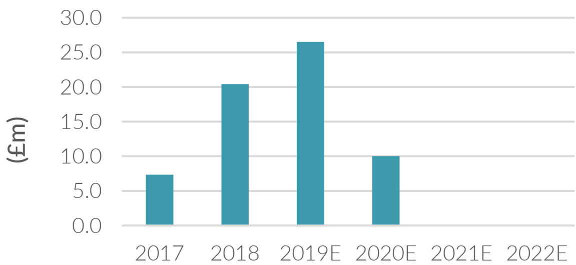
- With sales of first machines, EPS expected to improve
- We forecast AVO to be EPS-positive from 2022

Free cashflow/OCFPS



- In FY2019, cash burn estimated to peak at £25.6 and then reduce in subsequent years, following commencement of sales
- In FY2019, we anticipate further investment in Daresbury site, as well as at Harley Street site
- We forecast AVO to be free-cashflow-positive (bars in chart to the left) in 2023

Equity issues



- In fiscal year 2018, AVO raised £20.4m by way of a Placing and private placement
- In 2019, AVO has raised £40.8m gross new funds, of which £26.8m (gross) in equity and £14.0m in long-term debt

Source: Company data, Hardman & Co Life Sciences Research

Daresbury facility

Assembly and testing site in the UK

Daresbury will house the first complete LIGHT system for validation and regulatory approval

In May 2018, AVO made an important decision to sign a lease with the UK Government's Science and Technology Facilities Council (STFC) to establish a UK testing and assembly site at Daresbury (Cheshire). As highlighted earlier, the first complete full energy LIGHT system will now be assembled at this site, which will be used for the first patient treatment and for the purpose of obtaining regulatory approval. AVO has indicated that the treatment of a small cohort of patients will be needed for CE marking.

STFC facility

Source: STFC website

Initially, an existing bunker on the STFC site was adapted in preparation for the assembly of the components that comprise the LIGHT system. The concrete shielding for the proton injector and RF test bunkers is already in place, and the supporting steel work and appropriate electrical installations are at an advanced stage. At the AGM, management indicated that assembly would commence next month and that all of the modular components of the linear accelerator had been manufactured, with some already delivered to Daresbury. The full schedule is shown below.

Daresbury LIGHT schedule

Component*	#	Manufactured	Delivery at Daresbury
Proton source	1	✓	By end of September 2019
RFQ	1	✓	✓ Delivered
SCDTL	4	✓	By end of September 2019
CCL	13	✓	6 delivered, 7 by early 4Q'19
Patient positioning	1	✓	By end of 2019
On-site validation			Throughout 2019 and 2020
First patient treatment			By end of 2020

**see appendix (page 17)*

Source: Advanced Oncotherapy AGM statement

The Daresbury site will establish new treatment capability infrastructure for the LIGHT system, and provides risk mitigation. It does not change AVO's well-advanced plan for high-volume production, and, together with its industrial partners, the company is looking at its options for the industrialisation of LIGHT and supply chain strategy to make the system more affordable and attractive to potential customers.

During assembly of this first LIGHT system, AVO's goal is to further streamline the production process, with the opportunity to scale up manufacturing infrastructure by setting up additional assembly lines. The initial plan has not changed and relies on the unique modular features of the LIGHT system, which will enable the manufacture of up to eight LIGHT machines p.a. in the first instance.

STFC

STFC is an independent, non-departmental public body of the UK government's Department for Business, Energy & Industrial Strategy (BEIS), and one of Europe's largest multi-disciplinary research organisations. It was established in 2007, and has been an active partner in the initial installation and upgrades of the Large Hadron Collider at CERN. The Daresbury Laboratory has expertise in world-leading scientific research in fields such as accelerator science, bio-medicine, physics, chemistry, materials, engineering and computational science. It is a particularly good fit for the LIGHT system, as it is home to the Accelerator Science and Technology Centre (ASTeC), which studies all aspects of the science and technology of charged particle accelerators, ranging from large-scale international and national research facilities through to specialised industrial and medical applications.

FLASH technology

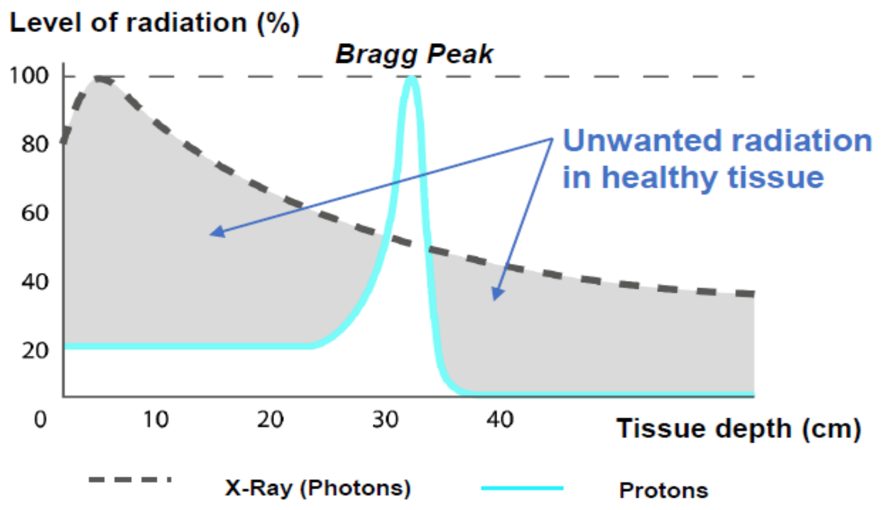
Energy efficiency of LIGHT

Comparative evaluations provide further evidence of the superiority of LIGHT over conventional cyclotrons

AVO's R&D team in Geneva has used simulating tools to perform a head-to-head comparison between the energy efficiency of proton beams generated by LIGHT with those from a conventional cyclotron. Efficiency is determined from the ratio of the protons produced to the number of protons delivered to the patient.

As highlighted earlier, conventional cyclotrons shoot the proton beam at high energy, and then use energy degraders to reduce it to the required level, so that protons stop at the right depth in the patient's body – a proton beam with high energy will enable the treatment of a deep-seated tumour compared with a proton beam with low energy.

Bragg peak – unique physical property of protons



Source: AVO AGM presentation July 2019

Shielding requirement

Source: AVO AGM presentation July 2019

The need for absorbers in circular accelerators reduces the efficiency of the system, and the excess amount of unwanted radiation needs to be isolated via thick and expensive protective shielding. In contrast, LIGHT generates a proton beam at an energy level that can be modulated via the linear accelerating units, eliminating surplus radiation and removing any need for energy degraders. The data showed that LIGHT has a 95% energy efficiency at two clinically relevant energies; in contrast, the cyclotron had an energy efficiency of only 20% and 50%, at 170Mev and 210 MeV, respectively. AVO estimates that the shielding requirement for LIGHT is ca.60% lower compared with the current shielding used for cyclotrons, at 1.5m vs. 4.0m, respectively.

Simulated efficiency of LIGHT vs. cyclotron

Energy simulated	LIGHT efficiency	Cyclotron efficiency
170 MeV	95%	20%
210 MeV	95%	50%

Source: AVO

Apart from being a more efficient system, needing lower shielding requirements, the study also envisioned:

- reduced concerns over the safety of emitted radiation – a feature particularly relevant for installation in city centres such as the Harley Street site; and
- lower cost compared with an extensive shielding requirement for cyclotrons.

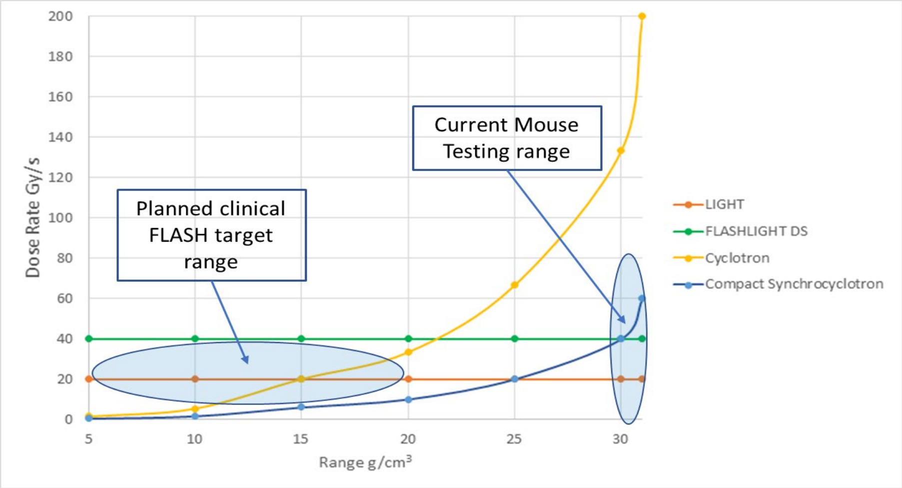
LIGHT will be compatible with state-of-the-art technologies, such as FLASH irradiation

Flash radiation

Side effects of radiation therapy are a major concern for clinicians, even when using proton therapies that deliver highly targeted dose deposition. It is of clinical interest to develop methods that spare normal healthy tissue from radiotherapy toxicity.

Patients undergoing radiotherapy are traditionally treated over a course of 20 to 30 visits. This technique, called fractionation, allows healthy cells that may have been damaged by radiation to recover, whereas cancerous cells will eventually die. Some early – but very promising – studies have shown that a patient could potentially be treated in only one visit if he/she were to receive an ultra-high dose of radiation in a very short time frame – typically less than half a second. This is the basis of FLASH radiation therapy, and it has created a lot of excitement in the industry, due to the greater convenience for patients, and the potential to increase the number of patients that can be treated – thereby improving the economic profile of the clinical facility.

Flash technology



Source: AVO AGM presentation July 2019

This novel technique has the potential to dramatically change the landscape of radiotherapy and patient cancer care by enhancing the therapeutic window. It is believed that the use of an ultra-high radiation dose, delivered in a millisecond, could provide more effective tumour treatment, and fewer and faster treatments – in addition to lower side effects on surrounding tissues. Fewer and faster treatments will also allow radiotherapy treatment rooms to accommodate more patients, significantly expanding their utilisation. FLASH irradiation is still a very recent technique under review in animal studies.

Opportunity for LIGHT

As highlighted in the previous section, the ability of cyclotrons to generate a FLASH light radiation beam is particularly challenging, due to i) the need to use absorbers, which create excess radiation in the accelerator hall, resulting in a large shielding requirement, and ii) the need to generate significantly more protons than in traditional treatment (ca.40 Grays per second with FLASH vs. two Grays per minute, on average!). Because LIGHT does not require absorbers and is efficient at all energies, it becomes clear why one would be so excited about the prospects of delivering FLASH through LIGHT. In our opinion, this feature has fallen under investors' radars, but we doubt that it will have been overlooked by some high-profile hires at the company, specialist oncologists, or AVO's competitors.

In a poster[2] presented at the last PTOG, held in Manchester, scientists at AVO investigated the possibility of using LIGHT in proton pencil beam scanning (PBS) for uniform FLASH irradiation. Using a commercial treatment planning system from RaySearch, the study indicated that radiations were delivered at the needed dose within the half-second FLASH time limit, at a pulse rate of 200 Hz (i.e. pulse every five ms).

- LIGHT is the first PBT linac with a 3GHz time structure – as conventional radiotherapy linac – that could deliver FLASH beams.
- Electronically selectable energy allows FLASH irradiation at all depths, including those requiring lower energy, without the need for energy degraders.
- The analytical study shows that average dose rates up to 93Gy/s could be achievable, dose therapeutically relevant.

This is a topical issue, given that IBA also disclosed recently the use of FLASH irradiation in a gantry with its ProteusONE machine.

[2] Investigation on FLASH therapy using a high frequency linac for proton, A.M. Kolano et al, PTCOG 2019, poster presentation, Manchester UK

Harley Street on schedule

The development of the Harley Street site is on track, with the last stage of building work just started

Progress at 141-143 Harley Street continues apace. The project is expected to include two treatment rooms without the usual huge and heavy legacy gantry – instead using a robotic chair that moves patients between a vertical sliding CT scanner and the beam nozzle. The building work was divided into three contracts.

Three stages of construction work

Contract	Description	Status
#1	Excavation, piling, and wall and roof reconstruction	✓ Completed
#2	Landlord fitting, including lifts, air extractors, etc	✓ Completed
#3	Tenant fitting	About to start

Source: Hardman & Co Life Sciences Research

Contracts #1 and #2 have now been completed. The £10m building cost of the two first contracts has been borne by the freeholder, Howard de Walden Estate. With the handover to AVO, the site is now ready for the final stage of work – the fit-out phase – which corresponds to the detailed design of the site to support and prepare for installation of the LIGHT system.

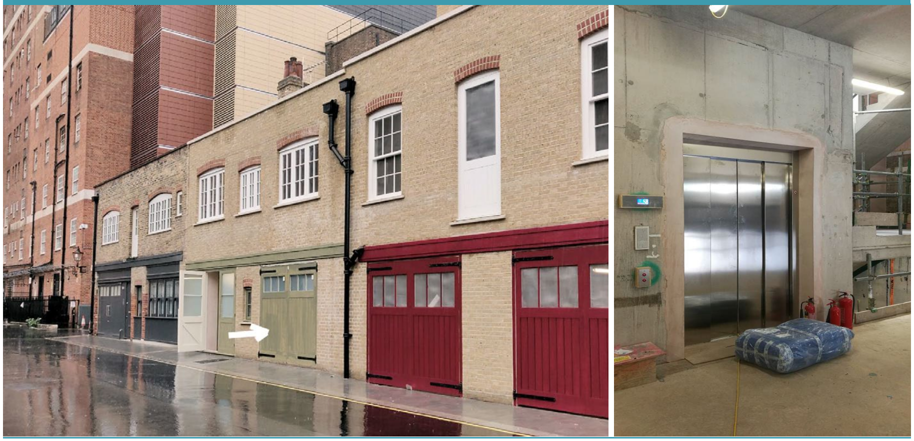
We have carried out a site visit, noticing that the outside scaffolding has now been removed and the site cleared, ready for tenant customisation. The patient reception and consultation rooms will be at the historical front-end of the building, while the PBT treatment areas will be in modern and friendly state-of-the art rooms.

Site visit – potential for two treatment rooms

Source: Hardman & Co Life Sciences Research, site visit 25 July 2019

The modular design of the accelerator means that there is no requirement for heavy cranes/lifting equipment, each module being transported to the accelerator hall located in the basement through a 2.7m-high and 1.8m-wide lift, also highlighting the small footprint.

Modules delivered through the back door!



Source: Advanced Oncotherapy, Hardman & Co Life Sciences Research, site visit 25 July 2019

The following pictures show the current state of the accelerator hall and treatment room (left side) as observed during our site visit, and illustrations of them after being fitted out (right side).

Visualisation of the accelerator hall and treatment room: current and after LIGHT installation

Accelerator hall – current

Accelerator hall – after

Treatment room – current

Treatment room – after

Source: Advanced Oncotherapy, Hardman & Co Life Sciences Research, site visit 25 July 2019

Financial forecasts

Profit & Loss

- **Forecasts:** Unchanged, apart from the knock-on effects of the 2018 actuals.[3]
- **COGS:** Corresponds to the impairment of the prototype LIGHT machine used to generate the 52MeV, which has no commercial value. New, upgraded units, are being used to construct the system for CE marking at the Daresbury facility.
- **SG&A:** Forecasts split SG&A into marketing spend (from LIGHT model) and administration costs (corporate overhead).
- **Underlying EBIT:** Share-based costs are now incorporated as part of underlying EBIT, reflected by the consequent changes to earnings.
- **Profitability:** Based on our LIGHT forecasts, AVO will become profitable at both the EBITDA and EBIT levels in fiscal 2022.

Profit & Loss account

Year-end Dec (£m)	2017	2018	2019E	2020E	2021E	2022E
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	-1.9	0.0	-19.6	-54.0	-83.8
Gross profit	0.0	-1.9	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	-15.7	-15.4	-15.8	-16.1	-16.4
Share-based costs	-1.5	-4.2	-4.6	-5.0	-5.5	-6.3
R&D (future development)	0.0	0.0	0.0	-1.1	-1.6	-2.4
Other income	0.0	0.0	0.0	0.0	0.0	0.0
Underlying EBITDA	**-14.1**	**-21.4**	**-19.6**	**-17.3**	**-9.1**	**5.1**
Depreciation	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4
Amortisation	0.0	0.0	0.0	-2.2	-2.2	-2.2
Underlying EBIT	**-14.5**	**-21.8**	**-20.0**	**-20.0**	**-11.8**	**2.5**
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	-21.8	-20.0	-20.5	-11.1	4.1
Net interest	-2.0	-0.1	-0.7	-1.5	-1.9	-1.9
Underlying PBT	**-16.5**	**-21.9**	**-20.7**	**-21.5**	**-13.7**	**0.6**
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 PBT	-16.5	-21.9	-20.7	-22.0	-13.0	2.2
Tax payable/credit	2.8	0.8	2.4	2.2	1.1	1.2
Underlying net income	**-13.7**	**-21.1**	**-18.2**	**-19.3**	**-12.6**	**1.7**
Forex gain/loss	-1.1	1.0	0.0	0.0	0.0	0.0
Statutory net income	-14.7	-20.2	-18.2	-19.8	-11.9	3.4
Ordinary 25p shares:						
Period-end (m)	72.5	169.6	236.7	252.0	259.0	266.0
Weighted average (m)	77.8	150.5	186.3	244.3	255.5	262.5
Fully-diluted (m)	91.4	188.2	221.3	272.3	276.5	276.5
Underlying basic EPS (p)	**-17.6**	**-14.0**	**-9.8**	**-7.9**	**-4.9**	**0.7**
Statutory basic EPS (p)	-18.9	-13.4	-9.8	-8.1	-4.7	1.3
Underlying fully-diluted EPS (p)	-14.9	-11.2	-8.2	-7.1	-4.6	0.6
Statutory fully-diluted EPS (p)	-16.1	-10.7	-8.2	-7.3	-4.3	1.2
DPS (p)	0.0	0.0	0.0	0.0	0.0	0.0

Source: Hardman & Co Life Sciences Research

[3] https://www.hardmanandco.com/wp-content/uploads/2019/05/AVO-–-Is-PT-the-new-MRI-13-May-2019.pdf

Balance sheet

- **Net cash/(debt):** AVO had a small net debt position of -£2.0m at 31 December 2018 (-£9.2m 2017). This has been boosted subsequently by the three new funding arrangements to date in 2019.
- **Subscription:** In January 2019, AVO completed a direct Subscription for 25.0m new Ordinary shares at a price of 40p, raising gross new funds of £10.0m, led by DNCA Investments with £4.8m (48%). A further Subscription in May 2019 raised £2.3m. The Subscription just announced will raise a further £14.5m (gross, including loan conversion), which will be received by the company across August and September.
- **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	34.0	42.3	32.4	20.5	24.0
Cumulated goodwill	0.0	0.0	0.0	0.0	0.0	0.0
Total equity	28.7	34.0	42.3	32.4	20.5	24.0
Share capital	20.2	42.4	59.2	63.0	64.8	66.5
Reserves	8.4	-8.4	-16.9	-30.6	-44.2	-42.6
Provisions/liabilities	0.0	16.5	16.5	16.5	16.5	16.5
Long-term loans	0.0	0.0	14.0	24.0	24.0	24.0
Short-term debt	9.2	3.0	0.0	0.0	0.0	0.0
less: Cash	0.1	1.0	12.9	15.0	8.7	10.2
Invested capital	**37.9**	**52.5**	**59.9**	**57.9**	**52.3**	**54.3**
Fixed assets	1.2	4.1	4.1	4.1	4.1	4.2
Intangible assets	30.6	40.2	44.6	44.5	43.4	41.2
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	10.0	13.5	17.0	17.5	25.4
Trade debtors	*0.0*	*0.0*	*1.5*	*2.1*	*6.3*	*10.3*
Other debtors	*2.8*	*3.2*	*3.2*	*3.2*	*3.2*	*3.2*
Tax liability/credit	*2.9*	*0.7*	*2.4*	*2.2*	*1.1*	*1.2*
Trade creditors	*-4.0*	*-2.8*	*-1.9*	*-2.0*	*-2.1*	*-2.2*
Other creditors	*-3.5*	*-3.2*	*-7.7*	*-16.5*	*-24.5*	*-32.4*
Debtors less creditors	-1.8	-2.1	-2.6	-11.0	-16.1	-19.9
Invested capital	**37.9**	**52.5**	**59.9**	**57.9**	**52.3**	**54.3**
Net cash/(debt)	**-9.2**	**-2.0**	**-1.1**	**-9.0**	**-15.3**	**-13.8**

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 Circle Health, AVO is committed to an investment of £3.0m in fiscal 2020.
- **Capitalised spend:** High intangible expenditure of £8.8m in 2018 includes, in part, the investment at the Daresbury site. This is expected to reduce significantly from next year.
- **Loans/capital increases:** To date in 2019, AVO has raised a total of ca.£40.5m new capital through a mixture of equity (ca.£26.5m gross) and loan facilities (£14.0m). An assumption has been made that future loans will be taken against contracted orders for LIGHT.
- **Capital increases/warrants:** At the end of 2018, AVO had 31.4m warrants outstanding, which are exercisable over the coming years, with the potential to raise ca.£8.0m of new capital. This 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	-14.5	-21.8	-20.0	-20.0	-11.8	2.5
Depreciation	0.4	0.4	0.4	0.4	0.4	0.4
Amortisation	0.0	0.0	0.0	2.2	2.2	2.2
Share-based payments	1.5	4.2	4.6	5.0	5.5	6.3
Inventories	*-0.2*	*-4.3*	*-3.5*	*-3.5*	*-0.5*	*-7.9*
Receivables	*-2.1*	*0.0*	*-1.5*	*-0.6*	*-4.2*	*-4.0*
Payables	*4.3*	*-1.4*	*-0.9*	*0.1*	*0.1*	*0.1*
Change in working capital	2.0	-5.7	-5.9	-4.0	-4.6	-11.8
Exceptionals/provisions	-0.8	18.0	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	0.8	0.0	0.0	0.0	0.0
Company op. cashflow	**-11.4**	**-4.0**	**-20.9**	**-16.3**	**-8.2**	**-0.4**
Net interest	-0.6	-0.1	-0.7	-1.5	-1.9	-1.9
Tax paid/received	3.1	2.9	0.7	2.4	2.2	1.1
Operational cashflow	**-8.9**	**-1.2**	**-20.9**	**-15.4**	**-7.9**	**-1.2**
Capital expenditure	-0.1	-3.3	-0.4	-0.4	-0.5	-0.5
Capitalised intangibles	-8.4	-8.8	-4.4	-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**	**-25.7**	**-18.1**	**-9.5**	**-1.8**
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**	**-25.7**	**-21.1**	**-9.5**	**-1.8**
Exercise of warrants	0.0	0.0	0.0	3.2	3.2	3.2
Capital increases	7.3	20.4	26.5	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**	**7.2**	**0.8**	**-7.9**	**-6.3**	**1.4**
Hardman & Co CF/share (p)	-11.4	-0.8	-11.2	-6.3	-3.1	-0.5
Opening net cash (debt)	0.9	-9.2	-2.0	-1.1	-9.0	-15.3
Closing net cash/(debt)	**-9.2**	**-2.0**	**-1.1**	**-9.0**	**-15.3**	**-13.8**

Source: Hardman & Co Life Sciences Research

Company matters

Board of Directors

Board of Directors	
Name	**Position**
Dr Michael Sinclair	Executive Chairman
Nicolas Serandour	Chief Executive Officer
Peter Sjostrand	Non-executive Director, Vice-Chairman
Prof. Steve Myers	Executive Director, ADAM executive Chairman
Michael Bradfield	Non-executive Director
Hans von Celsing	Non-executive Director
Chunlin Han	Non-executive Director
Dr Yuelong Huang	Non-executive Director
Dr Nick Plowman	Non-executive Director, Chairman Medical Advisory
Gabriel Urwitz	Non-executive Director
Dr Enrico Vanni	Non-executive Director
RenHua Zhang	Non-executive Director

Source: Company reports

Medical Advisory Board

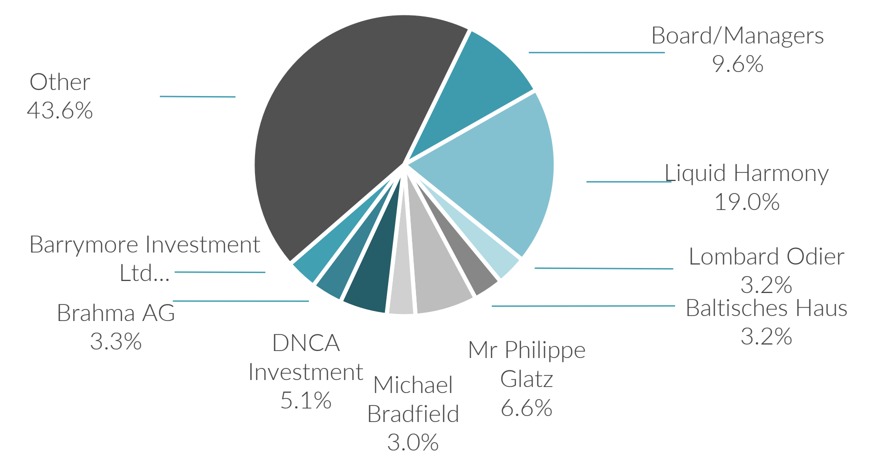
Medical Advisory Board	
Name	**Affiliation**
Prof. Ugo Amaldi	Founder and President of the TERA Foundation
Dr Hanne Kooy	Associate Director of Medical Physics at Harvard Medical School
Dr Jay S Loeffler	Professor of Radiation Oncology at Harvard Medical School and Chair of Radiation Oncology at the Massachusetts General Hospital
Prof. Chris Nutting	Clinical oncologist & chair at The Royal Marsden and ICR London
Dr Margaret Spittle OBE	Clinical oncologist at University College Hospital London
Dr Euan Thomson	Operating partner at Khosla Ventures, CEO of AliveCor and Director of the Hospice of the Valley

Source: Company reports

Share capital

By the end of September, on a *pro-forma* basis, AVO will have 236,650,044 Ordinary shares in issue. There are currently 8.0m options and 35m warrants outstanding.

Shareholders – *pro-forma* (on admission of new shares to AIM)



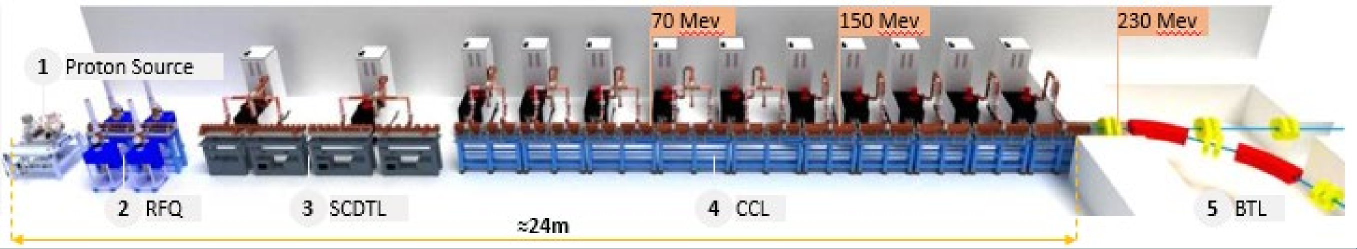
**Also members of the Board*
Source: Company announcements, Hardman & Co Life Sciences Research

Appendix

The LIGHT accelerator

The LIGHT proton beam accelerator unit is composed of four main structures, which are integrated with delivery and patient positioning systems.

LIGHT accelerator



Source: Advanced Oncotherapy investor presentation

- **Proton source:** The proton source generates a very high rate of up to 200 pulses of protons per second (a rate higher than that of any competitor) from a source of hydrogen gas. The protons are accelerated to an energy level of 40keV.
- **Radio Frequency Quadruple (RFQ):** This focuses the beam and accelerates the protons from 40keV to 5MeV. The RFQ structure is composed of four units, each designed to match the proton velocity. The RFQ unit has been designed by CERN. It operates at the highest frequency in the world, at 750MHz (compared with the closest RFQ at 400MHz), which allows the wavelength to be much shorter; this, in turn, allows the RFQ component to be shorter and more affordable.
- **Side Coupled Drift Tube Linac (SCDTL):** Manufactured by TSC and VDL, the SCDTLs, each with their own power unit, sit between the RFQ and the CCL components. The four low-speed accelerating units aim to accelerate the protons from 5MeV to 37.5MeV. Again, each unit is different, so that it matches the increasing velocity of the protons.
- **Coupled Cavity Linac (CCL):** This structure of high accelerating units is composed of up to 15 separate units to accelerate the proton beam from 37.5MeV to the clinically relevant energy of up to 230MeV (0.6x the speed of light).
- **Dose Delivery System (DDS, or 'nozzle'):** Once fully accelerated, the high-energy beam passes into the DDS, which ensures that the proton beam is both measured and targeted to maximise its effectiveness in cancer treatment.
- **Patient Positioning System (PPS):** This represents the end-part of the system and comprises several components that allow the optimal positioning of the patient for both imaging and therapy.

Glossary

ASTeC	Accelerator Science and Technology Centre
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
PBT	Proton Bean Therapy
STFC	Science and Technology Facilities Council

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