

**Market data**

EPIC/TKR	AVO
Price (p)	50.7
12m High (p)	64.8
12m Low (p)	9.5
Shares (m)	156.5
Mkt Cap (£m)	79.4
EV (£m)	72.4
Free Float*	47%
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 Harley Street, London, during 2019; it will be operated through a JV with Circle Health.

Company information

Exec. Chairman Michael Sinclair
CEO Nicolas Serandour

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www.advancedoncotherapy.com**Key shareholders**

Board & Management	15.4%
Yantai CIPU	28.9%
Brahma AG	5.8%
AB Segulah	4.2%
M3T Pte Ltd	3.3%
MK Trust	3.1%

Diary

Oct'18	Interims
Mch'19	Finals
1H'19	Harley Street ready

Analysts

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Advanced Oncotherapy

Treatment planning system agreement

AVO's goal is to deliver a more affordable, novel, proton-based radiotherapy system, based on state-of-the-art technology developed originally at the world-renowned CERN. Major technical milestones were achieved in 2017 and the company remains on track with its development plan. Confidence has been boosted greatly by the integration of the first three structures and overcoming the technical challenge of accelerating the proton beam. With the hardware progressing well, AVO has announced a strategic collaboration with RaySearch for the development of the treatment planning system for LIGHT in Harley Street.

- **Strategy:** To develop a compact and modular proton therapy (PT) 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, Geneva, and relies on a base of world-class suppliers.
- **Collaboration agreement:** The strategic collaboration agreement with RaySearch will enable AVO to equip the LIGHT system at Harley Street with the full spectrum of the company's RayStation software functionality for treatment planning, encompassing patient positioning through to treatment solutions.
- **RaySearch:** RaySearch has a presence in 2,600 clinics in 65 countries through licensing agreements with leading medical technology companies. It is the global leader in software solutions for radio and particle therapies and will provide AVO with its established RayStation software to control the LIGHT system.
- **Risks:** With the new funding secured, the visibility of the company and its ability to keep the pace of its development plan have improved. Execution risk remains, but the more complex technical challenges have been overcome, and integration of the remaining units follows known working prototypes.
- **Investment summary:** Demand for PT is increasing worldwide and the need for a small, flexible, affordable and close-to-patient machine is desirable. AVO has attracted strong partners and discussions with potential customers are advancing. Attention is focused on the construction timetable for the flagship Harley Street site and installation of the first LIGHT system. Forward planning to provide the software for controlling the LIGHT hardware is boosting confidence further.

Financial summary and valuation

Year-end Dec (£m)	2015	2016	2017	2018E	2019E	2020E
Sales	0.0	0.0	0.0	0.0	0.0	4.6
Administration costs	-6.6	-11.2	-12.9	-12.4	-12.6	-12.8
Milestones/up-fronts	0.0	0.0	0.0	16.5	0.0	0.0
EBITDA	-6.4	-10.8	-12.6	4.5	-12.1	-12.3
Underlying EBIT	-6.6	-11.2	-12.9	4.1	-12.6	-12.8
Reported EBIT	-8.5	-13.1	-14.5	2.2	-14.6	-15.4
Underlying PBT	-6.7	-11.3	-14.9	1.4	-15.6	-15.8
Statutory PBT	-8.6	-13.2	-16.5	-0.5	-17.7	-18.5
Underlying EPS (p)	-7.1	-13.9	-15.6	2.8	-6.8	-6.6
Statutory EPS (p)	-12.3	-14.4	-18.9	1.6	-7.9	-7.9
Net (debt)/cash	8.0	0.9	-9.2	12.3	-5.3	-25.2
Capital increase	21.1	13.5	0.3	32.2	8.0	8.0

Source: Hardman & Co Life Sciences Research

Partnering with RaySearch

Collaboration agreement for the TPS

As with all computer-assisted systems, the hardware is worthless without the appropriate software to control it. This is particularly true for radiotherapy, and even more so for proton therapy (PT), where patient position, imaging and the beam have to be measured, simulated and aligned extremely accurately – in the order of one millimetre – to maximise the positive effects of the proton and minimise the harm to healthy tissue. AVO has made sufficient progress with its hardware over the past 18 months, and this now requires the patient treatment planning system (TPS) to be considered.

AVO has selected the validated and established RayStation software solution to provide the TPS for LIGHT. RayStation is a flexible software system, easy to operate by the end-user, and compatible with most radiotherapy machines. The agreement provides AVO with the full spectrum of RayStation's functionality, integrating everything needed to operate a PT system. Currently, the collaboration agreement is only for the LIGHT machine to be installed at Harley Street.

RaySearch is the market-leading entity that provides its innovative RayStation software platform for patient planning solutions for flexible systems. RaySearch's software solutions have been installed in over 2,600 clinics in 65 countries through licensing agreements with leading medical technology companies. In the current year, RayStation has been used in 466 centres in 31 countries as the software controlling the TPS in oncology. Therefore, oncologists/radiologists around the world are familiar with this software package. RaySearch's products are being distributed through licensing agreements with leading medical radiation therapy *RT) companies such as Varian, IBA, Philips, Accuray and Hitachi-Mitsubishi.

Treatment planning system

The TPS is at the heart of RT systems and considered to be key to improved patient outcomes. It uses 3D image datasets of the patient's position and internal organ/tissue where the tumour/s is/are located. The system develops a complex plan for each patient to optimise the route of the beam line to access the tumour, as well as avoiding key organs that are sensitive to radiation. The software also estimates and processes the dose distribution and frequency in the patient's tissue, including variables such as tissue type (e.g. bone or lung vs. muscle) that require different energy levels.

RayStation software features

RayStation integrates all RaySearch's advanced treatment planning solutions into a flexible treatment planning system. It has been designed for 4-D adaptive RT as a built-in generic feature and it incorporates the latest techniques for PT, including the fast proton Monte Carlo dose engine used for modelling the proton beam. It also contains tools for multi-criteria optimisation, enabling a much more intuitive treatment planning process. The software uses a modular design to offer different combinations of its capabilities. It also includes functionality that can be used in other radiotherapy techniques for intensity-modulated radiation therapy (IMRT) and volumetric modulated arc therapy (VMAT) optimisation, and highly accurate dose engines for particle therapies: photon, electron, proton and carbon ion therapy. The system is built on the latest software architecture and features a graphical user interface with state-of-the-art usability and flexibility.



Source: RayStation product brochure 2018

The list of the different features included in the RayStation system is too long to be itemised, and software upgrades add new elements that follow requests from customers. In 2018, RaySearch released RayStation8, which will provide a new feature in artificial intelligence (AI). With the RayStation system, AVO will have access to the full spectrum of software possibilities, including the following:

- ▶ a fast proton Monte Carlo dose engine, which can be used for final dose computation and optimisation;
- ▶ robust 4D optimisation, which allows organ motion seen, for example, during patient breathing;
- ▶ linear energy transfer (LET) driven optimisation, which describes the action of radiation into matter;
- ▶ deformable registration, which allows, for example, weight loss and tumour shrinkage;
- ▶ dose accumulation for better results;
- ▶ plan adaptation;
- ▶ multi-criteria optimisation;
- ▶ automatic plan generation through Plan Explorer.

What does the agreement mean for AVO?

The collaboration with RaySearch will provide AVO with almost turnkey software, which will require new development and customisation in order to maximise the potential of the LIGHT system's advanced capabilities. RayStation is already established in controlling PT systems from various competitors, giving confidence that RayStation can provide an adequate TPS solution for LIGHT. The system supports a full range of standard features used in PT, including pencil beam scanning, double scattering, uniform scanning, line scanning and wobbling. The system has been adopted by 43 particle centres in 14 countries. However, although RayStation will provide a faster, validated, alternative to bespoke software, in the longer term, we believe AVO will build its own TPS in order to maximise the distinct features of the LIGHT system. We noted, for example, that the use of the unique fast beam frequency at 200MHz will not be supported by RayStation.

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