

Targovax

ONCOS-102 plus durvalumab trial in spotlight

Company update

Pharma & biotech

28 May 2020

Price **NOK8.00**

Market cap **NOK608m**

Net cash (NOKm) at end Q120 (excludes government loans) plus private placement 135.3

Shares in issue 76.0m

Free float 90%

Code TRVX

Primary exchange Oslo Stock Exchange

Secondary exchange N/A

Share price performance



% 1m 3m 12m

Abs 8.7 38.9 52.4

Rel (local) 2.6 46.9 74.6

52-week high/low NOK10.2 NOK3.7

Business description

Targovax is an immunoncology company headquartered in Oslo, Norway, developing an oncolytic virus platform, ONCOS. ONCOS-102 is prioritised in several indications including mesothelioma and melanoma. Targovax is also working on next-generation oncolytic viruses in its preclinical R&D pipeline.

Next events

Additional ONCOS-102 mesothelioma Phase I data Mid-2020

Cohort 2 data from Phase I melanoma H220

More preclinical data on new oncolytic viruses 2020

Q120 results 20 August 2019

Analyst

Jonas Peculis +44 (0)20 3077 5728

healthcare@edisongroup.com

[Edison profile page](#)

**Targovax is a research client of
Edison Investment Research
Limited**

Targovax has announced that one of the trials with ONCOS-102, which is sponsored by Ludwig Institute for Cancer Research, will be in the spotlight at this year's ASCO meeting. This is an open-label Phase I/II trial that is exploring the combination of intraperitoneally delivered ONCOS-102 and systemically administered checkpoint inhibitor durvalumab (anti-PD-L1, Imfinzi, AstraZeneca) in patients with ovarian or colorectal cancers metastasised to the peritoneum. An abstract from the dose-escalation part of the trial will be presented at ASCO. Although Targovax is not sponsoring the trial, this may become a new opportunity for the company. Targovax's two lead trials with ONCOS-102 in melanoma and mesothelioma are on track to deliver data later this year. Our valuation is virtually unchanged at NOK1.52bn or NOK20.0 per share.

Year end	Revenue (NOKm)	PBT* (NOKm)	EPS* (NOK)	DPS (NOK)	P/E (x)	Yield (%)
12/18	0.0	(147.3)	(2.8)	0.0	N/A	N/A
12/19	2.3	(147.9)	(2.4)	0.0	N/A	N/A
12/20e	0.0	(134.5)	(1.9)	0.0	N/A	N/A
12/21e	0.0	(136.6)	(1.8)	0.0	N/A	N/A

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

Peritoneal malignancies uniquely suitable indication

The abstract was published online last week and describes the dose-escalation part of the study. The combination treatment had an acceptable tolerability profile and no dose-limiting toxicities were observed. As a result, the high dose level was selected for the expansion phase, which is ongoing. Targovax has not confirmed its future intention in this setting, which we believe will depend on the data and any potential interest from partners. Patients with peritoneal metastasis can be treated with intraperitoneal chemotherapy, but there are limited number of chemotherapy options available. ONCOS-102 can also be used for intraperitoneal therapy and, if successful, this trial can open up opportunities with administration into cavities and address significant unmet needs.

Two lead trials on track to deliver data in 2020

Targovax started 2020 with the first randomised data readout from its Phase I/II trial with oncolytic virus ONCOS-102 in unresectable mesothelioma. It will present further data by mid-2020. Interim results released in July 2019 from Part 1 of the Phase I trial with ONCOS-102 in refractory melanoma were the hallmark event last year. More data from this trial are expected later this year (H220). In addition, Targovax has hired Dr Victor Levitsky, a medical doctor with a PhD in virology, as chief scientific officer. One of his key focus areas will be the new generation of oncolytic viruses, so we expect this programme to gain importance as it advances towards clinical trials.

Valuation: NOK1.52bn or NOK20.0 per share

Our valuation is virtually unchanged at NOK1.52bn or NOK20.0/share. The timely private placement of NOK101m in January 2020 ensured funding for 2020. In our view, this and the upcoming newsflow from both key clinical trials helped the share price to rebound to pre-COVID-19 levels.

ONCOS-102 plus durvalumab (Imfinzi) dose escalation abstract to be presented at ASCO

Targovax reported that an abstract from the ongoing investigator-led Phase II trial in peritoneal malignancies had been selected for the poster discussion session 'Developmental Therapeutics – Immunotherapy' and will be presented on 29 May at the ASCO 2020 virtual meeting. The abstract was published online last week and describes the dose escalation part of the study. This trial is a collaboration among Ludwig Institute for Cancer Research, Cancer Research Institute (CRI, New York City), AstraZeneca and Targovax. Ludwig Institute is the official sponsor that runs the study. AstraZeneca supplies durvalumab and Targovax supplies ONCOS-102.

Exhibit 1: Key Targovax Phase I/II data vs historical controls

Product candidate	Preclinical	Phase I	Phase II	Phase III	Next expected event
ONCOS-102	Mesothelioma Combination w/ pemetrexed/cisplatin				1H 2020 Updated clinical and immune data
	Melanoma Combination w/Keytruda				2H 2020 Clinical and immune activation data
	Peritoneal malignancies Collaborators: Ludwig, CRI & AstraZeneca Combination w/Imfinzi				1H 2020 Update at ASCO
	Prostate Collaborator: Sotio Combination w/DCvac				Update by collaborator
ONCOS-200 series	Next Gen viruses				Updates at conferences
Novel mutRAS concepts					

Source: Targovax

Exhibit 2: Targovax's ONCOS-102 collaborations, current status and upcoming newsflow

Indication and collaborator	Stage	Combo with	Trial design and upcoming events
■ Ovarian and colorectal cancer (sponsored by Ludwig/CRI)	Phase I/II	CPI (durvalumab)	<ul style="list-style-type: none"> ■ Rather large open-label clinical trial (n=78) sponsored by US Ludwig Institute for Cancer Research and the CRI. In combination with durvalumab supplied by AstraZeneca. ■ Endpoints: safety/tolerability, clinical efficacy benefit at week 24, ORR, PFS, OS. ■ Study completion date: 2022

Source: Edison Investment Research, Targovax. Notes: CPI: checkpoint inhibitor; ORR: objective response rate; PFS: progression-free survival, OS – overall survival.

This is an open label [Phase I/II trial](#), which is exploring the combination of intraperitoneally delivered ONCOS-102 and systemically administered checkpoint inhibitor durvalumab (anti-PD-L1, Imfinzi, AstraZeneca) in patients with platinum-resistant ovarian or colorectal cancers that have metastasized to the peritoneal cavity. The trial design includes a dose-escalation phase assessing three different dosing levels. This is followed by an expansion phase with a total of up to 78 patients enrolled into ovarian and colorectal cancer arms.

The ASCO abstract presents safety, immune activation and clinical response data from the three dose escalation cohorts. In total, 17 patients were recruited into three cohorts: A (low dose, four patients), B (middle dose, five patients) and C (high dose, eight patients). The combination treatment had an acceptable tolerability profile and no dose-limiting toxicities were observed. As a result, the high dose level was selected for the expansion phase, which is ongoing. Preliminary

immune response findings indicate the treatment is triggering immune activation and has clinical activity, which were more pronounced in higher dose cohorts B and C.

Because it was the dose escalation part of the trial, no conclusions about the clinical efficacy can be made yet. The fact that the combination was well tolerated and the highest dose was selected for the expansion phase was the best possible outcome of this part of the trial. Phase II part of the trial is now enrolling patients.

Peritoneal malignancies: Potentially large commercial opportunity

The peritoneum is a tissue (membrane) that lines organs in the abdominal cavity. Due to its proximity to several other organs, a primary tumour in these organs can easily metastasise to the peritoneum. Primary tumours can also originate in the peritoneum, but this is very rare. Colorectal cancer and ovarian cancer are common primary tumours that are known to metastasise to the peritoneum. Although survival rates have improved somewhat with the introduction of new treatments, the prognosis of these patients is still very poor due to the advanced stage of the disease. Specific treatments for peritoneal metastases are cytoreductive surgery and hyperthermic intraperitoneal chemotherapy, but patients will likely be receiving additional treatments for their primary tumours. Patients with peritoneal metastasis can be treated with intraperitoneal chemotherapy, but there are limited number of chemotherapy options available. ONCOS-102 can also be used for intraperitoneal therapy and, if successful, this trial can open up opportunities with administration into cavities and address significant unmet needs.

Potentially large patient population

Epithelial ovarian cancer is the most common type of ovarian cancer, making up around 90% of cases ([cancer.org](https://www.cancer.org)). The majority of patients who are diagnosed have advanced disease (around 87%; [Narod, 2016](#)), where the tumour has spread beyond the pelvic tissues, for example to the lymph nodes or peritoneum (stage III), or further to liver or spleen parenchyma (stage IV). Most patients with advanced disease have peritoneal metastases (one [study](#) found this to be 76% of patients) and it is ultimately regarded as part of the disease.

Colorectal peritoneal metastases are not as common as in ovarian cancer. Around 16% of metastatic colorectal cancer cases have peritoneal metastases. Treatment with cytoreductive surgery and hyperthermic intraperitoneal chemotherapy can improve survival from around five months (untreated) to 12–18 months ([Koumpa et al, 2019](#)).

Given the early stage of the study, it is too early to estimate the potential precise positioning of ONCOS-102 for treatment of patients with peritoneal metastasis, but our initial evaluation reveals a relatively large accessible patient population given the rather specific peritoneal chemotherapy approach (Exhibit 3). We estimate that the number of patients with advanced ovarian cancer with peritoneal metastases to be around 13k in US and 19k in Europe. Applying the same pricing as we have done for ONCOS-102 in other indications (\$75k in US and €52.5k in Europe) would indicate a potential market of \$1bn in the US and the same in Europe (assuming 100% penetration). We estimate the number of patients with colorectal peritoneal metastases to be lower, around 4k in the US and 5k in Europe, which would translate into an addressable market of around \$300m in US and the same in Europe.

Exhibit 3: Patient number estimates for peritoneal metastases from CRC and epithelial ovarian cancer (2018 estimates, 000s)

Colorectal cancer				Epithelial ovarian cancer			
		US	Europe			US	Europe
Incidence of CRC		96	116	Incidence of ovarian cancer		22	32
Metastatic CRC	25%	24	29	Epithelial ovarian cancer	90%	20	28
Peritoneal metastases	16%	4	5	Advanced stage	87%	17	25
				Peritoneal metastases	76%	13	19

Source: cancer.gov, Globocan, [Jacobson et al. 2018](#), [Bhatt et al. 2016](#). Note: Europe numbers include the top five European countries, Benelux, Scandinavia, Austria and Switzerland.

Upcoming newsflow

We provided a detailed discussion about Targovax's R&D progress in our [March 2020 report](#). Both key clinical trials will continue generating data in the near term. Targovax's preclinical development of the new generation of oncolytic viruses is also advancing.

Mesothelioma: 12-month follow-up by mid-2020

The Phase I/II (n=31) open-label trial compares ONCOS-102 plus standard of care (pemetrexed/cisplatin) versus standard of care treatment in first- and second-line settings. Targovax reported first randomised data (six-month follow-up) from this on 22 January 2020, which we analysed in our [January 2020](#) report and concluded the immunological activation data, in combination with the clinical response seen in patients, show the mechanistic effect of ONCOS-102 is potentially associated with clinical improvement. In the recently released announcement (18 May) Targovax confirmed that after nine-month follow up the first-line patients continue to perform well and will be the target population in further trials. Median progression free survival remained in line with previously published data.

The next update will be 12-month follow-up data with more extensive immune activation and biomarker findings expected to be released by mid-2020. Meanwhile, it has started working on the next stage. The next trial will focus on the first-line patients and will assess ONCOS-102 in a triple combination including standard chemotherapy and checkpoint inhibitors (CPIs) (likely to become a new standard of care in the near future). In addition, Targovax has indicated it is already in discussions with a prospective pharma partner for a study collaboration, although the extent of the possible partnership is not yet confirmed but it is likely this will be in the form of a CPI supply agreement. Because of high costs, combinations with CPIs can inflate the cost of clinical trials significantly, so a supply agreement has a direct positive financial effect for the trial sponsor.

Melanoma: Results from Part 2 of Phase I study in H220

The ongoing Phase I trial enrolled patients with advanced, unresectable melanoma, who progressed on treatment with anti-PD1 checkpoint inhibitors. ONCOS-102 is administered in combination with the CPI pembrolizumab (Keytruda, Merck & Co). The trial aims to show ONCOS-102 can activate the immune response in anti-PD1 refractory patients, trigger relevant T-cell production and enhance infiltration into the tumour. The goal is to allow the patients to benefit from treatment with CPI again.

Part 2 of the Phase I melanoma trial is now fully enrolled and the readout from this part will be the key catalyst expected in H220. Patients are being administered with significantly extended dosing of ONCOS-102 compared to patients in Part 1. [Data](#) from the Part 1 demonstrated 33% overall response rate, which compared well with other similar studies, and evidence of systemic anti-tumour response.

ONCOS-200: New oncolytic viruses

In second-generation ONCOS viruses, Targovax was able to add double transgenes (the first-generation ONCOS-102 has granulocyte macrophage colony stimulating factor). These new viruses have different **properties** and are optimised to inhibit tumour growth and vascularisation, counteract the immunosuppressive tumour microenvironment or have enhanced cell-killing properties.

Targovax also presented some in vivo data from its studies with the ONCOS-210 and 212 viruses and we expect more data in the near future, including more details about positioning in the clinic and which indications will be prioritised.

In April 2020, Targovax announced it had hired Dr Victor Levitsky as chief scientific officer. Dr Levitsky is a medical doctor with a PhD in virology and post-doctoral training in tumour biology at Karolinska Institute, Sweden. One of his key focus areas will be the new generation of Targovax's oncolytic viruses, so we expect this programme to gain importance as it advances towards clinical trials.

Financials and valuation

Targovax's Q120 operating expenses were NOK29.6m, which were significantly lower than NOK39.6m in Q120 following the cost reduction programme. Q120 external R&D spending was NOK13.4m. We lower our external R&D spending estimates to NOK60m from NOK70m for 2020 and 2021. Our operating loss forecasts now are NOK135m and NOK137m for 2020 and 2021, respectively (versus NOK145m and NOK147m previously).

Targovax had cash and cash equivalents of NOK135m at the end of Q120. In January 2020, it raised NOK101m via a private placement, which secured funding for 2020, according to our model and in line with the company's guidance. The funding gap in 2021 is covered in our model by increasing long-term debt (as per our principles; Exhibit 5).

Our valuation is virtually unchanged at NOK1.52bn or NOK20.0/share, which is based on a risk-adjusted NPV analysis using a 12.5% discount rate, including NOK135m net cash. We continue to exclude other long-term debt of NOK64.m in Finnish government grants from our valuation, as repayment is only required if the products are sold or launched. Our valuation is due to be revised after the data readouts from both lead clinical trials.

Exhibit 4: Sum-of-the-parts Targovax valuation

Product	Launch	Peak sales (\$m)	Unrisked NPV (NOKm)	Unrisked NPV/share (NOK)	Probability (%)	rNPV (NOKm)	rNPV/share (NOK)
ONCOS-102 – advanced melanoma	2025	590	2,894.5	38.0	15%	736.5	9.7
ONCOS-102 – mesothelioma	2026	424	2,291.3	30.1	20%	650.7	8.6
Net cash, last reported			135.3	1.8	100%	135.3	1.8
Valuation			5,321.1	69.9		1,522.5	20.0

Source: Edison Investment Research. Note: WACC = 12.5% for product valuations. Excludes conditional government long-term loans.

Exhibit 5: Financial summary

	NOK'000s	2018	2019	2020e	2021e
		IFRS	IFRS	IFRS	IFRS
December					
PROFIT & LOSS					
Revenue		27	2,251	0	0
Cost of Sales		0	0	0	0
Gross Profit		27	2,251	0	0
Research and development		(64,006)	(80,286)	(60,103)	(59,913)
EBITDA		(145,804)	(146,247)	(134,508)	(136,550)
Operating Profit (before amort. and except.)		(146,100)	(150,273)	(134,508)	(136,550)
Intangible Amortisation		0	0	0	0
Exceptionals		0	0	0	0
Other		0	0	0	0
Operating Profit		(146,100)	(150,273)	(134,508)	(136,550)
Net Interest		(1,249)	2,423	0	0
Profit Before Tax (norm)		(147,349)	(147,850)	(134,508)	(136,550)
Profit Before Tax (reported)		(147,349)	(147,850)	(134,508)	(136,550)
Tax		334	321	0	0
Profit After Tax (norm)		(147,015)	(147,529)	(134,508)	(136,550)
Profit After Tax (reported)		(147,015)	(147,529)	(134,508)	(136,550)
Average Number of Shares Outstanding (m)		52.6	60.8	69.6	75.9
EPS - normalised (NOK)		(2.79)	(2.43)	(1.93)	(1.80)
EPS - normalised fully diluted (NOK)		(2.79)	(2.43)	(1.93)	(1.80)
EPS - reported (NOK)		(2.79)	(2.43)	(1.93)	(1.80)
Dividend per share (NOK)		0.0	0.0	0.0	0.0
Gross Margin (%)		100.0	100.0	N/A	N/A
EBITDA Margin (%)		N/A	N/A	N/A	N/A
Operating Margin (before GW and except.) (%)		N/A	N/A	N/A	N/A
BALANCE SHEET					
Fixed Assets		371,129	371,050	371,050	371,050
Intangible Assets		370,240	367,083	367,083	367,083
Tangible Assets		889	726	726	726
Investments		0	3,241	3,241	3,241
Current Assets		166,509	85,858	42,407	16,429
Stocks		0	0	0	0
Debtors		0	0	0	0
Cash		151,189	70,429	26,978	1,000
Other		15,320	15,429	15,429	15,429
Current Liabilities		(59,377)	(50,690)	(40,149)	(43,874)
Creditors		(50,250)	(53,931)	(43,390)	(47,115)
Short term borrowings		(9,127)	0	0	0
Long Term Liabilities		(103,565)	(109,263)	(109,263)	(210,465)
Long term borrowings		(43,933)	(50,441)	(50,441)	(151,643)
Other long term liabilities		(59,632)	(58,822)	(58,822)	(58,822)
Net Assets		374,696	296,955	264,045	133,141
CASH FLOW					
Operating Cash Flow		(112,816)	(140,094)	(139,403)	(127,180)
Net Interest		1,249	(2,423)	0	0
Tax		0	0	0	0
Capex		0	(134)	0	0
Acquisitions/disposals		0	0	0	0
Financing		(30)	66,863	95,950	0
Other		(3,041)	(2,353)	2	0
Dividends		0	0	0	0
Net Cash Flow		(114,638)	(78,141)	(43,451)	(127,180)
Opening net debt/(cash)		(212,767)	(98,129)	(19,988)	23,463
HP finance leases initiated		0	0	0	0
Other		0	0	0	0
Closing net debt/(cash)		(98,129)	(19,988)	23,463	150,643

Source: Targovax accounts, Edison Investment Research

General disclaimer and copyright

This report has been commissioned by Targovax and prepared and issued by Edison, in consideration of a fee payable by Targovax. Edison Investment Research standard fees are £49,500 pa for the production and broad dissemination of a detailed note (Outlook) following by regular (typically quarterly) update notes. Fees are paid upfront in cash without recourse. Edison may seek additional fees for the provision of roadshows and related IR services for the client but does not get remunerated for any investment banking services. We never take payment in stock, options or warrants for any of our services.

Accuracy of content: All information used in the publication of this report has been compiled from publicly available sources that are believed to be reliable, however we do not guarantee the accuracy or completeness of this report and have not sought for this information to be independently verified. Opinions contained in this report represent those of the research department of Edison at the time of publication. Forward-looking information or statements in this report contain information that is based on assumptions, forecasts of future results, estimates of amounts not yet determinable, and therefore involve known and unknown risks, uncertainties and other factors which may cause the actual results, performance or achievements of their subject matter to be materially different from current expectations.

Exclusion of Liability: To the fullest extent allowed by law, Edison shall not be liable for any direct, indirect or consequential losses, loss of profits, damages, costs or expenses incurred or suffered by you arising out of or in connection with the access to, use of or reliance on any information contained on this note.

No personalised advice: The information that we provide should not be construed in any manner whatsoever as, personalised advice. Also, the information provided by us should not be construed by any subscriber or prospective subscriber as Edison's solicitation to effect, or attempt to effect, any transaction in a security. The securities described in the report may not be eligible for sale in all jurisdictions or to certain categories of investors.

Investment in securities mentioned: Edison has a restrictive policy relating to personal dealing and conflicts of interest. Edison Group does not conduct any investment business and, accordingly, does not itself hold any positions in the securities mentioned in this report. However, the respective directors, officers, employees and contractors of Edison may have a position in any or related securities mentioned in this report, subject to Edison's policies on personal dealing and conflicts of interest.

Copyright: Copyright 2020 Edison Investment Research Limited (Edison).

Australia

Edison Investment Research Pty Ltd (Edison AU) is the Australian subsidiary of Edison. Edison AU is a Corporate Authorised Representative (1252501) of Crown Wealth Group Pty Ltd who holds an Australian Financial Services Licence (Number: 494274). This research is issued in Australia by Edison AU and any access to it, is intended only for "wholesale clients" within the meaning of the Corporations Act 2001 of Australia. Any advice given by Edison AU is general advice only and does not take into account your personal circumstances, needs or objectives. You should, before acting on this advice, consider the appropriateness of the advice, having regard to your objectives, financial situation and needs. If our advice relates to the acquisition, or possible acquisition, of a particular financial product you should read any relevant Product Disclosure Statement or like instrument.

New Zealand

The research in this document is intended for New Zealand resident professional financial advisers or brokers (for use in their roles as financial advisers or brokers) and habitual investors who are "wholesale clients" for the purpose of the Financial Advisers Act 2008 (FAA) (as described in sections 5(c) (1)(a), (b) and (c) of the FAA). This is not a solicitation or inducement to buy, sell, subscribe, or underwrite any securities mentioned or in the topic of this document. For the purpose of the FAA, the content of this report is of a general nature, is intended as a source of general information only and is not intended to constitute a recommendation or opinion in relation to acquiring or disposing (including refraining from acquiring or disposing) of securities. The distribution of this document is not a "personalised service" and, to the extent that it contains any financial advice, is intended only as a "class service" provided by Edison within the meaning of the FAA (i.e. without taking into account the particular financial situation or goals of any person). As such, it should not be relied upon in making an investment decision.

United Kingdom

This document is prepared and provided by Edison for information purposes only and should not be construed as an offer or solicitation for investment in any securities mentioned or in the topic of this document. A marketing communication under FCA Rules, this document has not been prepared in accordance with the legal requirements designed to promote the independence of investment research and is not subject to any prohibition on dealing ahead of the dissemination of investment research.

This Communication is being distributed in the United Kingdom and is directed only at (i) persons having professional experience in matters relating to investments, i.e. investment professionals within the meaning of Article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005, as amended (the "FPO") (ii) high net-worth companies, unincorporated associations or other bodies within the meaning of Article 49 of the FPO and (iii) persons to whom it is otherwise lawful to distribute it. The investment or investment activity to which this document relates is available only to such persons. It is not intended that this document be distributed or passed on, directly or indirectly, to any other class of persons and in any event and under no circumstances should persons of any other description rely on or act upon the contents of this document.

This Communication is being supplied to you solely for your information and may not be reproduced by, further distributed to or published in whole or in part by, any other person.

United States

Edison relies upon the "publishers' exclusion" from the definition of investment adviser under Section 202(a)(11) of the Investment Advisers Act of 1940 and corresponding state securities laws. This report is a bona fide publication of general and regular circulation offering impersonal investment-related advice, not tailored to a specific investment portfolio or the needs of current and/or prospective subscribers. As such, Edison does not offer or provide personal advice and the research provided is for informational purposes only. No mention of a particular security in this report constitutes a recommendation to buy, sell or hold that or any security, or that any particular security, portfolio of securities, transaction or investment strategy is suitable for any specific person.

Frankfurt +49 (0)69 78 80 76 960
Schumannstrasse 34b
60325 Frankfurt
Germany

London +44 (0)20 3077 5700
280 High Holborn
London, WC1V 7EE
United Kingdom

New York +1 646 653 7026
1,185 Avenue of the Americas
3rd Floor, New York, NY 10036
United States of America

Sydney +61 (0)2 8249 8342
Level 4, Office 1205
95 Pitt Street, Sydney
NSW 2000, Australia