New strategy evolving

Dividend payment approaching

Bavarian Nordic presented a deferred consideration to AdaptVac of EUR 10m in last week's Q3 report. This should make up the final payment to AdaptVac in the ABNCoV2 licensing deal which was entered in 2020 and now has been put on hold.

We speculate that EUR 6m of this payment to be distributed to AdaptVac's shareholders NextGen Vaccines and ExpreS²ion Biotechnologies either in 2024 or 2025, providing ExpreS²ion operations with SEK 22m in cash. This would correspond to around 40 percent of current market capitalization.

A post-covid strategy taking shape

In a sudden move in August, ExpreS²ion decided to put its proprietary program ES2B-C001 on hold. After revising its development strategy, management now intends to pursue a less costly path for this asset. Substantial investments have already been made in the program, but at the moment it lacks funding for progressing into a clinical trial. With a dividend payment in 2024 we estimate that there is enough headway at for a clinical trial application (CTA).

AdaptVac-holding may become asset

In all the disappointment surrounding ABNCoV2 it should be kept in mind that the primary phase 3 endpoint was reached and that data on immunogenic longevity look promising. This provides validation of both the AdaptVac technology and the EXPRES2 platform, which paves the way for future deals and grants. The AdaptVac pipeline is still in early stages but will have the financial resources to advance.

Four malaria programs with University of Oxford

ExpreS²ion Biotechnologies is involved as protein expression supplier in four different malaria vaccine programs initiated by University of Oxford. This institution is a leading force behind the development of new cures for this devastating disease and was the sponsor behind a recent WHO approved vaccine. The ExpreS²ion programs are progressing and may be part of a second or third wave of malaria vaccines.

Fair value slashed, but trades below cash position

In our revision of the commercial prospects for ExpreS²ion we have excluded the Covid-vaccine and taken a more cautious approach to ES2B-C001. However, market capitalization is trading below the cash position, assuming no value in the protein expression platform or stake in AdaptVac. This looks too pessimistic to us as we arrive at a SOTP of SEK 2,2 (12), including full dilution of the TO9 warrant.

ExpreS²ion Biotech

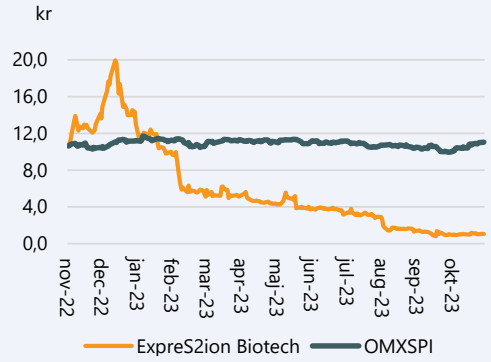
Date	27 november 2023
Analyst	Sten Westerberg

Facts

Industry	Vaccine Development
Chairman of the Board	Martin Roland Jensen
CEO	Bent U. Frandsen
Year of Listing	2016
Stock List	First North Growth Market
Ticker	EXPRS2
Share price	SEK 1,1
No. of shares, mln.	51,4
Market cap, SEKm	56
Cash, SEKm	77

Web site www.expres2ionbio.com

Share price development last year



Source: Refinitiv

Forecasts & Key ratios, SEKm

	2021	2022	2023p	2024p
Revenues	14	6	9	30
R&D expenses	-10	-63	-52	-35
Net income	-44	-119	-105	-35
Earnings per share	-1,5 kr	-2,3 kr	-2,0 kr	-0,7 kr
Revenue growth	-10%	-57%	42%	248%
Cash	139	111	51	16
New share issue	83	76	58	0

Source: Company, Analysguiden forecasts

New R&D strategy adopted

After the discontinuation of the ABNCoV2 vaccine program in August, ExpreS²ion Biotechnologies has been forced to revise its strategy and adopt to a financing model which is not dependent on a tight funding market or ABNCoV2 milestones.

This new R&D strategy includes a cost savings program aiming to extend cash runaway into 2025. Savings of SEK 50m are targeted, which should be compared to a cost base of SEK 130m in 2022. The current cash burn would suggest that cash only lasts into second half of 2024 but including these savings we expect a cash runaway into early 2025. This estimate does not include an AdaptVac payout or the start of a phase 1 study with ES2B-C001.

Continued preparations of ES2B-C001

In a sudden move before the ABNCoV2 program was discontinued by Bavarian Nordic, management announced that its proprietary breast cancer program ES2B-C001 was put on hold and that different strategic options were being assessed. The plan had been to initiate a phase 1 study in 2024, administered by an appointed Contract Research Organization (CRO). After the ABNCoV2 discontinuation this plan could no longer be funded, neither by new share issues nor by cash flow in the ABNCoV2 project.

The renewed development strategy announced in the Q3 report intends to find a more economical path to a phase 1 study, which would exclude the CRO appointment. Management is in discussions with possible academic investigators, which would be a substantially less costly approach, at least in the case of a smaller phase 1. Also, the manufacturing issues which have been lingering in the program have been solved.

The current cash position of SEK 77m will allow management to pursue ongoing preclinical activities and advance to a Clinical Trial Application (CTA) next year. In light of the expected dividend payout from AdaptVac, possibly already next year, it may be possible to start recruiting a limited number of patients in an investigator-led phase 1 study.

Exploring different ways of risk-sharing

There is a general interest in cancer vaccine initiatives, also for programs not based on a mRNA technology. The VLP technology may have lost momentum in pandemic and influenza settings, while in genetically more stable diseases, such as cancer and infectious disease, there should be a continued interest from the pharmaceutical industry.

We do not expect ExpreS²ion to arrive at an out-licensing deal of the asset at this stage, but some risk-sharing initiative could be an alternative way forward. An outright asset sale is another option which cannot be ruled out given the substantial investment carried out so far in animal testing and manufacturing. In our mind, the most likely scenario for ES2B-C001 is a small investigator-driven phase 1 study or an asset sale. Given the incentives of the deal with AdaptVac

in 2021, there should be a mutual interest in moving ES2B-C001 forward.

WHO recommends new Oxford vaccine

Malaria is a major public health problem in developing countries. It is a mosquito-borne disease and places a particularly high burden on children in the African Region. There were around 240 million cases of malaria and 627,000 deaths worldwide in 2020, mostly children.

For 20 years the University of Oxford has been carrying out extensive research in this field and has several programs ongoing. In October this year the WHO recommended the R21/Matrix-M vaccine, which has been sponsored by University of Oxford in collaboration with the Serum Institute of India and Novavax. Novavax is the proprietary owner of the Matrix-M adjuvant and will market the vaccine in non-endemic countries. The vaccine is expected to be launched by the Serum Institute and Novavax next year.

This is the second malaria vaccine to be approved and recommended by WHO after RTS,S/AS01 (Mosquirix, GlaxoSmithKline), which was developed in the late 80's and received a WHO recommendation only in 2021. Both vaccines have shown to be safe and effective in preventing malaria in children and, when implemented broadly, are expected to have a high public health impact.

The R21/M vaccine shows a reduction of symptomatic cases of malaria by 75% during the 12 months following a 3-dose series. Mosquirix is believed to be less efficient in the region of 50 percent. In a phase 3 trial, Mosquirix efficacy was 56% in children aged 5–17 months.

Last year UNICEF paid up to USD 170 million to access 18 million doses of Mosquirix over a three-year period, corresponding to a price per dose of 9,4 USD. We estimate that Mosquirix is selling at around EUR 75m annually. Low unit prices are likely to remain but the launch of the second more efficient vaccine should substantially expand the market. ExpreS²ion refers to a Data Bridge study projecting an EUR 1,8 bn malaria market by 2029, which should assume the entry of more efficient vaccines.

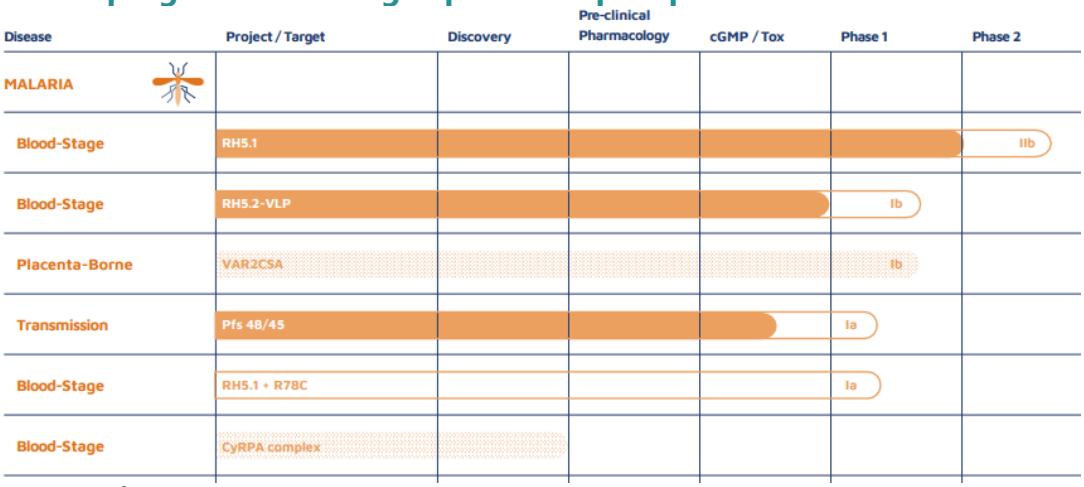
ExpreS²ion vaccine will have to prove higher efficacy

ExpreS²ion is currently involved in four different clinical studies sponsored by University of Oxford. All these studies have progressed to a clinical phase or is currently preparing to recruit. A cooperation with the world leader in malaria research and development is an asset for ExpreS²ion. However, in order to enter this vaccine market, a new vaccine will have to prove higher immunogenicity than the two marketed products.

According to clinicaltrials.gov University of Oxford is currently sponsoring 35 ongoing trials in malaria vaccination. Four of these trials involve ExpreS²ion as a subcontractor of the RH5 spike protein. The most advanced is VAC091 (NCT05790889) which will involve 360-460 participants in Burkina Faso and report results late in next year. At this point in time, we find it difficult to assess the possibility for this row of programs to reach success, but serving as a

subcontractor to University of Oxford is a meriting feature. We view the continuous efforts of University of Oxford in this field as a second or third wave of new Oxford malaria cures. However, in absence of a commercial agreement between University of Oxford and the involved parties, such as ExpreS²ion Biotechnologies, we remain cautious on the value of these programs.

Oxford programs involving ExpreS²ion spike protein



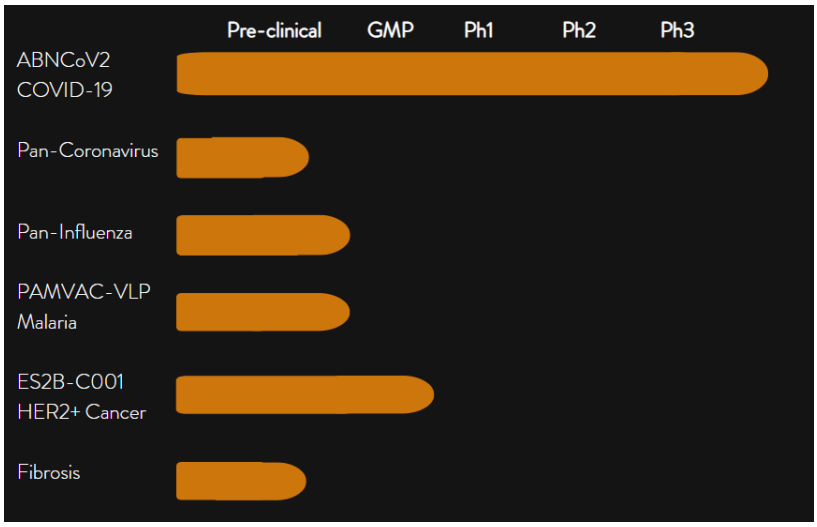
Source: ExpreS²ion Biotechnologies (participation in VAR2CSA and CyRPA discontinued)

Valuation of AdaptVac

ExpreS²ion Biotechnologies 34 percent stake in AdaptVac is another asset which we believe should be assigned a value. However, information about the preclinical programs in AdaptVac is scarce and insufficient to supply information about the amount of money which the company has invested in its programs. The company is not seeking private funding but relies on grants from Danish and European institutions as well as the 2020 payment from Bavarian Nordic. AdaptVac had an operational loss of around DKK 6m last year. The remaining Bavarian payment of EUR 10m should provide AdaptVac with funding at least until 2026, assuming that EUR 6m will be handed over to shareholders in 2024. This is assuming no or minimal tax consequences for AdaptVac.

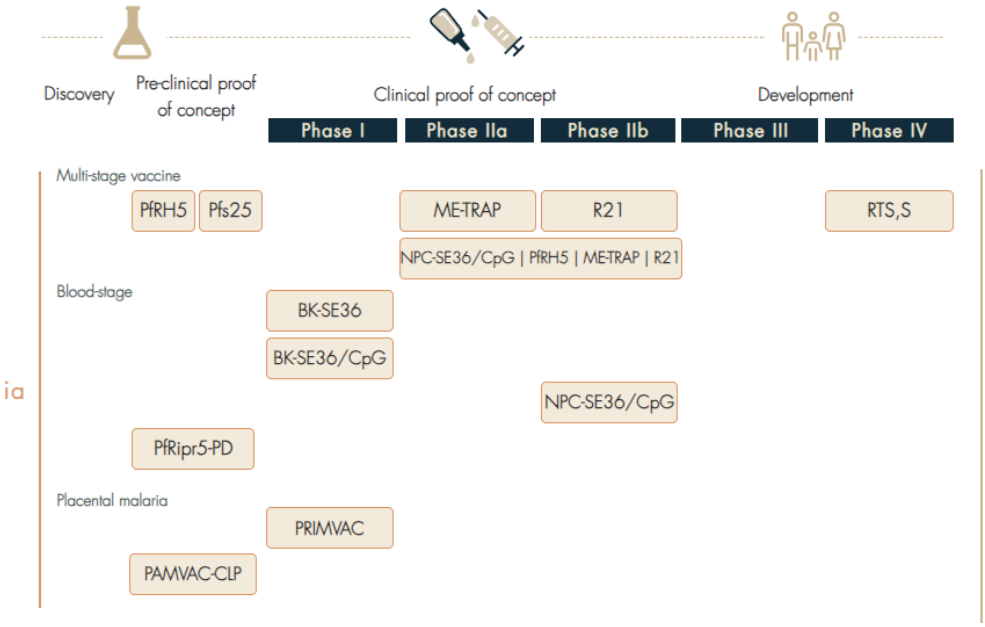
A challenge for AdaptVac may be to market its VLP-based technology platform considering competition from more flexible mRNA platforms, which totally dominate the Covid-19 pandemic. Still, we believe that the longevity data from the ABNCoV2 program, together with robust immune responses, should allow for alternatives to the mRNA platform, especially in genetically more stable diseases. However, in the pandemic and influenza settings, the pathogens are rapidly shifting, it may be difficult to compete with the mRNA vaccines.

AdaptVac pipeline posted on its webpage



A second factor behind a cautious approach to the value of AdaptVac is the lack of external validations other than from Bavarian Nordic. There is a number of different virus-like particle (VLP) vaccine platforms, both involving capsids or other scaffolds. The VLP technology was first described in animal models in 2007. Since then, VLPs are considered as promising nanotools for the development of subunit vaccines due to high immunogenicity and safety. The proprietary knowledge of AdaptVac is based on a method of displaying the isopeptide (spike protein) on the surface of the VLP, a method which we believe has distinctive features over similar generic techniques, such as the SpyTag/Catcher system.

Malaria portfolio of the European Vaccine Initiative



Source: European Vaccine Initiave

The most advance program in AdaptVac after ABNCoV2 is PAMVAC-VLP (also PAMVAC-CLP). This program is a malaria vaccine candidate sponsored and coordinated by the European Vaccine Initiative (EVI) in collaboration with the Oxford University.

The PAMVAC program is still in a phase of preclinical proof-of-concept. The basis of the project was invented by University of Copenhagen and later transferred to AdaptVac. A randomized phase 1 clinical trial was conducted in Germany and Benin in 2015-17. It was published in 2019[1] and the authors concluded that a follow-up trial in in women before first pregnancies in an endemic area was to come next. Since then, the program has not advanced to a new clinical trial.

The parties received financing of EUR 10m by the European Union in 2022 which is expected to last until 2027. The PAMVAC-VLP program is a placenta-borne concept as opposed to the RH.5 blood stage programs of ExpreS²ion. In the ExpreS²ion Q3 report it was announced that the company is discontinuing collaboration in the placenta-borne malaria program after the decision of University of Copenhagen to contract a different manufacturer of the spike protein.

Our valuation of AdaptVac have not assigned a value of PAMVAC or any other of the programs except its share of ES2B-C001. The AdaptVac valuation relies on a rough assessment of the unique iso-peptide display platform. Awaiting more information, we set a technology value of the platform of SEK 100m, which is a cautious assumption, reflecting the early-stage profile of the pipeline.

This can be compared to one of the market leaders of the VLP technology, Seattle-based Iscosavax Inc, which has a market capitalization of USD 560m. It has a lead program in phase 2 with a bivalent RSV vaccine and a preclinical portfolio of two to three other programs. Icosavax's VLP platform technology is designed to enable multivalent, particle-based display of complex viral antigens, which it believes will induce durable virus protection.

This valuation points to the very substantial potential if ExpreS²ion and AdaptVac were to succeed in reaching phase 2.

Bavarian payment to AdaptVac in 2024

According to the Q3 report from Bavarian Nordic it expects to pay a final milestone to AdaptVac of DKK 74m (EUR 10m), which has been booked as a deferred consideration on the balance sheet. We believe this payment may be due after publication of the final results from the phase 3 trial in US and Denmark. ExpreS²ion states in its Q3 report that this payment is expected to be due in 2024.

After the payment no further liabilities should remain on behalf of Bavarian Nordic to AdaptVac. In total AdaptVac will then have received approx. DKK 107m from Bavarian Nordic, including the DKK 33m downpayment in 2020.

It is not clear to us how AdaptVac will dispose of this payment. We find it likely that a part of the EUR 10m payment will be reinvested in

[1] *Clinical Infectious Diseases*, Volume 69, Issue 9, 1 November 2019, Pages 1509–151

operations, just as the lion share of the first payment of DKK 33m. At that time shareholders received a dividend payment of DKK 1m in 2021.

In our model we expect the Board of Directors of AdaptVac to move forward with a dividend payout in 2024 or 2025 corresponding to 60 percent of Bavarian payment. Since ExpreS²ion Biotechnologies holds a 34 percent share of AdaptVac this would correspond to around SEK 22m, assuming no negative tax consequences in AdaptVac or ExpreS²ion.

We are not aware of any dividend policy adopted by the board of directors in AdaptVac why this assumption is a speculation based on the pronounced intention of ExpreS²ion's management. Judging by the dividend paid in 2021 this assumption may be generous. The main shareholder of AdaptVac, NextGen Vaccines, holds 66 percent of the stock and may want to invest more in the operations.

However, given that most of the 2020 payment remained in AdaptVac and that its operations were running at a low burn rate of DKK 6 m last year we expect that the 2024 payment will be handled differently.

AdaptVac is being controlled by NextGen Vaccines ApS, which holds 66 percent of the shares. NextGen is founded by the inventors of the proprietary capsid Virus-Like Particle (cVLP) platform technology which was spun out from the University of Copenhagen in 2017. ExpreS²ion holds the remaining 34 percent.

Financial discussion and valuation

We are slashing our Sum-Of-The-Parts valuation of ExpreS²ion Biotechnologies. By adding cautions assumptions in the different projects, we come up with a fair value of SEK 2,2, down from SEK 12 in our last report per March. This reduction is made up of the exclusion of SEK 5,8 from ABNCoV2 and another SEK 2,6 from taking a more cautious approach to ES2B-C001.

It is noteworthy that the current market cap of the company at SEK 51m is markedly lower than the cash position of SEK 77m at the end of the third quarter. If we were to include an AdaptVac dividend of SEK 22, this gap becomes even more pronounced.

In theory there is nothing wrong with trading a stock below its cash position since the net present value of a cash position in a biotechnology business model may be zero. However, the situation in ExpreS²ion Biotechnologies is unusual and encompasses a lot of disbelief based on the setbacks with ABNCoV2 and ES2B-C001. It is our experience that this kind of sentiment can shift rapidly as some milestone is delivered.

We also see a substantial potential of reevaluation of the AdaptVac value, which we after the ABNCoV2 discontinuation have put at SEK 100m. AdaptVac is currently involved in a period of investment and may come up with more data on its early programs in 2024.

Sum-of-The-Parts valuation of ExpreS²ion Biotech

	Project value (MSEK)	Value / share (SEK)	Peak sales (MEUR)	LOA*	WACC	Share of NPV	Comments
ES2B-C001	30	0,6	1 325	3%	14%	100%	Reduced activity
Adaptvac holding	29	0,6		100%	12%	34%	Minority owner
Platform	31	0,6	0,7	100%	10%	100%	cash flow based
Malaria project	30	0,6	175	10%	0%	6%	of consortium
Indigo (influenza)	17	0,3	952	3%	12%	6%	of consortium
Administration	-20	-0,4					
Sum	138	2,2			*diluted no. of shares incl TO9, mln*		*53,4*
**) Likelihood of approval*					*current number of shares, mln*		*51,4*

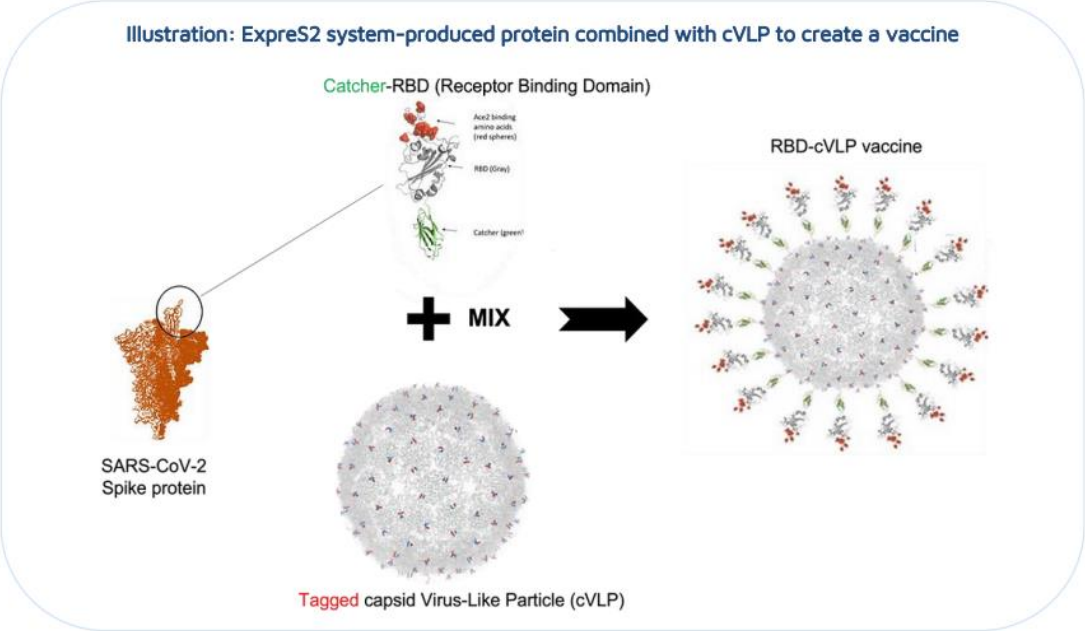
Forecasts by Analysguiden

Appendices -

Summary of the technology

We classify ABNCoV2 as a combined protein subunit antigen, provided by ExpreS²ion's EXPRES2 technology, coupled with a capsid Virus Like Particle (cVLP), provided by the AdaptVac platform. The capsid-like particle is coated with 60-80 particles of the recombinant RBD protein fragment. After exposure to the ABN vaccine, mice serum was tested for antibodies to the receptor binding domain of SARS-CoV-2. Researchers have shown in a Nature article that RBD proteins glued to the CLP had a 3-4-fold higher immunogenicity compared to soluble RBD proteins injected without being mounted to the capsid-like particle, a strong rationale for the technology behind the ABNCoV2 cVLP vaccine.

Schematic figure of cVLP expression and construct



Source: Company presentation

Vaccine candidate in development

ES2B-C001 is ExpreS²ion Biotechnologies in-house proprietary program which is progressing toward a clinical trial. In May this year ExpreS²ion Biotechnologies announced positive preclinical proof-of-concept results for this HER2-breast cancer vaccine candidate from a therapeutic study in HER2-transgenic mice. In the study, all transgenic mice vaccinated with ES2BC001 formulated in an adjuvant were metastasis-free, while all control mice had lung nodules. Furthermore, 73% of mice vaccinated with ES2B-C001 without adjuvant were metastasis-free.

ExpreS²ion still has some way to carry this in-house program before entering a clinical phase 1 trial. In 2020 it was expected that the program would be ready for a CTA, Clinical Trial Application, in the first half of 2022. This CTA has for various reasons been pushed into

2024, while the project now also lack funding for initiation of a phase 1 study.

In 2020 the program was developed by AdaptVac and called AV001. In the option deal which ExpreS²ion signed with AdaptVac in February 2020 described AV001, later to be ES2B-C001, as having shown proof-of-concept in animal testing on mice in an article published 2018 by researchers at the University of Bologna. However, this study was based on a non-proprietary tag catcher method and had to be redone with a proprietary tag catcher system developed by AdaptVac.

These new proof-of-concept studies in animals have been published recently in two separate articles. ES2B-C001 is developed as a therapeutical vaccine for patients with HER2 positive breast cancer, having progressed after initial treatment with the standard anti-HER2 therapy Avastin (trastuzumab). In published research ES2B-C001 has demonstrated a strong tumor-growth inhibiting effect in a mice model and when blood serum from vaccinated mice was applied to cultures of HER2-positive human breast cancer tumors. ES2B-C001 has also shown successful results in HER2-transgenic preventive as well as therapeutic tumor mice models, where ES2B-C001 demonstrated effective inhibition of tumor development compared to control groups.

According to the recently published prospect, two weeks after the inoculation of tumor cells, the first vaccine administrations were given. ES2B-C001 formulated in an adjuvant was found to totally block tumor development, whereas the control group progressively expanded with lung metastases and subcutaneously growing local tumors. Additionally, ES2B-C001 without adjuvant was found to inhibit, but not prevent, tumor development.

Competitive landscape in HER2+ breast cancer

About 15-20 percent of all breast cancers are HER2+, which makes any new treatment to a potential blockbuster. We note that there are several ongoing vaccine studies on HER2+ breast cancer. Clinicaltrails.gov lists 19 ongoing clinical trials when screening its data base. One of these is a 598-patient phase 3 trial, FLAMINGO-01, sponsored by Texas-based Greenwich Lifesciences, which is not yet recruiting. This competitive landscape needs to be looked into in order to understand the potential advantages of ExpreS²ion Biotechnologies lead program ES2B-C001.

We also note that in the second line setting of females with metastatic relapsing breast cancer after failing first line treatment with generic trastuzumab, AstraZeneca/Daiichi scored a recent success with its phase 3 program Enhertu. In the 557-patient study, those taking Enhertu survived for 23.9 months, as compared with 16.8 months for those who received standard chemotherapy. This is considered a very positive result in a difficult to treat patient setting and Enhertu is expected to change the current standard-of-care in second-line HER2+ breast cancer.

Potential launch of ES2B-C001 in 2029-30

We currently see a potential for ES2B-C001 to reach the market in 2030, a delay compared to a previously 2027-28. We have assigned the program a 3 percent chance of reaching the market. Our valuation of the program at SEK 30 million is substantially below the investment so far carried out. We estimate that including the last capital raise of SEK 55 million, the company has invested close to SEK 100 million in ES2B-C001.

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