Due Diligence and Valuation Report

Arrowhead Code:	69-05-02
Coverage initiated:	13 December 2015
This document:	19 December 2016
Fair share value bracket-DCF:	SEK 27.25 and SEK 31.21
Share price (19 Dec. 16):	SEK 4.30[i]

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Company:	CombiGene AB (publ)
Ticker:	AKTO: COMBI
Headquarters:	Lund, Sweden
Chairman	Arne Ferstad
CEO	Jan Nilsson
CSO	Casper René Götzsche
Website:	www.combigene.com

Market Data

52-Week Range:	SEK 3.50 - SEK 11.20[ii]
Average Daily Volume:	15,229 [iii]
Market Cap. (06-Dec-16):	SEK 50.7 million

Financial Forecast (in SEK) (FY ending – Dec)

SEK	'16E	'17E	'18E	'19E	'20E	'21E	'22E
High NI	(10)	(17)	(43)	(34)	(60)	(108)	(155)
High EPS	(0.7)	(1.0)	(1.6)	(1.0)	(1.3)	(1.6)	(1.4)
Low NI	(10)	(17)	(43)	(34)	(60)	(108)	(155)
Low EPS	(0.7)	(1.0)	(1.6)	(1.0)	(1.3)	(1.6)	(1.4)

Company Overview: CombiGene AB (herein referred to as "CombiGene" or "COMBI" or "the Company") is a Lund-based biopharmaceutical Company, developing methods for the treatment of epilepsy and other neurological diseases using gene therapy. The treatment is currently in the preclinical stage of development and has shown positive results in suppressing epileptic seizures. The Company relies strongly on the scientific research carried out at Lund University and University of Copenhagen. Established in 2006, CombiGene is a publicly held Company, listed on the Swedish marketplace, AktieTorget, under the symbol "COMBI".

The Company's focus currently is to develop a treatment process for epilepsy. In addition, the gene vector developed for epilepsy may have the potential to treat other neurological diseases as well. CombiGene aims to cure epilepsy by injecting a vector with transgenes expressing neuropeptide Y (NPY), along with the NPY receptor Y2, into the patient's brain. The related scientific research has proved NPY to have an inhibiting effect on the epileptic seizures. The Company's scientific cofounder David Woldbye was the first to show that NPY inhibits epileptic seizures in animals, and that study was followed by a series of publications from David Woldbye and the other cofounder, Merab Kokaia, confirming that finding, and adding gene therapy into the picture, and showing the advantage of combined upregulation of NPY and Y2.

Arrowhead is updating coverage on CombiGene AB with a fair value bracket of SEK 27.25 (Low-Bracket estimate) and SEK 31.21 (High-Bracket estimate).

Key Highlights: (1) Potential to be the first EMA and FDA approved treatment method, which uses gene therapy for curing epilepsy; **(2)** CombiGene's mission is to develop new methods of treatment for neurological diseases with greater accuracy, increased efficacy, and reduced side effects; **(3)** Partnered with Lund University and University of Copenhagen to optimize design and doses for the vector; **(4)** In June 2016, CombiGene selected the main candidate vector to be further studied and to be tested in a Phase I / II study on patients by 2019 **(5)** Patent applications approved by the USPTO (United States Patent and Trademark Office) and EPO (European Patent office) in December 2014; **(6)** 10 European countries also validated the patent in their respective geographies in 2015; **(7)** Preclinical trials have shown convincing favorable results in animals; **(8)** Panion Animal Health AB (formerly CombiGene Vet AB) will be distributed as a public company; **(9)** The Company recruited a new CEO, Jan Nilsson, effective October 1, 2016; **(10)** CombiGene signs agreement with Panion Animal Health for licensing of the drug candidate.

Key Risks: Key risks include the uncertainty related to the launch of the product, failure to get the required approvals, and the possibility of new and effective methods of treatment, which might replace CombiGene's treatment.

Valuation and Assumptions: Based on due diligence and valuation estimates, Arrowhead believes that COMBI's fair share value lies in the SEK 27.25 - SEK 31.21bracket using Discounted Cash Flow (DCF), which is our primary valuation methodology[iv]. We have assumed that CombiGene will be able to generate revenue from its sale of gene therapy treatment, with limited roll out by beginning 2024, and subsequent full launch in 2025.

Table of Contents

1. Summary and Outlook

We are updating coverage on CombiGene AB, headquartered in Lund, Sweden, a biopharmaceutical Company focused on developing a new gene therapy for the treatment of epilepsy.

Key Highlights:

(1) We expect the Company to go for a full launch of its treatment process in the year 2025, catering to a potential market of 50 million (WHO) patients worldwide.

(2) CombiGene received several vectors from GeneDetect in November 2015. In June 2016, the best of these vectors was chosen as the Company's main candidate vector. This vector will be subjected to further characterization and development to turn it into a human therapeutic product.

(3) The Company's next step is to further study the main candidate vector, with the aim to test it in a Phase I / II study on patients by early 2019

(4) Three potential partners have been identified by CombiGene to produce feasible amounts of main candidate vector for performing the final toxicological tests in accordance with Good Manufacturing Practice (GMP).

(5) UniQure's Glybera, an AAV-based gene therapy to treat Lipoprotein Lipase Deficiency (LPLD), received approval from European Commission for market authorization in 2012. This augurs well for CombiGene's treatment process, which is also based on gene therapy and uses an AAV type of vector.

(6) Although the Company's primary target market will be those patients who do not get satisfactory effects from Anti-Epileptic Drugs (AEDs) (i.e., about 30% of the total epileptic patients), it can potentially also expand its target market by offering a population within the remaining 70% a one-time treatment with fewer side effects than current AEDs.

(7) Jan Nilsson was appointed the Company's CEO effective October 1, 2016. Bengt Westrin will be available during the transition period to help Jan quickly catch up on the Company's plans and business goals.

(8) CombiGene was listed with the symbol "COMBI" on the Swedish marketplace, AktieTorget, on May 25, 2015, and the IPO was oversubscribed by almost 500%.

(9) The Company's patent protections will be valid until July 04, 2027. Both the US and European patents were granted in December 2014. In addition, 10 European countries individually approved the Company's patents by June 2015.

(10) At present, CombiGene AB has no shareholding in Panion Animal Health AB as the latter will be distributed as a public company.

(11) CombiGene signed agreement with Panion Animal Health giving the latter exclusive rights to develop Veterinary treatment methods based on CombiGene's drug candidate. The license covers operations in the EEA, Switzerland and the United States. The agreement includes an upfront payment of SEK three million crowns to be paid when Panion Animal Health receives funding for their activities, which is expected in the first quarter of 2017. Also, CombiGene will receive royalties on future sales.

Key Risks: The Company faces a potential risk of delayed launch of the product, which may result in an earlier launch by its competitors; also, any new and significant advancement in medical treatment processes of epilepsy could negatively affect the Company's target market. Currently, CombiGene is in preclinical stage and faces the risk of not getting regulatory approvals in the further stages; therefore, it remains crucial for the Company to create close dialogue with the regulatory authorities and experts to have a clear development plan for the future.

Industry Overview: CombiGene is developing a method to treat or cure epilepsy by the means of gene therapy. According to World Health Organization (WHO), approximately 50 million[v] people are affected by epilepsy worldwide. Approximately 80% of those affected live in low to middle income countries and about three fourths of them do not receive appropriate treatment in these countries. This chronic disorder is characterized by seizures with varying frequencies in different cases. The most prevalent treatment currently available in the market is the antiepileptic drugs (AEDs) to which approximately 70% of the patients respond and tolerate. For the remaining 30%, who fail to respond to AEDs, epilepsy surgery is the last resort. Patients are subjected to an assessment before deciding whether surgery can be performed or not. Only one third of those assessed pass the assessment and the remaining two third do not get relief via any current treatment method. CombiGene's treatment process, if successful, could potentially provide a safe and efficient cure to most patients, but particularly to those 30% of patients who fail to respond to AEDs.

2. Business Overview[vi]:

Established in 2006, CombiGene AB is headquartered in Lund, Sweden. The Company is engaged in combining modern neuroscience with recent advances in gene delivery. It has developed a method, which suppresses epileptic seizures in preclinical studies, and is now developing this method into an effective and safe therapy for epileptic patients. The method is also expected to have further development potential as a means for treating other neurological disorders.

An estimated 0.4-1.0% (WHO, 2005) of the world population suffers from epilepsy and epileptic seizures and nearly 30% of them do not respond to the currently available AEDs. For them, surgery may be the only option available. It can relieve most symptoms, but for medical and other reasons it is only performed in a fraction of these 30%. Moreover, AEDs may have certain side effects, for those 70% that are responding (e.g., memory problems).

The therapy, if fully successful, will be a one-time treatment unlike the current treatments prevailing in the market. Currently the treatment is in the preclinical phase and has shown promising results in the trials on epileptic animals (in vivo). Moreover, in experiments involving tissues donated from human epileptic patients after epilepsy surgery (in vitro), application of NPY had strong inhibitory effects on induced seizure activity, clearly indicating the treatment's potential to have positive results on humans. The Company has chosen its main candidate vector, designated CG01, and the next step is to further study the main candidate vector with the aim of testing it in a Phase I / II study on patients by 2018.

CombiGene got its patent approved by USPTO and EPO in December 2014. In Europe, the patent granted by the EPO had to be validated by a significant number of European countries before it gained legal force. This milestone was achieved in July 2015 after it was validated by 10 European countries - Germany, France, Italy, UK, Belgium, Netherlands, Poland, Switzerland, Spain and Sweden. Post approval in the two most important markets, the Company is well armored to continue the development.

2.1 Introduction to Epilepsy[vii]

According to the WHO, epilepsy is a chronic neurological disorder of the brain characterized by recurrent seizures, brief episodes of involuntary movement that may involve a part of the brain (partial) or entire brain (generalized), and is sometimes accompanied by loss of consciousness and control of bowel or bladder function. A single occurrence of a seizure does not imply an epileptic condition. Instead, two or more unprovoked seizures not caused by any treatable medical condition like an infection or diabetes are among the early symptoms of epilepsy.

2.1.1 What are Seizures?

These are a result of excessive electrical discharge in a group of brain cells causing a disturbance in the brain. What happens during a seizure depends on the part of the brain where the discharge takes place. It can vary from the briefest lapses of attention or muscle jerks, to severe and prolonged convulsions. The frequency also may vary from less than one per year to several per day.

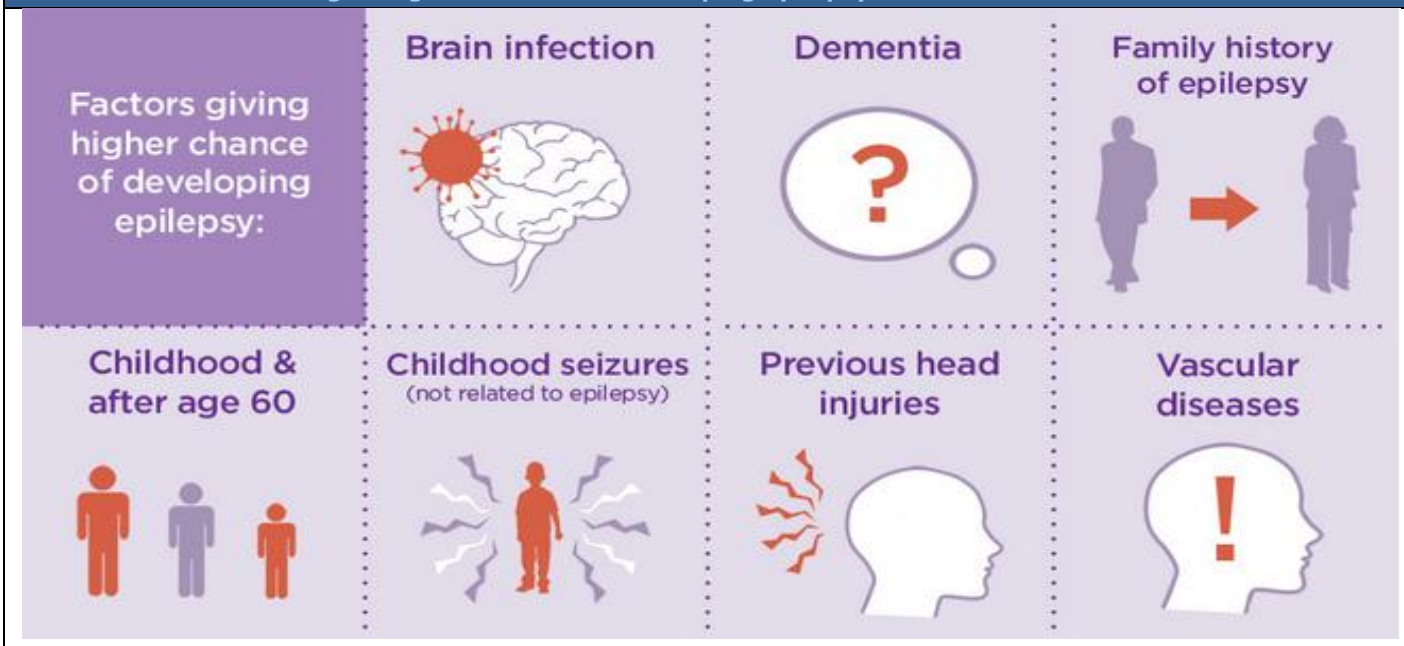
2.1.2 Signs and Symptoms

Usually the signs and symptoms vary among individuals depending on which part of the brain is affected and how far has the disturbance spread in the brain. Temporary symptoms occur such as loss of awareness or consciousness, and disturbances of movement, sensation (including vision, hearing, and taste), mood, or other cognitive functions.

2.1.3 Causes

Epilepsy can be divided into two sub parts based on the cause of occurrence - idiopathic epilepsy and symptomatic epilepsy. Idiopathic epilepsy, which affects nearly 6 out of 10 patients, has no identifiable cause, whereas symptomatic epilepsy could be caused by brain damage during birth, a severe head injury, a brain tumor, certain genetic syndromes, a stroke restricting amount of oxygen to the brain, and genetic conditions with associated brain malformations, etc.

Exhibit 1: Factors leading to higher chances of developing epilepsy



2.1.4 Treatment

Currently, there are various treatments available for epilepsy - medication, surgery, Deep Brain Stimulation (DBS), and Vagus Nerve Stimulation (VNS).

- **Medication:** There are few older and rather inexpensive medications such as diazepam, carbamazepine, valproate, etc. But since long there is a clear trend toward newer and more expensive medications with fewer side effects, e.g., Keppra (levetiracetam) and Lamictal (lamotrigine). In the major developed markets, a fair estimate for the medication costs is about 3,500 USD per year per patient. However, only c. 70% of the patients experience sufficient relief from seizures with the help of oral medication and the remaining 30% do not.
- **Surgery:** In case the seizures continue uncontrolled even after a trail of 2-3 different medications, a re-evaluation is suggested. The re-evaluation results then form a critical base to decide if the patient can undergo epilepsy surgery or not. Of the 30% patients, whose seizures are uncontrollable, approximately one-third may be selected as candidates for epilepsy surgery while lesser than one- third are assessed for it. Before the surgery is performed, the patient thus undergoes pre-surgical assessment to ensure that the operation will likely reduce the epileptic seizures and not cause damage to essential functions like speech, memory, etc. During the surgery, the part of the brain that triggers epileptic seizures is removed and following the removal, the desired outcome is that the patient is either free from the seizures or has reduced frequency of seizures' occurrence. However, a small fraction of patients fail to respond to the treatment as required. Surgery is most commonly used to treat partial epilepsy where only one area of the brain is involved.
- **Deep Brain Stimulation (DBS):** For patients who are not relieved by medication, DBS is an advanced treatment option. In DBS, electrodes are planted into specific areas of the brain and then stimulated with small regular electrical impulses, which work to reduce the seizures. Unlike medication and surgery, DBS is not a cure to epilepsy; it just aims to reduce seizures.
- **Vagus Nerve Stimulation (VNS):** VNS therapy is designed to prevent seizures by sending regular, mild pulses of electrical energy to the brain via the vagus nerve. These pulses are supplied by a device akin to a pacemaker. It is placed under the skin on the chest wall and a wire runs from it to the vagus nerve in the neck. Like DBS, the VNS procedure also only alleviates and doesn't cure epilepsy.

The above treatments come with various side-effects or risks attached. While the medication drugs may cause side-effects like memory impairment, blurry or double vision, sleepiness, stomach upset, etc., surgery potentially involves a risk of memory impairment, loss of speech, impaired vision, partial paralysis, etc. Therefore, surgery is only performed when the careful pre-assessment shows the risk-benefit balance to be clearly favorable. DBS and VNS do not offer permanent relief and are costly treatment processes, just like surgery.

2.2 Gene Therapy and its role in CombiGene's treatment process[viii]

2.2.1 Gene Therapy: Introduction

Gene Therapy is defined as a technique that uses genes to treat, ameliorate or prevent a disease or condition. The therapy may often involve introduction of functioning genes into the cells of a patient to replace defective or missing genes. Or as in the case of CombiGene's treatment: to supplement and enhance the expression from non-defective, functioning genes. Unlike traditional drug based approaches which treat the symptoms, gene therapy offers a way to fix the problem at its source. Gene therapy uses a vector, a recombinant virus, to deliver a gene to the cells where it is needed. Once the gene is inside, the cell's gene-reading machinery uses the information in the gene to build RNA and protein molecules. The proteins (or RNA) can then carry out their job in the cells.

2.2.2 CombiGene's treatment method

CombiGene is in the process of developing a treatment method comprising an AAV vector to express the transgenes encoding for neuropeptide Y (NPY) and Y2 receptor into the patient's brain cells with the aim to reduce the epileptic seizures. NPY is a 36-amino acid peptide that acts as a neurotransmitter in the brain and in the autonomic nervous system. It is produced in the brain in various locations and has several important functions like regulating appetite, relieving anxiety and stress, reducing pain perception, and controlling epileptic seizures. CombiGene's scientific founders, David Woldbye and Merab Kokaia, were the first in the world to show that NPY inhibit epileptic seizures in animals and that the effect is further enhanced by jointly using the NPY receptor Y2 as well.

Traditional research explains that the brain increases the production of NPY in key regions like hippocampus after the epileptic seizure. The researchers assumed the excessive production of NPY as the body's way to counteract the seizure. However, when an individual has well developed epilepsy, the NPY produced is not enough to ward off the epileptic attack. It led to the idea that increased concentration of NPY in the brain can be helpful in enforcement of the natural defense against epilepsy.

As gene therapy involves the use of a recombinant viral vector to deliver a gene to the cells (in CombiGene's case, genes that express NPY and Y2 receptors in the brain cells), CombiGene has selected a single candidate vector for further development, after having performed thorough testing of a series of different AAV vectors. AAV is a naturally occurring non-pathogen virus, which is recruited for biotechnological use by removing most of the viral DNA and replacing it with selected promoters and other functional elements, in addition to the desired transgene sequences. The resulting so-called recombinant AAV vector, which unlike its natural counterpart is incapable of replication, i.e. making viral copies to spread the infection, is instead used to deliver the transgene into the cells of the targeted tissue of the patient.

Using modern gene technology, CombiGene has been able to develop a treatment wherein genes are delivered directly into the affected brain region using these viral vectors. The treatment principle has so far shown promising results in animals with induced seizures (in vivo) and in experiments with human tissues (ex vivo); thereby, clearly indicating that the treatment also has the potential to inhibit seizures in humans.

2.3 Historical Progress of the Company

CombiGene AB was formed as a Company in 2006. However, the foundation was laid way back in 1999 when David Woldbye and Merab Kokaia decided to work together to find a cure to treat epilepsy. Following exhibit, compiled from the Company's website, highlights key events over the last 16 years.

Exhibit 2: Historical Timeline[ix]

1999-2005

- **The Discovery**
- Merab Kokaia and David Woldbye initiated the collaborative research to develop new forms of treatment of difficult-to-treat epilepsy. They worked with a belief that a more pronounced anti-seizure effect could be achieved if an increased level of NPY is combined with an increased level of the receptor Y2.

2006-2013

- **Founding the Company**
- A priority application was submitted to the Swedish Patent and Registration Office, PRV.
- CombiGene AB was formed by Merab Kokaia and David Woldbye, along with financier Lars Thunberg, to pursue development and commercialization of the discovery.
- The Company filed patent applications in the US and Europe.

2014

- **Initiating Operations**
- The Company got its patent applications approved in the US and Europe.
- Issued shares to a limited number of investors, raising SEK 7 million before costs and the company became a public company.

2015

- **Further Progress**
- Relocated its registered head office and premises to Medicon Village in Lund, Sweden.
- Recruited Bengt Westrin, to the position of CEO of the Company.
- The Company was listed on AktieTorget, following a oversubscribed IPO of SEK 12.5 million.
- Established contract research agreements with Lund University and the University of Copenhagen.

2016

- **Current Scenario**
- Candidate vector selected, designated CG01, contains the two transgenes NPY and Y2.
- Recruited Jan Nilsson, to the position of CEO of the Company.
- New Scientific Advisory Board appointed, previous board replaced with 3 new members.
- Three potential GMP Manufacturing partners have been identified
- A CRO has been selected to make a dose-response study of the candidate vector CG01 .

2.4 CombiGene's Scientific Founders[x]

David Woldbye and Merab Kokaia are the scientific founders of the Company.

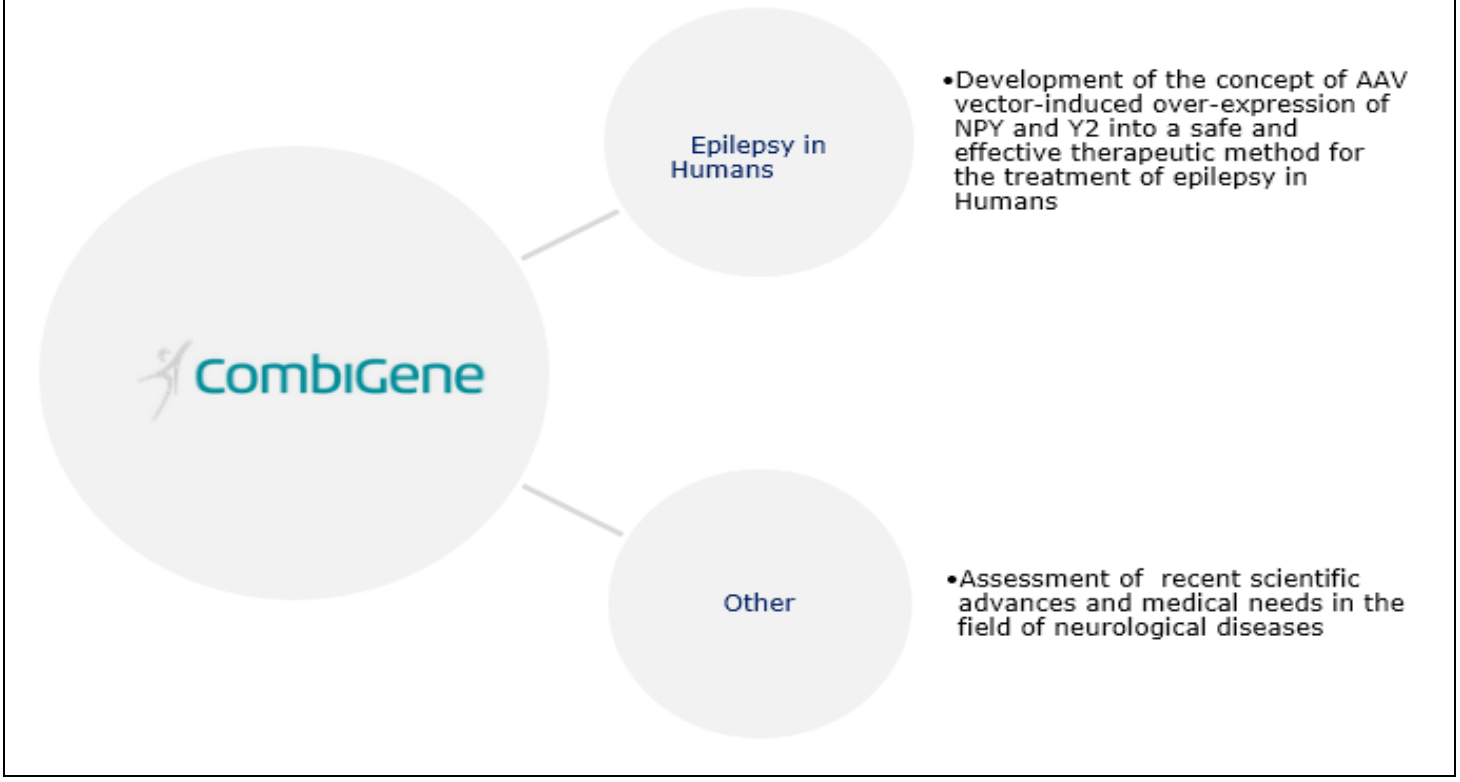
David Woldbye is an Associate Professor at the University of Copenhagen, where he leads a research team at the Laboratory of Neural Plasticity Department of Neuroscience and Pharmacology. David was first in the world to show that neurotransmitter neuropeptide Y has anti-epileptic effect in mammals.

Merab Kokaia is Professor of Physiology and Director of the Epilepsy Center, Department of Clinical Sciences, Lund University Hospital. Kokaia has also led pioneering studies in optogenetics and neurotrophins in epilepsy context.

2.5 CombiGene's Projects[xi]

CombiGene is currently focusing primarily on the Epilepsy Project in humans, but has plans to expand its project portfolio as shown in Exhibit 3 below.

Exhibit 3: Project Information



2.5.1 Epilepsy Project (Humans)

Based on thorough testing of a series of vectors produced on behalf of CombiGene, the Company has selected the main candidate AAV vector, and shown that induced over-expression of NPY and Y2 is an effective therapeutic method to treat seizures. The project is in preclinical stage and the final vector has been shortlisted in June 2016. Also, three potential GMP manufacturing partners have been identified and a series of toxicological studies will be conducted by the Company, estimating the Phase I/II safety study to begin in 2019. The project targets a population of patients suffering from partial epilepsy, showing resistance to drugs, or those not relieved by any other method. The prevalence of this group may be as high as 0.3% of the population, corresponding to about 2.5 million people in the US and EU alone.

2.5.2 Other Neurological Diseases

The Company's patent applications cover other neurological as well as psychiatric diseases, in addition to epilepsy. Currently, no such other project is yet in the development phase. However, the Company is assessing the recent scientific studies and medical needs in the field of neurological diseases with the aim to select a preferred and feasible indication for further pre-studies and potential development project. For example, Parkinson's disease is one for which there is scientific support for using a combined NPY and Y2 over-expression.

2.6 CombiGene's Platform[xii]

CombiGene's proprietary platform comprises the use of gene therapy vectors delivering a combination of transgenes encoding two or more of NPY, NPY receptors, galanin, galanin receptors, somatostatin, and/or somatostatin receptors, for the treatment of neurological or psychiatric diseases in humans or animals. The Company has its patent applications approved in the US and in Europe/EPO.

CombiGene is currently focused on developing an epilepsy treatment by means of an AAV vector carrying the transgenes for the neurotransmitter NPY and one of its receptors, the G protein-coupled receptor Y2. The Company uses well-

reputed contract providers for non-GMP AAV vector supply and three potential GMP manufacturing partners have been identified. One Contract Research Organization (CRO) has been selected for the purpose of a dose-response study of the elected candidate vector CG01. The trial has started and is expected to be completed in early 2017.

2.7 Trial Results[xiii]

Following are few graphs presenting recent academic studies supporting CombiGene's method.

Exhibit 4: Brief Description of the trial results

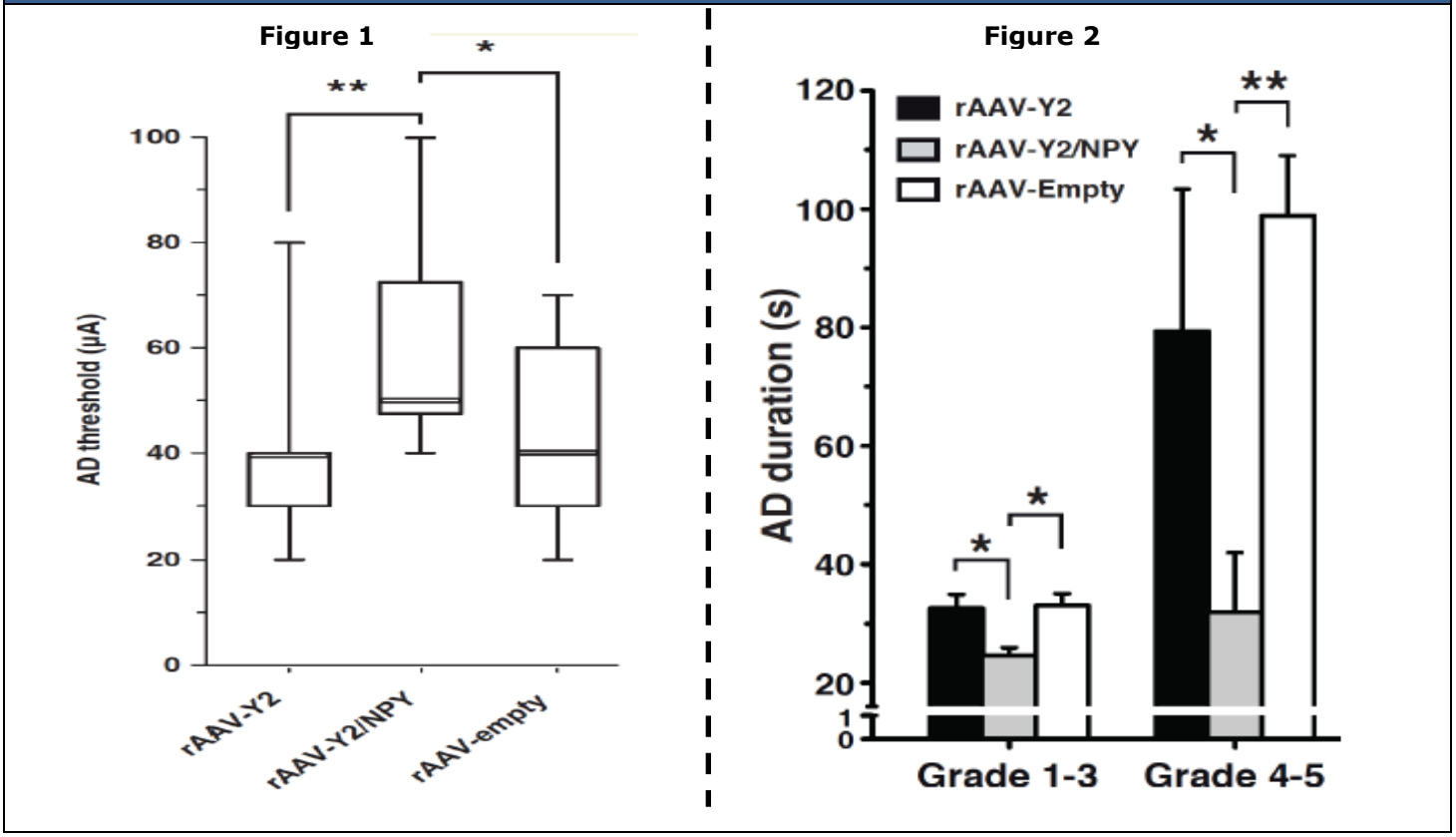


Figure 1
From Woldbye et al., 2010: The combination of rAAV-Y2 and rAAV-NPY vector treatments exert anti-epileptic effects by ***increasing*** the rapid kindling after discharge (AD) ***threshold*** as compared to rAAV-Y2 alone or rAAV-empty treatment in rats.

Figure 2
From Woldbye et al., 2010: Anti-epileptic effects of rAAV-Y2 rAAV-NPY vector combination treatment on rapid kindling in rats. The average after discharge (AD) ***duration*** during 40 rapid kindling stimulations for grade 1-3 and grade 4-5 seizures was significantly ***decreased*** by the rAAV-Y2/NPY combination as compared to treatment with rAAV-Y2 alone or rAAV-empty.

Exhibit 5: Brief Description of the trial results (Continued)

Figure 3

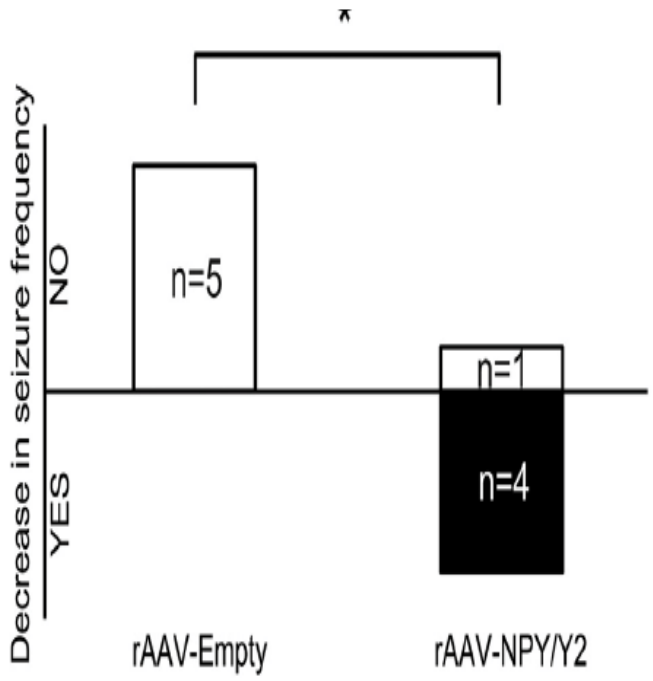


Figure 4

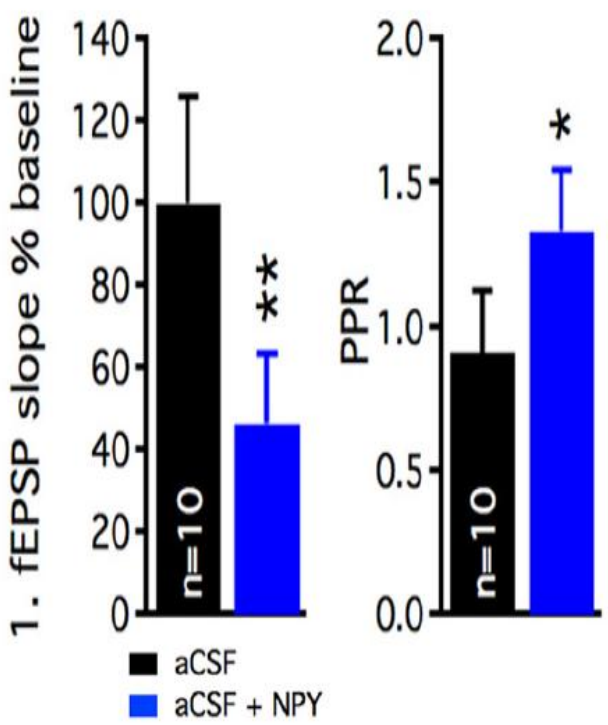


Figure 3
From Ledri LN et al., 2016: Effect of unilateral combinatorial rAAV-NPY + rAAV-Y2 treatment on spontaneous seizure ***duration*** in a clinical relevant model of epilepsy. The column chart shows the number of rats that exhibited ***decreased*** seizure frequency after combinatorial rAAV-NPY + rAAV-Y2 treatment (black) as compared with AAV-Empty (white).

Figure 4
From Ledri M et al., 2015: ***Excitatory synaptic transmission*** in Schaffer collateral-CA1 synapses in human epileptic hippocampus is ***strongly inhibited*** by NPY. During NPY application, a profound inhibitory effect is observed on the first evoked field excitatory postsynaptic potential (EPSP) with a concomitant increase in paired-pulse ratio (PPR), indicating suppression of glutamate release.

2.8 Future outlook on the Company events[xiv]

Given the current scenario, where the Company has finalized the main candidate vector, we estimate the following turn of events in the near term based on the FDA approval process. According to FDA[xv], the clinical trials of a drug can take anywhere from 3 years to 7 years. We have kept a conservative estimate of 6 years from 2019 (launch of Phase I clinical trials) before the drug hits the market.

Exhibit 6: Estimated future timeline

2016-17	2017-19	2020-22	2023-25
• Final candidate vector selected. • Following the selection, transfer to a GMP manufacturer will be made and a series of toxicological studies will be conducted.	• After the toxicological studies which can continue upto the first half of 2017, a first clinical study (PhaseI) is estimated to start by early 2019.	• During this time period, the company is expected to go for Phase II/III studies. • Submission of Marketing Authorization Application(MAA) and New Drug Application(NDA).	• Approval of the MAA and NDA • Limited launch initially; followed by a full launch by 2025.

We expect the Company to enter the market in 2025. It is initially expected to launch in the EU and the US markets, and eventually expand to under or developing economies like India, China and others.

2.9 Company Premiums[xvi]

- **Huge potential market:** Out of the total 50 million patients worldwide, approximately 30% do not get sufficient relief by the existing AEDs in the market. They can opt for surgery, where a specific part of the brain is removed, but only a handful of these 30% will in fact be eligible to undergo a surgery based on the assessments. There are no existing treatments in the market for the remaining patients. CombiGene's treatment methodology largely aims at providing potential treatment to these patients. It is estimated that the total society cost is over USD 15.5 billion[xvii] for epilepsy in the United States. Also, CombiGene has limited direct competitors and can, therefore, be the first Company to reap the benefits of gene therapy based treatment process.
- **Several convincing preclinical proof-of-principle studies:** When animals were subject to an injection of NPY/Y2 (in vivo) in the preclinical phase, they showed positive results in terms of reduced duration of the seizure, low mortality rate, mitigated side effects, increased latency, and low severity of the epileptic seizures. Positive results were also obtained when tests were carried out on human tissues (in vitro), making CombiGene's NPY/Y2 approach a promising case for development of gene therapy epileptic treatment, contrary to, for example, the galanin approach, which apparently did not work well on human tissue.
- **One-time treatment:** As opposed to medications, which may have to be administered for the rest of a patient's life or until the epilepsy spontaneously ends, CombiGene's treatment aims at being a one-time treatment for curing the chronic disease.
- **Experienced management and scientific founders:** CEO, Jan Nilsson has extensive experience having worked in leading positions with life science companies covering research development, pivotal product launch, corporate governance, etc. He has held two CEO, one CMO and one COO position in companies like CombiGene, and adds significant value to the Company in terms of track record, drug and clinical development experience, product launch and an international network. David Woldbye and Merab Kokaia, the scientific founders, have been the backbone

of the Company and have led breakthrough studies in the context of NPY and epilepsy. They are both distinguished and internationally renowned scientists with numerous publications in peer-reviewed journals. In review papers about gene therapy for epilepsy, their publications are cited frequently.

2.10 Company Risks[xviii]

- **Threat of competitors in the gene therapy field:** Another Company, Asklepios Biopharmaceuticals, is also in the preclinical stage of treatment development for epilepsy, based on the upregulation of galanin. Gene therapy remains the underlying treatment process for both the firms. CombiGene is always exposed to a risk of its competitor developing a successful treatment process earlier, which will significantly impact the financial projections of CombiGene. British Company GW Pharmaceuticals presented positive Phase III data for their drug Epidiolex against Dravet syndrome, which is a rare type of epilepsy in children.
- **New treatment processes/drugs:** Although new AED development activity in the pharma industry has decreased in the last decade, following the introduction of the third-generation drugs, there are still many projects in the pipeline, aimed at improved efficacy or – more often – reduced side effects. D Pharm Innovative Biopharmaceuticals is one such Company in Clinical phase II and any major success in that area could affect CombiGene unfavorably. Recently approved drugs, such as Trobalt/Potiga and Fycompa, are also focusing on improving the therapeutic efficacy among the partial epileptic patients.

2.11 CombiGene's Shareholding Pattern

CombiGene's total ordinary shares are 11,801,593 with the following shareholding pattern[xix]:

Exhibit 7: Shareholding Pattern [xx]

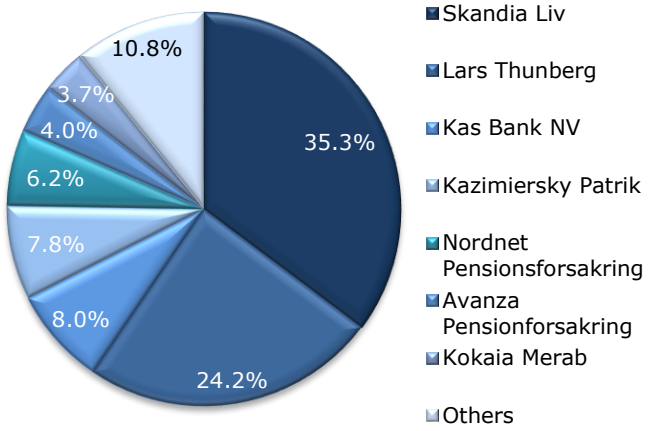


Exhibit 8: Shareholding Pattern [xxi]

Shareholders	No. of Shares	% of total
Skandia Liv	41,62,422	35.30%
Lars Thunberg	28,59,526	24.20%
Kas Bank NV	9,45,308	8.00%
Kazimiersky Patrik	9,15,804	7.80%
Nordnet Pensionsforsakring	7,34,649	6.20%
Avanza Pensionforsakring	4,75,604	4.00%
Kokaia Merab	4,31,938	3.70%
Skandia Liv	41,62,422	35.30%
Others	12,76,342	10.8%
Total	**11,801,593**	**100%**

2.12 Listing and Contact Details

The ordinary shares of CombiGene AB. are listed on Swedish marketplace, AktieTorget (Ticker AKTO: COMBI, Date of Listing – May 25, 2015)

Contacts: Medicon Village, SE- 22381 Lund, Sweden

Visiting Address: Scheelevägen 2

E-mail ID: jan.nilsson@combigene.com

Phone: +46 70 466 31 63

3. Key Variable Analysis[xxii]

3.1 Variable 1 - Market Share of CombiGene

We expect CombiGene to launch its treatment for epilepsy in limited markets by 2024, and initiate a full launch only by 2025. We assume that the Company will launch its treatment only in the US and EU markets initially, with further expansion dependent on market reception of its product. Resultantly, we have factored only the US and EU markets in our forecasts and expansion into new territory may provide further upside to our estimates. We have assumed epilepsy prevalence rate of 0.8%, with about 30% of these patients being resistant to currently available drugs (target market). We conservatively estimate the Company to capture a market share of 0.10-0.12% in 2024, which is expected to reach a peak of 0.90-1.00% by 2031. In the following years, we have kept the market share intact at 0.90% for low bracket and 1.00% for high bracket under the assumption of new market entrants.

Exhibit 9: CombiGene's market share estimate

%	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E	2034E	2035E	2036E	2037E
Low est.	0.10%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	0.90%	0.90%	0.90%	0.90%	0.90%	0.90%
High est.	0.12%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%

3.2 Variable 2 – Estimated number of patients to be treated by CombiGene

A study published by Hauser and colleagues in 1991, covering the trend over a period of 40 years for the US market concluded that there was no significant difference in prevalence rates of epilepsy during this time period, implying that the prevalence rate tends to be constant over time[xxiii]. Therefore, we have assumed a prevalence rate of 0.8% and multiplying it by the forecasted population, we calculated the estimated number of epilepsy patients per year. Taking a product of this result with the estimated market share, we forecast CombiGene to treat the following number of patients per year till 2037:

Exhibit 10: Estimate of CombiGene's patients

('000)	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E	2034E	2035E	2036E	2037E
Low est.	2.0	6.2	8.2	10.3	12.4	14.5	16.6	18.7	18.8	18.8	18.8	18.9	18.9	18.9
High est.	2.5	8.2	10.3	12.4	14.5	16.6	18.7	20.8	20.8	20.9	20.9	21.0	21.0	21.0

3.3 Variable 3 – Revenue from treatment of patients suffering from Epilepsy

Considering that the currently available drugs only alleviate the impact of seizures, while the Company's gene therapy would offer effectively a cure for epilepsy, we expect the Company to price its treatment at a premium. Moreover, the Company is targeting drug resistant patients, who either do not have any effective treatment available or can be only treated through expensive surgery. Cumulatively, we expect the Company to charge $70,000 per patient for its gene therapy treatment before the expiry of its patent, decreasing thereafter due to additional competition. Based on our assumptions, the estimated revenue generated would be as follows after having been adjusted for development-related risks:

Exhibit 11: Risk-adjusted revenue from epilepsy patients

SEK million	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E	2034E	2035E	2036E	2037E
Low estimate	198	595	795	997	1,199	1,402	1,606	1,811	1,815	1,782	1,749	1,717	1,686	1,652
High estimate	316	1,057	1,325	1,595	1,865	2,137	2,409	2,683	2,688	2,640	2,592	2,544	2,498	2,448

4. News[xxiv]

- **Panion Animal Health signs agreement with CombiGene regarding licensing of candidate drug for the veterinary market:** The license agreement gives Panion Animal Health exclusive right to develop veterinary Combination therapies based on CombiGene's drug candidate. The license covers operations in the EEA, Switzerland and the USA. The agreement includes an upfront payment of SEK three million, which will be paid when Panion Animal Health receives funding for its operations. Also, CombiGene will receive royalties on future sales.

- **New CEO, Jan Nilsson accepts offer to purchase options:** The newly appointed CEO accepted an offer to purchase 60,000 options, which was 100% of the offer, within the framework of the options programme decided upon at the AGM held on 4th April 2016. Jan Nilsson purchased a further 60,000 options from his predecessor as CEO.

- **Jan Nilsson appointed as new CEO:** Effective October 1, 2016, Jan Nilsson has taken up this position. Jan Nilsson has experience of working in leading positions in life science companies, both public and private (national and international). His prior role was as COO in Nasdaq Stockholm listed NeuroVive Pharmaceutical AB (publ), wherein he held various positions since 2010 and played an active role to bring the Company to its current stage.

- **New Scientific Advisory Board:** The previous board, consisting of associate professor Eskil Elmér from Lund and the Company's scientific co-founders Merab Kokaia and David Woldbye, has been replaced by a new 3-member Board. The new Board consists of Dr. Annamaria Vezzani from Milan, professor Deniz Kirik from Lund and professor Margitta Seeck from Geneva. A scientific meeting was held with the objective to discuss the preclinical development program remaining before the start of first study on humans and the preliminary design of that study.

- **Candidate vector selected:** The candidate vector CG01 contains the two transgenes, NPY and Y2. This main candidate vector will be subject to further characterization and development to turn it into a human therapeutic product. This vector will be the focus for further study, with the aim to test it in a Phase I / II study on patients by 2019. The exact sequence and identity of the vector will currently not be disclosed.

- **Key personnel acquire warrants:** Total 230,000 warrants were acquired with each warrant giving holder the right to buy a CombiGene share in May 2019 at a price of 11,1 SEK. The two scientific cofounders, David Woldbye and Merab Kokaia, acquired 80,000 and 60,000 warrants, respectively. Former CEO, Bengt Westrin acquired 60,000, and CSO, Casper Götzsche acquired 30,000. CombiGene Personal AB administers this warrant series TO 2 and now has 123 760 TO 2 warrants remaining, which can be offered as incentives to other key personnel in future. Board member, Lars Thunberg acquired 40,000 shares in the open market the same day as these transactions.

- **University of Copenhagen, a new shareholder:** Share transfer from CombiGene's co-founder David Woldbye to the University of Copenhagen makes it a holder of 216,000 share in CombiGene, i.e., 1.9% of the shares. This transaction fulfils a mutual agreement from 2007 stipulating that transfer would be conducted when Combigene becomes a public and listed Company.

- **Joining "The Alliance for Regenerative Medicine":** Combigene has been invited to become a part of The Alliance for Regenerative Medicine (ARM). ARM, which is based in Washington, D.C., promotes legislative, regulatory and reimbursement initiatives. It facilitates advances in gene and cellular therapies and other regenerative medicine. Combigene's objective from this alliance is gaining access to international and cutting-edge network within gene therapy, and reach out to business development and investment opportunities, along with contributing to alliance's mission and goals.

- **Participation in the BIO International Convention, San Francisco (BIO2016):** To continue dialogue with the big drug companies, Combigene participated in the partnering conference BIO-Europe in Cologne**.** Combigene confirmed that there is significant interest in gene therapy and many big pharmaceutical companies have started building departments for exclusive work on gene therapy.

- **Contract Research Organization selected:** In the development phase, the main activity was to identify and assign a contract research organization (CRO) to work to make a dose-response study of the main candidate vector CG01. A CRO has been selected and the trial has started; it is expected to be completed by early 2017.

- **Potential GMP Manufacturing Partner:** Three potential partners have been identified to produce feasible amounts of the main candidate vector designated as CG01.

5. Management and Governance

The management team includes experienced professionals, who have held positions of responsibility across various firms. CEO Jan Nilsson was recruited in October 2016, and CSO Casper René Götzsche was recruited in Oct 2015. Both have significant experience in their respective areas.

Exhibit 12: Management and Governance[xxv]

Name	Position	Past Experience	Qualifications
Arne Ferstad	Chairman	• He has previously overseen Baxter Healthcare's business in the Nordic and Benelux countries and has served as the President of EMEA Baxter Renal Division • Also, he has held various senior management roles with H&S, Medfield, Aggancio AB, and Ankor Consultants	• He completed his MBA from INSEAD
Jan Nilsson	CEO	• He served as COO of NeuroVive Pharmaceutical AB, CMO of Pergamum AB, CEO of Lipopeptide, an Operating Unit, CEO of Tripep AB, Managing Director, Sweden of Schering-Plough & Vice President Nordic Operations of Schering-Plough • From 1995 onward, he has acquired extensive industry experience, in leading positions with life science companies, covering research and development, implementing pivotal product launch to corporate governance	• He completed his MBA, International Business Management from University of Uppsala in 1993.
Casper René Götzsche	CSO	• He had previously worked as a Research Assistant at the University of Copenhagen and Rigshospitalet • He has also worked as a Guest Researcher at Lund University and Massachusetts Institute of Technology • He has been working with NPY and gene therapy targeting brain diseases since 2008 and has authored more than 10 scientific papers related to the subject	• Obtained his MSc in Human Biology, Neuroscience and Pharmacology, and PhD in Health and Medical Sciences from the University of Copenhagen

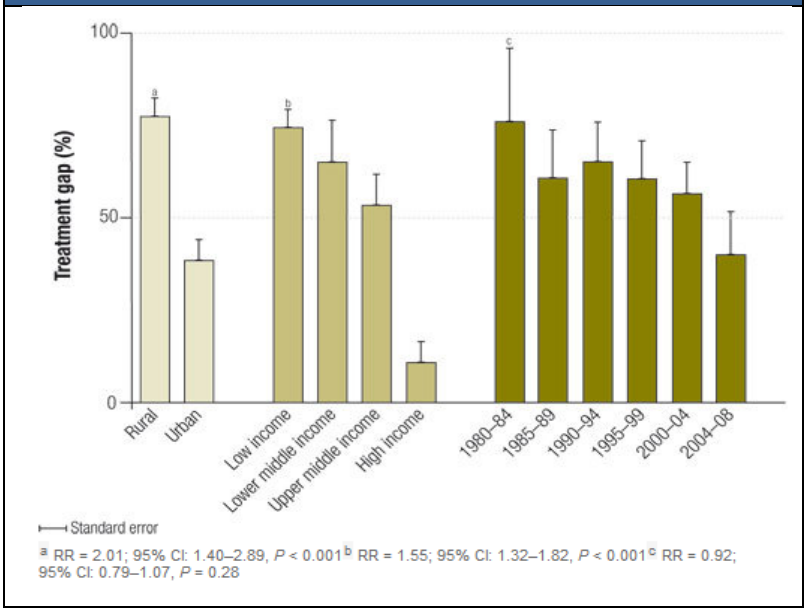
6. Markets and Competition

6.1 Industry Overview[xxvii]

6.1.1 Epilepsy and its market size

According to WHO, there are approximately 50 million people worldwide who are suffering from epilepsy. Nearly 80% of them live in the low and middle income countries and approximately 75% of the epileptic patients in low and middle income countries do not get the required treatment. Epilepsy can be treated easily and successfully via Anti-Epileptic Drugs (AED) in about 70% of the cases. Furthermore, if 2- 5 years of successful treatment results in being seizure-free, drugs can be withdrawn for about 70% of children and 60% of adults, without subsequent relapse. In low and middle income countries, about three fourths of people with epilepsy may not receive the treatment they need. This is called the "treatment gap". According to a review by WHO, low to middle income countries suffer from the problem of treatment gap, which is more prevalent in rural areas as compared to the urban areas. This is depicted in Exhibit 13.

Exhibit 13: Treatment Gap Statistics[xxvi]



Worldwide calculation of epileptic patients is done by multiplying the prevalence rate with the total population. According to the data reported by WHO in 2005, the global prevalence rates vary in the range of 0.4%-1% among different countries. For this report, we have taken the prevalence rate of 0.8% in US and EU countries.

According to Center for Disease Control and Prevention, the total direct and indirect cost of epilepsy in the US is estimated to be about USD 15.5 billion per year, which amounts to roughly USD 6,000 per patient. In Europe, according to the report by International League Against Epilepsy (ILAE), the International Bureau for Epilepsy (IBE), and the World Health Organization (WHO), the total costs per year amounted to over € 20 billion (USD 21 billion) for 6 million patients in 2011; amounting to USD 3,500 (approximately) per patient.

6.1.2 Estimated number of patients for gene therapy in US and EU

Since the Company currently has patents in the US and Europe (10 countries), we conservatively estimated the market size for just these regions. In US, about 2.5- 3 million people have epilepsy, and approximately an additional 150,000 Americans are diagnosed every year with epilepsy. The active epilepsy patients are calculated by multiplying the current population with the prevalence rate of 0.8%. Among EU countries, taking the prevalence factor of 0.8%, nearly 4 million people suffer from epilepsy.

For the estimation of current market size, we have taken the prevalence rate of 0.8% and a combined population of US and EU countries to be 830 million. This means the total epileptic patient population would be about 6.64 million. Of these, 60%-70% get treatment via AEDs, the remaining 30%-40% (on an average 2.16 million) patients will form the target market for gene therapy based treatment in US and the countries of European Union.

6.2 Gene Therapy[xxviii]

Gene therapy is defined as "the introduction of genetic material (either DNA or RNA) into cells for a therapeutic purpose" (Touchefeu et al., 2010). The aim is to introduce a functional gene to selectively repair or replace an abnormal mutant gene or to selectively regulate the expression of a gene by knocking out its expression (Misra, 2013). However, in the case of CombiGene's approach, the aim is to supplement and enhance the expression from non-defective, functioning genes.

Gene therapy was initially introduced in 1970s, and had been making progress till 1999. In 1999, a patient named Jesse Gelsinger died in a clinical trial due to severe immunotoxicity caused by the adenoviral vector (which is different from AAV). This reduced the number of clinical trials being carried out every year and increased the level of precaution taken by the FDA and other regulatory authorities. Despite the hurdles, first drug for gene therapy was approved in China in

2003: Gendicine. Till now, 2 major products have been approved in the developed markets of North America, the EU and Japan under gene therapy and 3 in places outside these markets:

Developed Markets

- Glybera (alipogene tiparvovec) for the treatment of familial Lipoprotein Lipase Deficiency (LPL)
- Kynamro (mipomersen) for Homozygous Familial Hypercholesterolemia (HoFH)

Outside Developed Markets

- Gendicine (rAd-p53) approved in China for head and neck cancers
- Oncorine (rAd5-H101) approved in China for head and neck cancers
- Neovasculgen (Pl-VEGF165) approved in Russia for peripheral arterial disease

Following are the major risks associated with Gene Therapy:

- **Gene delivery and activation:** Gene therapy involves delivering the genes to the correct cells and activating them, so that they can produce the encoded genes. Improper targeting can result in the gene getting delivered to the wrong cells and can induce health issues for the patient.
- **Immune response:** Human immune system wards off any intruder such as bacteria and virus trying to enter the body. For gene therapy to succeed, the vector induced must be able to avoid the human surveillance system. Adverse immune response could potentially cause serious illness or death. AAV vectors are generally considered not to give such immune responses, but this is nevertheless a risk factor to keep in mind.
- **Disruption of important genes:** For a therapeutic gene to become a permanent part of the target cell's genome, it must integrate into the cell's own DNA. There have been cases in the past when the gene was integrated into an inappropriate location and disrupted other genes. However, in the case of CombiGene's project, as well as other projects using AAV vectors, the aim is not to insert the therapeutic gene into the cell's DNA, but rather to supplement that DNA. AAV vectors are not believed to give such insertional mutagenesis but nevertheless, the possibility of the therapeutic gene disrupting other genes is a risk that must be considered.

Despite the challenges it faces, gene therapy is now starting to see its moment of success. Though the process has been slow, the future looks promising. Encouraging treatment results in few cases have made it possible for the researchers to believe in its future success.

6.3 Future of Gene Therapy as a Treatment Process for Epilepsy

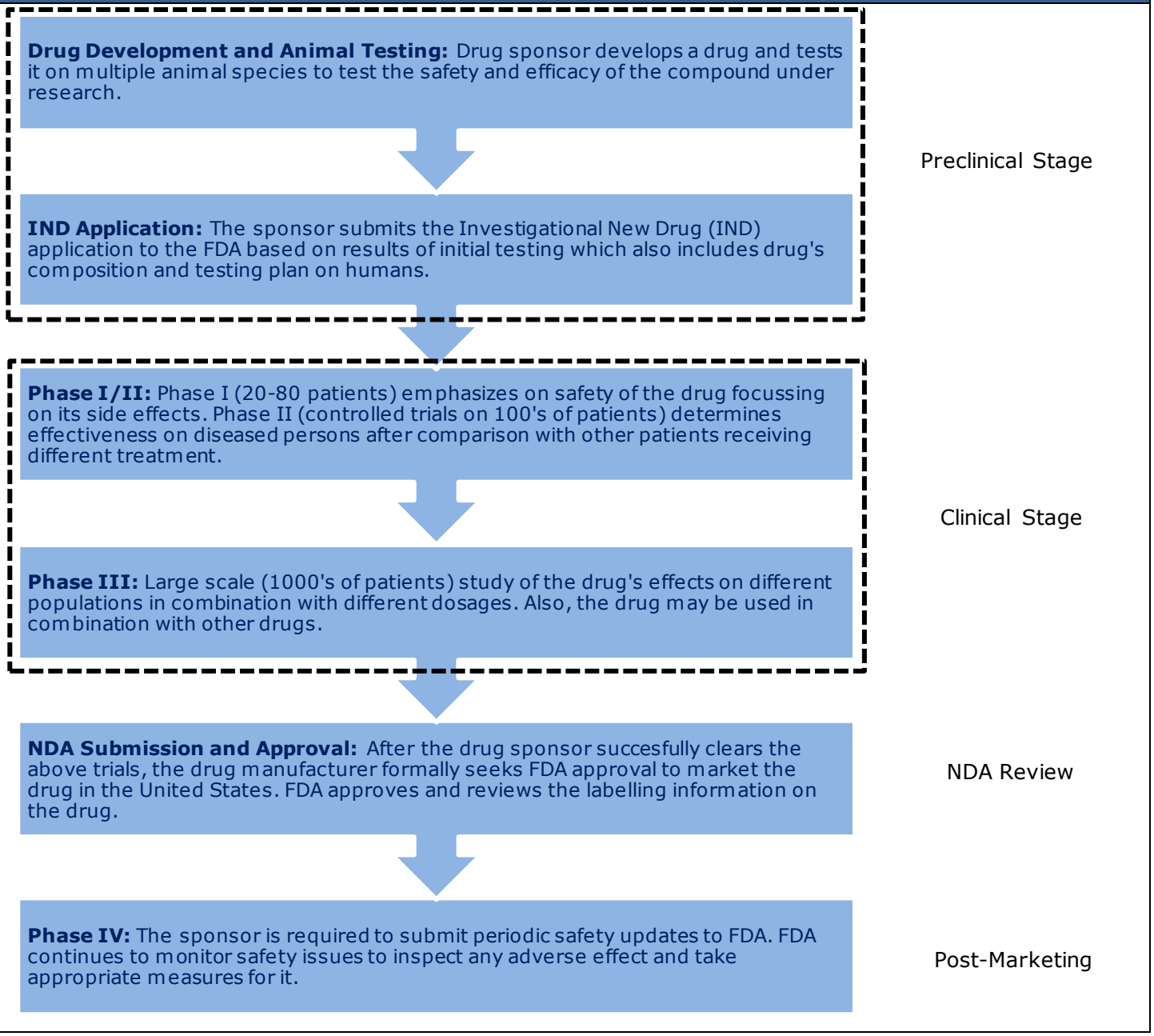
Gene therapy has been in an evolution process for decades and has been regarded as one of the most promising new technology to treat human diseases. It has witnessed limited success so far but it remains largely an attractive topic for research and development on different diseases due to the promising results shown in tests for various other diseases. Use of gene therapy for epilepsy is still in preclinical stages, making it difficult to assess its success; however, the following are a few arguments to point out why CombiGene's approach can be a new successful technique in the market:

- NPY has been shown to inhibit neural hyperactivity via activation of Y2 and/or Y5 NPY receptors. Several studies by the Company's scientific founders and independent researchers have held forward NPY as the most promising concept for gene therapy against epilepsy[xxix].
- Positive results of using NPY in combination of Y2 and/or Y5 receptors in other neurological diseases like Parkinson's disease and Alzheimer's disease.
- Gene therapy received a major boost after European Commission granted market authorization for Glybera in 2012. Glybera is a gene therapy that is designed to restore the LPL enzyme activity required to enable the processing, or clearance, of fat-carrying chylomicron particles formed in the intestine after a fat-containing meal.

6.3 Regulation[xxx]

There are various phases involved in getting the drug approval from the US FDA (Food and Drug Administration) to bring the drug to the market, and the same is true for EMA (European Medicines Agency). Following flow chart describes the various phases a Company must go through to obtain the approval to market its drug in the US.

Exhibit 14: Drug Approval Process



6.4 Competition[xxxi]

CombiGene AB has few direct competitors, who are using the gene therapy to cure seizures. However, the possibility of cheaper and more effective drugs/ medical devices remains, such that may be able to cure or significantly alleviate the seizure for patients suffering from drug resistant partial epilepsy. Researches by Scripps Research Institute and D Pharm Innovative Biopharmaceuticals point toward the development of drugs that can also help in reducing partial epileptic seizures. Since there is a huge market of epileptic patients still without a drug/treatment to provide freedom from seizures, the AED producing firms are also in the race to acquire this market via new and improved versions of the drugs.

Exhibit 15: Listed peers' treatment/drug[xxxii]

Company	Market Cap ($ millions)	Product*	Trial Stage
Novartis	188574	Tegretol	Launched
		Trileptal	Launched
		BGG-492	Phase II
Pfizer	199285	Neurontin	Launched
		Lyrica	Launched
		ICA-105665	Phase II
GlaxoSmithKline	94616	Lamictal	Launched
		Potiga	Launched
Abbott	56095	Depakene	Launched
		Depakote	Launched
Eisai	17081	Zonegran	Launched
		Fycompa	Launched
UCB	11793	Keppra	Launched
		Vimpat	Launched
		Brivaracetam	Phase III
Dainippon Sumitomo Pharma	6597	Excegran	Launched
		DSP- 0565	Phase I
Supernus Pharmaceuticals	1176	Oxtellar XR	Launched
Supernus Pharmaceuticals	1176	Trokendi XR	Launched
Bionomics	118	NA	Preclinical
Marinus Pharmaceuticals**	18	Ganaxolone	Clinical
D-Pharm	4	DP- VPA (Valproic Acid)	Clinical Phase II

* The product list is just an indication and may not be exhaustive.
** Indicates trials for adults, children at different stages of Clinical Phase.

Additionally, new drugs targeting the galanin system are being researched, which may prove to be effective for treating epilepsy. Following are a few on-going researches for the treatment of epilepsy like CombiGene's:

6.4.1 Scripps Research Institute[xxxiii]

Scripps Research Assistant Professor, Xiaoying Lu, co-authored a paper with Professor Edward Roberts, Chair of the Molecular and Integrative Neurosciences Department Tamas Bartfai, and colleagues to find a new class of drugs for epileptic seizures. They formed a compound, dubbed CYM2503, which binds to one of the three receptors for galanin on nerve cells, the galanin receptor type 2 (GalR2). The researchers tested the effects of CYM2503 on mice and rats that had received a chemical causing them to have seizures. The animals that received CYM2503 took longer to get the seizures and, when they did, the seizures lasted for a shorter time. Also, when the researchers looked at the animals after 24 hours, the rats that had been treated with CYM2503 had a dramatically higher survival rate than those that had not.

6.4.2 Asklepios Biopharmaceutical Inc. (AskBio)[xxxiv]

AskBio, which has some similarities with CombiGene, is also in the process of developing epilepsy treatment using gene therapy; however, by using a transgene for the neuropeptide galanin instead of using NPY + Y2. The Company is currently in the preclinical stage of development. It has been founded based on inventions by scientists from University of North Carolina Gene Therapy Center. The Company is currently handling 6 other projects, which are at various stages of development.

6.4.3 NeuroAdjuvants Inc.[xxxv]

NeuroAdjuvants is Utah based Company, founded in 2005, involved in the development of peptide-based therapeutics for the treatment of neurological disorders. The Company partners with The University of Utah for the development of a galanin receptor based therapy. Due to limited disclosure by the Company, not much can be commented on the progress of the research.

7. Valuation

Based on the estimates and calculations presented below, we propose that the Fair Market Value for all Company shares stands between SEK 310.1 million and SEK 355.3 million as of December 19, 2016. The Fair Market Value for one Company publicly traded share (COMBI) stands between SEK 27.25 and SEK 31.21 as of December 19, 2016. The primary valuation approach followed is the Discounted Cash Flow method.

7.1 Discounted Cash Flow Method

Valuation

WACC

Risk-free rate	2.24%[xxxvi]
Beta	1.08[xxxvii]
Market premium	14.0%[xxxviii]
Additional Risk Premium	0.0%
Cost of Equity	14.40%
Cost of Debt	3.12%
Terminal Growth Rate	1.0%
WACC (Discount Rate)	15%

Figures are in million SEK, unless indicated otherwise

KEY VARIABLES

Market captured	Market Share
Refer to *Key Variables Analysis* section	

Year Ending	2016E	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E
FCFE (High)*									
Net cash from operating activities	(10)	(17)	(42)	(34)	(60)	(108)	(152)	(150)	27
Capital Expenditure	(0)	(0)	(0)	(0)	(0)	(0)	(50)	(51)	(53)
Net Finance Income	0	0	0	0	0	0	0	0	0
Free Cash Flow to Equity	(10)	(17)	(42)	(34)	(60)	(108)	(202)	(201)	(25)
Discount factor	0.87	0.76	0.66	0.57	0.50	0.43	0.38	0.33	0.28
Present Value of FCFE	(9)	(13)	(28)	(20)	(30)	(47)	(76)	(66)	(7)
FCFE (Low)*									
Net cash from operating activities	(10)	(17)	(42)	(34)	(60)	(108)	(152)	(150)	34
Capital Expenditure	(0)	(0)	(0)	(0)	(0)	(0)	(50)	(51)	(53)
Net Finance Income	0	0	0	0	0	0	0	0	0
Free Cash Flow to Equity	(10)	(17)	(42)	(34)	(60)	(108)	(202)	(201)	(18)
Discount factor	0.87	0.76	0.66	0.57	0.50	0.43	0.38	0.33	0.28
Present Value of FCFE	(9)	(13)	(28)	(20)	(30)	(47)	(76)	(66)	(5)

* In the model, the valuation is continued to the year 2037, from which point the terminal value is established. For all data refer to the Appendix section 8.

Arrowhead Fair Value Bracket	High	Low
Terminal Value (TV)	2,929	2,725
Present Value of TV	273	254
Present value of FCFE	83	56
Equity Value Bracket	355.3	310.1
Shares O/s (million)	11.4	11.4
Fair Share Value Bracket (SEK)	**31.21**	**27.25**
Current Market Price (SEK)	4.30	4.30
Current Market Cap. (SEK million)	48.9	48.9
Target Market Cap. Bracket (SEK million)	355.3	310.1

[xxxix]

Approach for DCF Valuation

Time Horizon: The Arrowhead fair valuation for CombiGene is based on a DCF method. The time period chosen for the valuation is 264 months (2016E-2037E).

Terminal Value: Terminal value is estimated to depend on a terminal growth rate of 1.0%, representing an increase in the sale of CombiGene's gene therapy treatment for epilepsy.

Prudential nature of valuation: It should be noted that this Arrowhead Fair Value Bracket estimate is a relatively prudential estimate, as it discounts the eventuality of any new products being launched in the market or any significant change in the strategy.

Key variables: The upper and lower bounds in the estimation correspond to the extreme positions taken by the following key variables:

Variable 1 – Estimated market share of CombiGene

Exhibit 16: CombiGene's market share estimate

%	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E	2034E	2035E	2036E	2037E
Low est.	0.10%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	0.90%	0.90%	0.90%	0.90%	0.90%	0.90%
High est.	0.12%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%

Variable 2– Estimated number of patients to be treated by CombiGene

Exhibit 17: Number of CombiGene's patients estimate

('000)	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E	2034E	2035E	2036E	2037E
Low est.	2.0	6.2	8.2	10.3	12.4	14.5	16.6	18.7	18.8	18.8	18.8	18.9	18.9	18.9
High est.	2.5	8.2	10.3	12.4	14.5	16.6	18.7	20.8	20.8	20.9	20.9	21.0	21.0	21.0

Important information on Arrowhead methodology

The principles of the valuation methodology employed by Arrowhead BID are variable to a certain extent depending on the subsectors in which the research is conducted, but all Arrowhead valuation research possesses an underlying set of common principles and a generally common quantitative process.

With Arrowhead Commercial and Technical Due Diligence, Arrowhead extensively researches the fundamentals, assets and liabilities of a Company, and builds solid estimates for revenue and expenditure over a coherently determined forecast period.

Elements of past performance, such as price/earnings ratios, indicated as applicable, are present mainly for reference purposes. Still, elements of real-world past performance enter the valuation through their impact on the commercial and technical due diligence.

Elements of comparison, such as multiple analyses may be to some limited extent integrated in the valuation on a project-by-project or asset-by-asset basis. In the case of this CombiGene report, there are no multiple analyses integrated in the valuation.

Arrowhead BID Fair Market Value Bracket

The Arrowhead Fair Market Value is given as a bracket. This is based on quantitative key variable analysis, such as key price analysis for revenue and cost drivers or analysis and discounts on revenue estimates for projects, especially relevant to those projects estimated to provide revenue near the end of the chosen forecast period. Low and high estimates for key variables are produced as a tool for valuation. The high-bracket DCF valuation is derived from the high-bracket key variables, while the low-bracket DCF valuation is based on the low-bracket key variables.

In principle, an investor who is comfortable with the high-brackets of our key variable analysis will align with the high-bracket in the Arrowhead Fair Value Bracket, and likewise in terms of low estimates. The investor will also take into account the Company intangibles – as presented in the first few pages of this document in the analysis on strengths and weaknesses and other essential Company information. These intangibles serve as supplementary decision factors for adding or subtracting a premium in the investor's own analysis.

The bracket should be understood as a tool provided by Arrowhead BID for the reader of this report and the reader should not solely rely on this information to make his decision on any particular security. The reader must also understand that on one hand, global capital markets contain inefficiencies, especially in terms of information, and that on the other hand, corporations and their commercial and technical positions evolve rapidly: this present edition of the Arrowhead valuation is for a short to medium-term alignment analysis (one to twelve months). The reader should refer to important disclosures on page 27 of this report.

8. Appendix

8.1 CombiGene's Balance Sheet Forecast

Exhibit 18: Consolidated Balance Sheet *Low Bracket estimates* All figures in million SEK, unless stated differently

Year Ending	2016E	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E
Total current assets	14.6	17.2	14.7	25.3	25.0	26.7	24.6	23.6	55.5	135.5
Total non-current assets	1.3	1.2	1.2	1.2	1.2	1.2	48.7	94.8	139.6	183.0
TOTAL ASSETS	15.9	18.4	15.9	26.5	26.2	27.9	73.3	118.4	195.1	318.5
Total current liabilities	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	18.2	53.9
TOTAL LIABILITIES	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	18.2	53.9
Total shareholder's equity	15.3	17.8	15.3	25.8	25.6	27.2	72.7	117.8	176.9	264.6
TOTAL LIABILITIES & EQUITY	15.9	18.4	15.9	26.5	26.2	27.9	73.3	118.4	195.1	318.5

Exhibit 19: Consolidated Balance Sheet *Low Bracket estimates*

Year Ending	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E	2034E	2035E
Total current assets	238.2	318.5	440.8	585.1	639.2	664.4	673.8	681.1	689.6	690.8
Total non-current assets	225.0	265.5	304.6	342.2	378.2	412.5	445.3	476.4	505.7	533.3
TOTAL ASSETS	463.2	584.0	745.4	927.3	1,017.3	1,076.9	1,119.1	1,157.5	1,195.4	1,224.2
Total current liabilities	72.0	90.1	108.3	126.6	145.0	163.4	163.7	160.8	157.9	146.4
TOTAL LIABILITIES	72.0	90.1	108.3	126.6	145.0	163.4	163.7	160.8	157.9	146.4
Total shareholder's equity	391.3	493.9	637.1	800.7	872.4	913.5	955.4	996.7	1,037.5	1,077.8
TOTAL LIABILITIES & EQUITY	463.2	584.0	745.4	927.3	1,017.3	1,076.9	1,119.1	1,157.5	1,195.4	1,224.2

Exhibit 20: Consolidated Balance Sheet *Low Bracket estimates*

Year Ending	2036E	2037E
Total current assets	702.1	714.4
Total non-current assets	559.1	583.0
TOTAL ASSETS	1,261.2	1,297.4
Total current liabilities	143.7	140.8
TOTAL LIABILITIES	143.7	140.8
Total shareholder's equity	1,117.5	1,156.6
TOTAL LIABILITIES & EQUITY	1,261.2	1,297.4

Exhibit 21: Consolidated Balance Sheet *High Bracket estimates* All figures in million SEK, unless stated differently

Year Ending	2016E	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E
Total current assets	14.6	17.2	14.7	25.3	25.0	26.7	24.6	23.6	64.2	194.3
Total non-current assets	1.3	1.2	1.2	1.2	1.2	1.2	48.7	94.8	139.6	183.0
TOTAL ASSETS	15.9	18.4	15.9	26.5	26.2	27.9	73.3	118.4	203.8	377.3
Total current liabilities	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	28.9	95.6
TOTAL LIABILITIES	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	28.9	95.6
Total shareholder's equity	15.3	17.8	15.3	25.8	25.6	27.2	72.7	117.8	174.9	281.7
TOTAL LIABILITIES & EQUITY	15.9	18.4	15.9	26.5	26.2	27.9	73.3	118.4	203.8	377.3

Exhibit 22: Consolidated Balance Sheet *High Bracket estimates*

Year Ending	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E	2034E	2035E
Total current assets	313.7	410.0	547.3	709.7	776.3	810.5	823.1	831.8	841.7	840.2
Total non-current assets	225.0	265.5	304.6	342.2	378.2	412.5	445.3	476.4	505.7	533.3
TOTAL ASSETS	538.7	675.5	851.9	1,051.9	1,154.4	1,223.1	1,268.4	1,308.2	1,347.5	1,373.5
Total current liabilities	119.7	143.9	168.3	192.7	217.2	241.9	242.4	238.0	233.7	216.7
TOTAL LIABILITIES	119.7	143.9	168.3	192.7	217.2	241.9	242.4	238.0	233.7	216.7
Total shareholder's equity	419.0	531.6	683.7	859.2	937.2	981.2	1,026.0	1,070.2	1,113.8	1,156.8
TOTAL LIABILITIES & EQUITY	538.7	675.5	851.9	1,051.9	1,154.4	1,223.1	1,268.4	1,308.2	1,347.5	1,373.5

Exhibit 23: Consolidated Balance Sheet *High Bracket estimates*

Year Ending	2036E	2037E
Total current assets	852.8	866.4
Total non-current assets	559.1	583.0
TOTAL ASSETS	1,411.9	1,449.4
Total current liabilities	212.7	208.5
TOTAL LIABILITIES	212.7	208.5
Total shareholder's equity	1,199.2	1,241.0
TOTAL LIABILITIES & EQUITY	1,411.9	1,449.4

FCFE Calculation (2025E-2037E) – Continued from page 21

Exhibit 24:	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E
FCFE (High)*									
Net cash from operating activities	88	140	231	312	362	404	458	479	478
Capital Expenditure	(54)	(55)	(57)	(58)	(59)	(61)	(62)	(64)	(66)
Net Finance Income	0	1	1	2	3	4	5	5	5
Free Cash Flow to Equity	34	85	175	256	306	348	400	419	417
Discount factor	0.25	0.22	0.19	0.16	0.14	0.12	0.11	0.09	0.08
Present value of FCFE	8	18	33	42	43	43	43	39	34
FCFE (Low)*									
Net cash from operating activities	82	132	213	297	341	375	432	450	449
Capital Expenditure	(54)	(55)	(57)	(58)	(59)	(61)	(62)	(64)	(66)
Net Finance Income	0	1	1	2	3	4	4	4	4
Free Cash Flow to Equity	29	77	158	241	284	318	373	390	388
Discount factor	0.25	0.22	0.19	0.16	0.14	0.12	0.11	0.09	0.08
Present value of FCFE	7	17	30	39	40	39	40	36	31

Exhibit 25:	2034E	2035E	2036E	2037E
FCFE (High)*				
Net cash from operating activities	476	448	471	469
Capital Expenditure	(67)	(69)	(71)	(72)
Net Finance Income	5	5	5	5
Free Cash Flow to Equity	413	384	406	401
Discount factor	0.07	0.06	0.05	0.05
Present value of FCFE	29	24	22	19
FCFE (Low)*				
Net cash from operating activities	447	428	443	441
Capital Expenditure	(67)	(69)	(71)	(72)
Net Finance Income	4	5	5	5
Free Cash Flow to Equity	384	364	377	374
Discount factor	0.07	0.06	0.05	0.05
Present value of FCFE	27	22	20	17

9. Analyst Certifications

I, Parvati Rai, certify that all of the views expressed in this research report accurately reflect my personal views about the subject security and the subject Company, based on the collection and analysis of public information and public Company disclosures.

I, Sumit Wadhwa, certify that all of the views expressed in this research report accurately reflect my personal views about the subject security and the subject Company, based on the collection and analysis of public information and public Company disclosures.

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10. Notes and References

[i] Source: Bloomberg, retrieved on December 19, 2016

[ii] 52 weeks to December 19, 2016. Source: Bloomberg, December 19, 2016

[iii] 3 months December 19, 2016. Source: Bloomberg, December 19, 2016

[iv] Arrowhead Business and Investment Decisions Fair Value Bracket – AFVBTM. See information on valuation on pages 21-22 of this report and important disclosures on page 27 of this report.

[v] Source: WHO – Epilepsy Factsheet. http://www.who.int/mediacentre/factsheets/fs999/en/

[vi] Source: CombiGene Annual Report 2015, Company website, Press Releases

[vii] Source: WHO website, www.epilepsy.com

[viii] Source: Company Website, http://learn.genetics.utah.edu/content/genetherapy/

[ix] Source: Company Website

[x] Source: Company Website

[xi] Source: Company Website

[xii] Source: Company Website

[xiii] Source: -Ledri M, Sørensen AT, Madsen MG, Christiansen SH, Ledri LN, Cifra A, Bengzon J, Lindberg E, Pinborg LH, Jespersen B, Gøtzsche CR, Woldbye DP, Andersson M, Kokaia M. Differential Effect of Neuropeptides on Excitatory Synaptic Transmission in Human Epileptic Hippocampus. J Neurosci. 2015, 35:9622-31.

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[xiv] Source: Company Website and Arrowhead BID estimate

[xv] Source: http://www.fda.gov/ForPatients/Approvals/Drugs/ucm405622.htm

[xvi] Source: Arrowhead BID analysis

[xvii] Source: Centre for Disease Control and Prevention

[xviii] Source: Arrowhead BID analysis

[xix] Source: Bloomberg

[xx] Source: Bloomberg

[xxi] Source: Bloomberg

[xxii] Source: Arrowhead BID estimate

[xxiii] Source: Hauser et al., 1991

[xxiv] Source: CombiGene press releases

[xxv] Source: LinkedIn

[xxvi] Source: WHO, http://www.who.int/bulletin/volumes/88/4/09-064147/en/

[xxvii] Source: WHO, http://www.healthline.com/health/epilepsy/facts-statistics-infographic#12

[xxviii] Source: GBI Research, "Gene Therapies - A Diverse Range of Technologies with a Promising Long-Term Outlook" and other articles

[xxix] Source: Woldbye et al., 2005; El Bahh et al., 2005; Simonato,2013; Sorenson and Kokaia, 2013
[xxx] Source: FDA
[xxxi] Source: http://www.epilepsy.com/accelerating-new-therapies/new-therapies-pipeline
[xxxii] Source: Bloomberg, respective companies' websites, GlobalData Epilepsy Report 2013 Reference Code GDHC72PIDR
[xxxiii] Source: http://www.sciencedaily.com/releases/2010/07/100729091456.htm
[xxxiv] Source: AskBio Website; http://www.askbio.com/technology.html
[xxxv] Source: http://www.epilepsy.com/sites/core/files/atoms/files/2-03_Klein.pdf
[xxxvi] Source: Bloomberg, retrieved on December 19, 2016
[xxxvii] Source: Arrowhead BID estimate
[xxxviii] Source: Bloomberg
[xxxix] Source: Company Filings