EDISON

Transgene

R&D update

Building a strong immunotherapy portfolio

Pharma & biotech

Combinations with immunotherapies are key to Transgene's strategy. The company is focused on combining its main assets, TG4010 (cancer vaccine) and Pexa-Vec (oncolytic virus), with immune checkpoint inhibitors (ICIs), ipilimumab (Yervoy) and nivolumab (Opdivo). ICIs as monotherapies have proven successful in patients; however, positive efficacy has been limited to certain cancers and long-term responses remain difficult. Combinations with other immunotherapies may improve both addressable population and long-term efficacy. To this end, Transgene is conducting Phase I and II trials in collaboration with academic institutions and pharmaceutical companies. The first read-outs are expected later this year. Our updated valuation is €208m.

Year end	Revenue (€m)	PBT* (€m)	EPS* (€)	DPS (€)	P/E (x)	Yield (%)
12/15	9.9	(28.9)	(0.78)	0.0	N/A	N/A
12/16	10.3	(23.1)	(0.43)	0.0	N/A	N/A
12/17e	8.3	(35.0)	(0.62)	0.0	N/A	N/A
12/18e	8.6	(36.8)	(0.65)	0.0	N/A	N/A

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

Combination trials underway and planned

Lead assets TG4010 and Pexa-Vec are in two ongoing trials with nivolumab (second-line non-small cell lung cancer (NSCLC) in collaboration with Bristol-Myers Squibb (BMS) and UC Davis) and ipilimumab (solid tumours) respectively, with both expected to read out by year end. A Phase II trial of TG4010, in combination with nivolumab and chemotherapy (in collaboration with BMS), in first-line NSCLC patients with low or undetectable PD-L1 levels is due to start by end 2017 and read out in 2018. Pexa-Vec plus nivolumab will shortly start patient enrolment in a Phase II trial for patients with first-line hepatocellular carcinoma (HCC). A Phase I/II trial of TG4001 in combination with avelumab (PD-L1 ICI) in HPV-positive head and neck cancer (HNSCC) in collaboration with Merck and Pfizer will commence in H217.

Pexa-Vec in pivotal Phase III trial

The first European patient has been enrolled in the global PHOCUS Phase III study of Pexa-Vec. The study is testing Pexa-Vec in patients with advanced first-line HCC in combination with sorafenib (kinase inhibitor). The trial is being conducted by partner SillaJen under a special protocol assessment with the FDA. If data are positive in 2019 when the trial reads out, it should lead to approvals worldwide. Transgene retains rights in Europe.

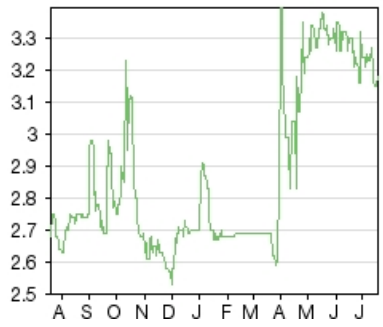
Valuation: Updating rNPV to €208m or €3.7/share

We revise our valuation to €208m or €3.7/share (vs €204m or €3.6/share) as a result of updating the epidemiology data for HCC in the EU, rolling forward our model in time and updating cash numbers. Cash and equivalents at the end of Q117 were €50.7m. We introduce no further changes to our valuation assumptions and leave our financial forecasts unchanged.

18 July 2017

Price	**€3.18**
Market cap	**€180m**
Cash and ST investments (€m) at end March 2017	50.7
Shares in issue	56.4m
Free float	34%
Code	TNG
Primary exchange	Euronext Paris
Secondary exchange	N/A

Share price performance



%	1m	3m	12m
Abs	(3.6)	4.6	17.7
Rel (local)	(2.9)	0.9	(2.7)
52-week high/low		€3.4	€2.5

Business description

Transgene is a French drug discovery and development company focused on the treatment of cancer and infectious diseases with immunotherapies. The lead products are Pexa-Vec and TG4010.

Next events

Pexa-Vec + Opdivo in HCC trial start	H217
TG6002 glioblastoma trial start	H217
TG1050 Phase I data	H217
TG4001 + avelumab trial start	H217
First results from ICI combination trials	Q417
TG4010 +ICI in first-line NSCLC trial start	Q417

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Edison profile page

Investment summary

Company description: Immunotherapy focus

Transgene is a drug discovery and development company that develops viral vector-based immunotherapies for the treatment of cancers and infections. The company has two platforms: therapeutic vaccines and oncolytic viruses. Its two lead clinical-stage programmes are Pexa-Vec, an oncolytic virus partnered with SillaJen undergoing a pivotal Phase III study in HCC; and TG4010, which has completed a Phase IIb study for NSCLC. Additionally, Transgene has ongoing and planned combination trials with ICIs such as nivolumab and/or ipilimumab for both Pexa-Vec and TG4010. Transgene is based near Strasbourg, France and was founded in 1979. It was listed on the Nouveau Marché (now Euronext) in 1998. Transgene is 60%-owned by Institut Mérieux.

Valuation: Updated rNPV of €208m

Our rNPV-based valuation of Transgene is €208m, or €3.7 per share (vs previous €204m or €3.6 per share). We have updated the epidemiology data of HCC in the EU-28, rolled forward our model in time and updated net cash. The valuation includes the prospects for TG4010 in NSCLC in the US and Europe (combined peak potential sales of €2.5bn – up from €2.3bn due to updated FX); Pexa-Vec for HCC in Europe (€518m peak sales vs previous €424m); and TG1050 for hepatitis B in the US and Europe (peak potential sales of €2.1bn in both regions, unchanged). For TG4010, we assume a classical clinical development timeline, starting with the Phase I/II studies planned in combination ICIs. For Pexa-Vec, the Phase III PHOCUS study being conducted by SillaJen will potentially be sufficient to file for approval in Europe, assuming a positive study result. For TG1050, we assume Transgene develops it and a partner conducts Phase III trials, registration and marketing. We introduce no further changes to our assumptions.

Financials: Cash runway into 2018

Transgene had €50.7m in cash and investments at 31 March 2017. The company has access to a further €10m from the European Investment Bank (EIB) loan that can be drawn down before the end of 2017. During 2016, Transgene drew down the first tranche from the EIB loan and successfully completed a rights issue for €46.4m in gross proceeds. As a result, the company expects to have sufficient funds to conduct its pipeline development activities through 2017 and 2018 with a cash burn of €30m anticipated by the company in 2017. We leave our financial forecasts unchanged.

Sensitivities: Clinical development risk

Transgene is subject to the usual risks associated with drug development, including clinical development delays or failures, regulatory risks, competitor successes, partnering setbacks, and financing and commercial risks. The key sensitivities relate to the results of the ICI combination studies of TG4010, Pexa-Vec and TG4001. The outcome of the TG4010 combination studies in particular will have an impact on its partnership and/or the financing prospects for the programme. First results from these trials will be available later this year. The clinical performance of Pexa-Vec in the Phase III trial (data in 2019) is another key sensitivity. We note that the ICI combination trials are small, open label and non-controlled; therefore, it is not possible to ascertain the magnitude of the effect of each product separately and assess the actual synergistic effect.

Viral vector-based immunotherapies

Transgene has a pipeline of immunotherapies for the treatment of cancer and viral indications. The programmes utilise viral vector technology with the aim of killing infected or cancerous cells (directly or indirectly). The two lead programmes comprise Pexa-Vec and TG4010. Pexa-Vec is an oncolytic virus that targets fast-dividing cells with an active EGFR/Ras signalling pathway, causing those cells to lyse and stimulates a T-cell immune response against nearby cells. TG4010 is a therapeutic vaccine, MVA-MUC1-IL2, which induces an immune response against tumour cells that express the MUC1 protein while IL-2 stimulates the immune response. Exhibit 1 details Transgene's clinical development pipeline.

The company's strategy involves developing its pipeline assets in combination with other products, predominantly ICIs. The rationale is that therapeutic vaccines stimulate the immune response to kill cancer cells; oncolytic viruses directly attack tumour cells and boost the immune system. ICIs block a pathway that acts as a brake against the activated T-cells; hence combination regimes have the potential to provide a more effective treatment while preserving safety.

The combination of ICIs with other products, especially other immunotherapeutics, is becoming increasingly popular in the oncology space as there is room to improve the efficacy and safety of ICIs as single agent or in combination. At April 2017, Evaluate Pharma lists 765 clinical trials using PD-1 or PD-L1 inhibitors in combination with other products.

Exhibit 1: Transgene's clinical pipeline

Compound	Combination compound	Indication	Phase	Collaborators	Trial start	Data read-out
TG4010	Opdivo (nivolumab)	Second-line NSCLC	II	University of California Davis Medical Centre	Ongoing	H217
TG4010	Opdivo and chemo	First-line NSCLC	II	N/A	Q417	2018
TG4010	N/A	Neoadjuvant NSCLC	Translational	University of Strasbourg (PI Pr Quoix)	YE17	N/A
Pexa-Vec	Sorafenib	First-line HCC	III	Conducted by partner SillaJen	Ongoing	2019
Pexa-Vec	Yervoy (ipilimumab)	Solid tumours	II	Centre Léon Bérard	H216	H217
Pexa-Vec	Opdivo (nivolumab)	First-line HCC	II	Nancy, France.	H217	N/A
Pexa-Vec	Cyclophosphamide	Sarcoma and breast	II	Institut Bergonié	Ongoing	N/A
Pexa-Vec	N/A	Solid tumours	Translational	University of Leeds	Ongoing	N/A
TG4001	Avelumab	HPV+ HNSCC	II	Institut Curie (PI Pr Christopher Le Tourneau)	H217	N/A
TG1050	Standard of care antiviral	Chronic hepatitis B	I/Ib	N/A	Ongoing	H217
TG6002	N/A	Glioblastoma	I	Assist. Publ Hôpitaux, Paris (PI Pr Delattre); French NCI	H217	N/A

Source: Edison Investment Research, Transgene.

Furthermore, Transgene's R&D efforts are focused on the new generation of oncolytic viruses. The company has generated ICI-expressing oncolytic viruses that have shown a durable anti-tumour effect in preclinical models. Preclinical data were presented at the American Association for Cancer Research (AACR) meeting in 2016. Transgene showed that its oncolytic virus constructs could express anti-PD-1 fragments and accumulate in tumours. The anti-tumour effect was similar as a combination of an anti-PD-1 antibody and an oncolytic virus and better than any of the single products in a preclinical model. Other preclinical work has focused on new techniques to improve the cytotoxic power of vaccinia vectors based on intracellular fragments that overcome cancer cell resistance; these experiments were presented at the International Meeting on Replicating Oncolytic Virus Therapeutics last year.

Transgene's R&D capabilities have been at the centre of its recent business development activities. Transgene and Servier recently entered into a research collaboration for the application of Transgene's viral vectorisation technology for the production of allogenic CAR-T cell therapies. The final objective is to achieve an allogenic CAR-T preparation method with better transgene integration yields and fewer steps. The research collaboration could generate €30m in revenues for Transgene..

Therapeutic vaccines

TG4010 in combination with Opdivo in lung cancer

The combination of TG4010 and Opdivo (nivolumab) is undergoing a Phase II clinical trial in collaboration with BMS and the University of California, Davis Medical Center. Transgene will fund the trial and BMS will provide Opdivo while UC Davis will conduct the trial under the supervision of Dr Karen Kelly, a world-renowned researcher in lung cancer. The multi-centre, single arm, open-label study plans to enrol up to 33 patients with advanced NSCLC who have failed first-line therapy. It will measure response (primary end point) and survival for up to two years. There will be an interim analysis when 3 out of 15 evaluable patients meet the pre-defined response criteria. If the criteria are met, enrolment will advance to 29 evaluable patients; if not, the trial will be stopped for futility. So far five patients have been recruited, as Dr Kelly mentioned at Transgene's R&D day on 22 June. Preliminary data are expected later in 2017.

Additionally, the company recently announced another study of TG4010 in combination with Opdivo and chemotherapy in first-line NSCLC patients that express low or undetectable levels of PD-L1. As in the previous study, Transgene will sponsor the trial and BMS will provide Opdivo. The multi-centre, single-arm and open-label study will evaluate response and disease control along with safety and tolerability in up to 39 patients. It is expected to start by year's end 2017 and release first data in 2018. The rationale is that a synergistic effect between TG4010 and Opdivo will increase responses. Moreover, the only immunotherapy approved in the first-line setting (Merck's Keytruda) is indicated only for patients whose tumours have high PD-L1 expression, leaving a large number of patients unserved.

Currently, PD-1/PD-L1 inhibitors are administered to NSCLC patients previously treated with a platinum-containing chemotherapy. Across trials, one-year and two-year overall survival (OS) rates of PD-1/PD-L1 inhibitors are 42%-55% and 23%-40% respectively. Phase I trials of Opdivo and Keytruda report similar three-year OS rates of 18% and 19% (Brahmer, JR *et al*, AACR 2017; and Leighl NB *et al*, ASCO 2017). Although response and survival have improved with these new therapies, they still remain low and there is no cure, hence there is room for increasing efficacy via combinations.

Launched in September 2014 by BMS and Asian partner Ono Pharmaceuticals, global sales of Opdivo were $4.7bn in 2016 (source BMS) and forecast is for sales of $9.5bn in 2022, according to consensus estimates on Evaluate Pharma. Competitor Keytruda was first launched in September 2014; 2016 sales were $1.4bn and consensus on worldwide sales is c $9.5bn in 2022 (Evaluate Pharma).

Based on epidemiology data from the US National Cancer Institute and GLOBOCAN for Europe there will be c 537k new NSCLC patients in both regions in 2017. We forecast EU/US peak sales for TG4010 of €2.5bn in this indication.

Building on previous data

Data from the Phase IIb TIME trial compared chemotherapy plus TG4010 to chemotherapy plus placebo in patients with advanced NSCLC (n=222). The overall response rate (ORR) and duration of response (DR) data are supportive of the potential of TG4010: for the total population (squamous and non-squamous NSCLC), those patients receiving TG4010 benefited compared to the placebo arm (ORR: 39.6% vs 28.8%; DR: 30.1 vs 18.7 weeks). The benefit was greatest in those patients with non-squamous NSCLC and low TrPAL biomarker (triple positive activated lymphocytes, ORR: 39.3% vs 30.3%; DR: 43.1 vs 18.1 weeks).

Importantly, in post-hoc analysis of all non-squamous NSCLC patients there was a similar level of PFS and OS benefit in the 97 patients with low levels of PD-L1 expression (<5%) to that observed

with all non-squamous NSCLC patients. In various studies, it has been shown that non-squamous NSCLC patients with low levels of PD-L1 will not benefit as much from ICIs targeting PD-L1 and PD-1 as those with high levels of PD-L1 expression. This suggests that TG4010 could potentially become a valuable treatment in those non-squamous patients less likely to benefit from treatment with PD-1 or PD-L1 inhibitors, in addition to the potential synergistic approach discussed previously.

TG4010 was well tolerated; the most frequent TG4010-related adverse events were mild to moderate injection site reactions. These data support the potential of TG4010 as any improvement of safety over ICI treatments would be openly welcomed if efficacy was comparable. To date, over 350 patients have been treated with TG4010.

Phase I/II study of TG4001 in combination with avelumab

Transgene has a collaboration agreement with Pfizer and Merck to combine TG4001 and avelumab, an anti-PD-L1 antibody in a Phase I/II study in second-line HPV-positive HNSCC. The trial will be funded by Transgene and is currently in preparation to start in H217. Pfizer and Merck will provide avelumab and co-design the Phase I and II cohorts of the study, which will be open label and enrol up to 50 patients; end points will include response rate and DR. Details on the trial design, financial terms, IP rights or other aspects of the agreement have not been disclosed. Avelumab is approved in merkel cell carcinoma in the US.

TG4001 is a therapeutic vaccine based on a modified vaccinia virus Ankara (MVA) vector engineered to express HPV 16 antigens E6 and E7 with adjuvant interleukin-2 (IL-2). Clinical data from 206 female patients with CIN2/3 Intraepithelial Cervical Neoplasia showed a 38% (20/52) clearance rate in HPV 16 mono-infected patients compared with 9% for placebo (2/23) (p value = 0.009) with a favourable safety profile.

Avelumab is undergoing a Phase I trial in patients with locally advanced HNSCC in combination with radiotherapy and cetuximab (expected n=10) with potential read-out in Q317. A Phase II trial is recruiting patients with nasopharyngeal cancer, a form of HNSCC with potential readout in H219.

Head and neck cancer is a heterogeneous group of cancers in the oral cavity, oropharynx, larynx, nasal cavity and salivary glands that affect 500,000 people annually worldwide. Over 90% of cases are squamous cell carcinomas (HNSCC). Annual incidences of oropharyngeal squamous cell cancers have risen to 6.2 per 100,000 men and 1.4 per 100,000 women in the US and 73% of these tumours are HPV-positive (data from 2004-08 period). The current treatments include surgery, chemotherapy and/or radiation, and are aggressive, with significant toxicities. In first-line HNSCC, ORR for chemo is 30%-40% and median OS is 6-9 months. Second-line treatments are Opdivo or Keytruda, with ORR 16%-19% and median OS 7-8 months.

TG1050: First patient in Phase Ib multiple dose cohort

In November 2016, the first patient was randomised in the multiple dose cohort of the ongoing Phase I/Ib trial of TG1050 with standard of care in patients with chronic hepatitis B infection. TG1050 is a therapeutic vaccine for the treatment of chronic hepatitis B that expresses three antigens of the hepatitis B virus (HBV). The clinical trial is an international, randomised, double-blind, placebo-controlled safety and dose-finding study evaluating single and multiple doses of TG1050 in patients who are currently being treated for chronic HBV infection with standard-of-care antiviral therapy (n=48). Secondary objectives include the antiviral activity of, and immune responses to, TG1050. Data are expected in H217.

There are currently limited treatments for HBV. The cure rate from nucleotide analogues such as tenofovir (Viread) and entecavir (Baraclude) or pegylated interferon-α is only 3-5%, so that patients normally need long-term antiviral therapy to control their infection. Around 240 million people have chronic HBV infection, according to the World Health Organization (WHO). Transgene will look to

partner TG1050 once it has proof-of-concept data from this study. We forecast peak sales of €2.1bn for TG1050 in HBV.

Oncolytic viruses: Pexa-Vec and new generation

First European patient recruited in PHOCUS Phase III study

The first European patient was enrolled in the PHOCUS Phase III study conducted by partner SillaJen in first-line HCC. This triggered a $4m milestone payment from Transgene to SillaJen. The PHOCUS study is an international randomised (1:1), open-label study comparing Pexa-Vec followed by Bayer's sorafenib (anti-BRAF/VEGFR/PDGFR tyrosine kinase inhibitor) and versus sorafenib alone in patients with advanced HCC who have not received prior systemic therapy (n=600). Pexa-Vec will be administered as three bi-weekly intratumoral injections at day one and weeks two and four, followed by sorafenib at week six; the comparator arm will receive sorafenib 400mg twice daily starting on day one. The primary end point is OS; secondary end points include time to progression, progression-free survival, ORR and disease control rate. Initial OS data are expected in 2019. SillaJen has responsibility for conducting and funding the study and worldwide rights. Transgene retains development and commercialisation rights in Europe.

Pexa-Vec combinations enter the clinic

An open-label, investigator-sponsored Phase I/II trial of Pexa-Vec in combination with Yervoy in up to 60 patients with solid tumours is ongoing at the Léon Bérard Cancer Centre. End points include toxicities, response and survival. Initial data will be available later this year. Additionally, a Phase I/IIa trial of Pexa-Vec in combination with Opdivo in first-line HCC patients is expected to start in France in July or August 2017. In the Phase I part, safety and efficacy will be assessed in six patients. In the Phase IIa part, safety and efficacy will be further assessed in 29 evaluable patients.

The mechanistic rationale is that an oncolytic vaccinia poxvirus, like Pexa-Vec, is able to overcome the immunosuppressive effect of the tumour microenvironment (Sharp *et al*, Biomedicines 2016); this would be further boosted by the addition of an ICI that would counter the inhibitory effect of tumour cells in the immune system. This strategy is in line with the interest from industry in this approach, as demonstrated by the increasing number of clinical trials of oncolytic viruses with ICIs. The most notable example is Amgen's Imlygic (talimogene laherparepvec), which was approved in the EU and US in late 2015. Imlygic is being tested in a number of clinical trials in combination with ICIs, in particular Keytruda and Opdivo. Imlygic generated $27m revenue in 2016 and Evaluate Pharma consensus forecast is $250m sales in 2022.

In April 2017, Transgene started the Phase II part of the METROmaJX trial. This Phase I/II study evaluates the combination of Pexa-Vec with metronomic cyclophosphamide (repetitive, low doses; shown to potentiate the activity of other immunotherapies) in patients with advanced soft tissue sarcoma and HER2 negative breast cancer and it will measure the maximum tolerated dose of the first cycle of the combination and antitumour activity. The trial is sponsored by the Bergonié Institute. The primary completion date is September 2018.

Based on updated epidemiology data from Cancer Research UK, there were c 64k new HCC patients in 2012 in the EU-28. We forecast EU peak sales for Pexa-Vec of €518m in HCC.

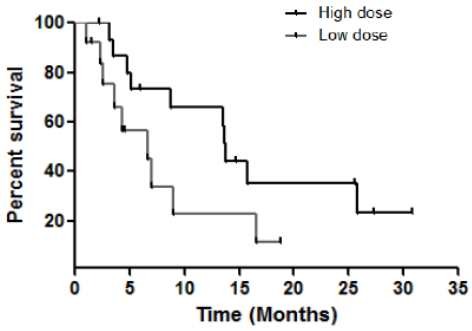
Summary of Pexa-Vec data

Pexa-Vec has been evaluated in more than 10 trials in a number of tumour types; it has been well-tolerated in all trials. In the Phase II dose-finding study in HCC patients (n=30; 80% first-line), those receiving high-dose Pexa-Vec (intratumoural delivery) had a median OS of 14.1 months compared to 6.7 months for those on a low dose (HR: 0.39; p=0.02; Exhibit 2). However, the subsequent

Phase IIb TRAVERSE study in second-line HCC was terminated early in 2013, as data from the first 80 events showed no evidence of OS benefit associated with Pexa-Vec.

The decision to continue development of Pexa-Vec was based on the detailed analysis of TRAVERSE and the prior Phase I/II trials with data from over 300 patients in total. The Phase III trial is in patients with first-line HCC, for which Pexa-Vec has previously shown promising data. This is also supported by the concept that immunotherapies are thought to be most effective when the tumour burden is low (ie less advanced) and in patients with functioning immune systems.

Exhibit 2: Results of Phase II study in HCC with Pexa-Vec



Source: Transgene

Next-generation TG6002

TG6002 is a viral vector derived from vaccinia virus expressing the FCU1 gene. The FCU1 gene encodes a protein that catalyses the transformation of the nontoxic pro-drug flucytosine (5-FC), into 5-FU and 5-fluorouridine monophosphate (5-FUMP) a widely used chemotherapy. Its expression is restricted to tumours, thereby reducing toxicity to normal tissues. The company has conducted numerous *in vitro* and *in vivo* experiments to establish its mechanism of action.

A Phase I trial in glioblastoma with Assistance Publique Hôpitaux de Paris (principal investigator Prof Delattre) and support from French National Cancer Institute is expected to commence in H217.

Sensitivities

Transgene is subject to the usual risks associated with drug development, including clinical development delays or failures, regulatory risks, competitor successes, partnering setbacks, and financing and commercial risks. The key sensitivities relate to the clinical performance of Pexa-Vec in the Phase III trial (initial data expected in 2019), the results of the ICI combination studies of TG4010, Pexa-Vec and TG4001, and Transgene's ability to secure a partner/funding to enable the continued development of its pipeline. The outcome of the TG4010 combination studies in particular will have an impact on its partnership and/or fresh financing prospects for the programme. First results will be available in H217. Due to the uncontrolled nature of the ICI combination trials it will be difficult to determine the effect that corresponds to each product independently and assess the actual synergistic effect.

Financials

Transgene's reported cash, cash equivalents and financial assets of €50.7m as of 31 March 2017. The company has access to a further €10m from the EIB loan that can be drawn down before the end of 2017. The EIB loan is for five years, with the principal and accumulated interest reimbursable only from the fourth year. During 2016, Transgene strengthened its cash position by

withdrawing the first tranche from the EIB loan in June 2016. Additionally, Transgene successfully completed a rights issue for gross proceeds of €46.4m in November 2016. As a result, the company expects to have sufficient funds to conduct its pipeline development activities through 2017 and 2018 with a cash burn of €30m anticipated by the company in 2017 (company reported cash burn for FY16 was €30.6m). We leave our financial forecasts unchanged.

During 2016, Transgene continued its restructuring activities initiated in 2015 that resulted in a reduction of the workforce. This resulted in R&D expenses of €26.4m in FY16 vs €32.1 in FY15. Transgene will have eleven clinical trials active at different points during 2017-18; hence, we expect an uptick in R&D expenses to €35.4m in 2017, which includes the $4m milestone payment to SillaJen on initiation of the Phase III PHOCUS study in Europe. G&A expenses were €6.2m in FY16, vs €5.8m in FY15. We expect G&A costs to remain broadly stable; therefore, we forecast G&A costs to be €6.4m in 2017 and €6.6m in 2018 from the higher than expected 2016 base.

Valuation

Our rNPV valuation of Transgene is €208m, or €3.7/share (vs €204m or €3.6/share). Our key inputs and assumptions are summarised in Exhibit 3 below.

Our key assumptions on TG4010 and Pexa-Vec are the following:

- TG4010: we model a classical clinical development timeline for the project, starting with the Phase I/II studies planned in combination ICIs, and use NSCLC as a proxy for this opportunity. As such, there could be considerable upside should the company go for accelerated filing, and/or development is expanded into other cancer indications. Our peak sales estimate for the US has moved slightly (from €1.3bn to €1.4bn) due to the updated €/$ exchange rate.
- Pexa-Vec: we have assumed that the Phase III PHOCUS study, which plans to include EU trial sites, will be sufficient to file for approval in Europe, assuming a positive study result. Under the deal with SillaJen, Transgene will be responsible for funding, compiling and submitting the regulatory application in Europe. We slightly increase peak sales from €424m to €518m as a result of updated epidemiology data (63.5k patients vs previous 52k as of 2012).
- TG1050: our valuation includes the EU and US market and we have assumed that TG1050 will be out-licensed on completion of a successful Phase II proof-of-concept study. Partner will fund Phase III trials, registration and commercial launch.

We currently do not ascribe any value to the pre-clinical asset TG6002 or Phase I asset TG4001, as they are early stage and no clinical data have been released so far.

Exhibit 3: Transgene valuation model and key assumptions

Product	Status	Market launch	NPV (€m)	Peak sales (€m)	Probability of success	Royalty estimate	rNPV (€m)	rNPV/ share (€)	Key assumptions
TG4010 – NSCLC (EU)	Phase I/II	2025	88.5	1,062	40%	17.5%	43.4	0.77	c 313k annual EU-28 incidence of lung cancer; 85% NSCLC; 75% MUC1 +ve; 66% normal NK cells; 20% peak penetration; €30k treatment price; €30m upfront on Phase IIb completion.
TG4010 – NSCLC (US)	Phase I/II	2025	78.8	1,429	40%	17.5%	35.5	0.63	c 222k annual US incidence of lung cancer; 85% NSCLC; 75% MUC1 +ve; 66% normal NK cells; 20% peak penetration; $50k treatment price
Pexa-Vec – HCC (EU)	Phase III	2020	99.4	518	50%	25.0%	66.2	1.17	c 64k annual EU incidence of liver cancer; 80% HCC; 25% peak penetration; €30k treatment price
TG1050 – HepB (EU+US)	Phase I	2025	190.5	2,054	15%	20.0%	22.4	0.40	c 5.4m chronic HepB prevalence in EU + US; 66% diagnosis rate; 33% require treatment; 5% peak penetration; €35k treatment price
Net cash (31 March 2017)							40.7	0.72	
Total							**208.2**	**3.69**	

Source: Edison Investment Research. Note: Peak sales represent the largest one-year sales that occur over the projected product lifespan. Spot rate $1.13/€.

Exhibit 4: Financial summary

€000s	2015	2016	2017e	2018e
Year end 31 December	IFRS	IFRS	IFRS	IFRS
PROFIT & LOSS				
Revenue	9,949	10,311	8,253	8,618
Cost of sales	0	0	0	0
Gross profit	9,949	10,311	8,253	8,618
R&D expenses	(32,138)	(26,419)	(35,441)	(37,019)
G&A expenses	(5,798)	(6,236)	(6,423)	(6,616)
EBITDA	(25,671)	(20,397)	(32,026)	(33,607)
Operating profit (before GW and except)	(27,957)	(22,514)	(33,484)	(34,922)
Intangible amortisation	(350)	(150)	(127)	(95)
Exceptionals (restructuring costs / discontinued operations)	(15,965)	(1,024)	0	0
Operating profit	(44,272)	(23,688)	(33,611)	(35,017)
Other	0	0	0	0
Net interest	(930)	(602)	(1,564)	(1,864)
Profit before tax (norm)	(28,887)	(23,116)	(35,048)	(36,786)
Profit before tax (IFRS)	(45,202)	(24,290)	(35,175)	(36,881)
Tax	0	0	0	0
Minority interest	(1,172)	(917)	0	0
Profit after tax (norm)	(30,059)	(24,033)	(35,048)	(36,786)
Profit after tax (IFRS)	(46,374)	(25,207)	(35,175)	(36,881)
Average number of shares outstanding (m)	38.5	56.0	56.4	56.4
EPS – normalised (€)	(0.78)	(0.43)	(0.62)	(0.65)
EPS – IFRS (€)	(1.20)	(0.45)	(0.62)	(0.65)
Dividend per share (€)	0.0	0.0	0.0	0.0
BALANCE SHEET				
Fixed assets	49,841	48,895	47,359	45,999
Intangible assets	485	423	317	243
Tangible assets	16,559	14,580	13,150	11,865
Other	32,797	33,892	33,892	33,892
Current assets	51,028	74,055	57,030	27,539
Stocks	1,164	221	221	221
Debtors	1,784	2,385	452	472
Cash	31,650	56,207	41,115	11,603
Other	16,430	15,242	15,242	15,242
Current liabilities	(26,725)	(19,919)	(20,613)	(18,815)
Creditors	(6,521)	(4,504)	(7,088)	(7,404)
Short-term borrowings	0	0	0	0
Short-term leases	(9,396)	(10,198)	(8,308)	(6,194)
Other	(10,808)	(5,217)	(5,217)	(5,217)
Long-term liabilities	(47,597)	(56,528)	(65,892)	(65,286)
Long-term borrowings	0	(10,000)	(20,000)	(20,000)
Long-term leases	(44,401)	(42,803)	(42,167)	(41,561)
Other long-term liabilities	(3,196)	(3,725)	(3,725)	(3,725)
Net assets	26,547	46,503	17,884	(10,563)
CASH FLOW				
Operating cash flow	(46,082)	(34,187)	(28,799)	(34,893)
Net interest	930	602	(1,890)	(2,114)
Tax	0	0	0	0
Capex	(1,527)	(47)	(49)	(51)
Acquisitions/disposals	0	0	0	0
Financing	477	45,080	0	0
Dividends	0	0	0	0
Other	12,975	4,561	6,282	8,151
Net cash flow	(33,227)	16,009	(24,456)	(28,906)
Opening net debt/(cash)	(13,744)	22,147	6,794	29,360
HP finance leases initiated	(2,646)	(427)	1,890	2,114
Other	(18)	(229)	0	0
Closing net debt/(cash)	22,147	6,794	29,360	56,152

Source: Transgene, Edison Investment Research

Contact details	Revenue by geography
Boulevard Gonthier d'Andernach Parc d'Innovation – CS80166 F-67405 Illkirch-Graffenstaden France +33 (0)3 88 27 91 00 www.transgene.fr	N/A

Management team

Chairman & CEO: Philippe Archinard	EVP, Research & Development: Eric Quéméneur
Philippe Archinard became CEO in 2004. From 2000 to 2004, he was CEO of Innogenetics and previously he was at bioMérieux, where he held various positions including CEO of its US operations. He has a PhD in biochemistry from Lyon University.	Eric Quéméneur joined Transgene in 2014. Prior to this, he spent over 20 years at the CEA (Atomic Energy Commission) where he was director of research programs and industrial partnerships in the life science division. He has a PhD in biochemistry from the Claude Bernard University in Lyon.
VP, Finance: Jean-Philippe Del	**CMO: Dr Maud Brandely**
Jean-Philippe Del became VP, finance at Transgene in 2014, previously serving as finance senior director. He has previously worked at Mazars and Kronenbourg Breweries. He has a post-graduate degree in accounting and finance and a master's degree from the University of Strasbourg.	Dr Maud Brandely joined Transgene in March 2016. She was previously director of clinical development at Pierre Fabre Oncologie until February 2016 where she was responsible for all clinical trials from Phase I to Phase III trials. She previously worked at Rhone-Poulenc (now Sanofi) and at Hoescht-Roussel-Uclaf (now Sanofi). Dr Brandely has an MD and PhD in immunology from the University of Paris VI.

Principal shareholders	(%)
Institut Mérieux	60.05
Dassault Belgique Aviation	4.93

Companies named in this report

Bayer (BAYN); Bristol-Myers Squibb (BMY); Merck & Co (MRK), Merck Group (MRK), Pfizer (PFE)