EDISON

MorphoSys

Licensing deals

Transformed by major alliances

Pharma & biotech

MorphoSys's recent major licensing deals with GlaxoSmithKline and Celgene mark a transformation of the company. Its main value drivers are now clearly its proprietary products, rather than its broad pipeline of antibodies created for partners. The co-development deal with Celgene also lays down a path for MorphoSys to have eventually its own European oncology sales force. In the meantime, its main focus is on working with its new partners and developing further its proprietary pipeline, possibly through in-licensing products. We value MorphoSys at $1.89bn.

Year end	Revenue (US$m)	PBT* (US$m)	EPADR (c)	DPADR (c)	P/E (x)	Gross yield (%)
12/11	108.7	27.9	46.2	0.0	N/A	N/A
12/12	69.0	9.4	18.6	0.0	N/A	N/A
12/13e	102.7	13.4	25.1	0.0	N/A	N/A
12/14e	84.7	(29.4)	(39.8)	0.0	N/A	N/A

Source: Edison Investment Research. Note: Converted at €1.33/US$ for table above and throughout the note; dividend yield excludes withholding tax. Investors should consult their tax advisor regarding the application of any domestic and foreign tax laws.

$500m deal for MOR103 with GSK

In June 2013, MorphoSys partnered MOR103 with GSK in a €450m deal for rheumatoid arthritis (RA), multiple sclerosis and potentially other indications. It followed promising Phase I/II data in RA with MOR103 in Q312. MOR103's various mechanisms of action and initial clinical data means that it could become an important treatment in RA and other autoimmune diseases, despite the competition.

MOR202 partnered with Celgene in $818m deal

Also in June, MOR202 was partnered with Celgene in an $818m co-development deal for various hematological cancers, although there is as yet no clinical data. However, Genmab reported efficacy data from a Phase I/II trial in multiple myeloma (MM) with daratumumab, another CD-38 antibody that was licensed to Janssen in a $1.1bn deal. MorphoSys retains co-promotion rights for MOR202 in Europe.

Focus on developing the pipeline

MorphoSys's main priorities are to ensure that the two partnerships start well and to develop its pipeline. A licensing deal for MOR208 is not expected until there is more data to show how it compares to other anti-CD19 therapies in development (Phase II data due in H214). If MorphoSys does partner MOR208, it will probably retain co-promotion rights, at least, in Europe to market MOR208 alongside MOR202.

Valuation: DCF valuation of $1.89bn

We raise our valuation by $5m to $1,895m, after making minor changes to estimates following revised financial guidance. However, we had already raised our valuation from $1,069m and made more extensive changes to our model in a note dated 8 August 2013 to reflect the deal with Celgene. The ADRs trade in line with the underlying shares, although there can be variations because of the limited liquidity of the ADRs.

15 August 2013

Price	**US$38.8**
Market cap	**US$1,855m**
	ADR/Ord conversion ratio 2/1
Net cash ($m) at 30 June 2013	214
Shares in issue	23.9m
Free float	70%
ADR Code	MPSYY
Primary exchange	Frankfurt
Secondary exchange	OTC

ADR price performance

52-week high/low	$38.8	$10.8

Business description

MorphoSys is a German biotechnology company. It uses its proprietary technologies to develop human antibodies for therapeutic use. It has partnered its lead antibody MOR103 with GSK for inflammatory indications and MOR202 with Celgene for hematological cancer indications.

Next events

Data on MOR208	Q313
Q313 results	7 November 2013

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Investment summary: Transformed by major alliances

Company description: Antibody development company

MorphoSys is a biotechnology company with a proprietary antibody development platform and a promising proprietary pipeline of therapeutic antibodies. It is based in Munich, Germany, with c 290 people and is focused on creating and developing therapeutic antibodies. It has collaborations with various pharmaceutical companies (including a major alliance with Novartis) and uses the profits from these alliances to invest in its own pipeline. There are c 75 drug development programs underway in its non-proprietary pipeline, 16 of which are in clinical trials, including gantenerumab in a Phase III study in Alzheimer's disease. It has six proprietary development programs, three of which are in clinical trials (Exhibit 1). MorphoSys's most important products are MOR103, which is licensed to GSK, and MOR202, which is being co-developed with Celgene.

Exhibit 1: Proprietary clinical R&D pipeline

Product	Development stage	Notes
MOR103	Phase II	Developed for rheumatoid arthritis and multiple sclerosis. Partnered with GSK in €450m deal.
MOR208	Phase II	Developed for chronic lymphocytic leukemia, B-cell acute lymphoblastic leukemia, non-Hodgkin's lymphoma.
MOR202	Phase I/II	Developed for multiple myeloma and other hematological cancers. Partnered with Celgene in $818m co-development deal.

Source: Edison Investment Research

Valuation: $1.89bn based on a risk-adjusted DCF valuation

We have increased our valuation of MorphoSys by $5m to $1,895m, including net cash of $400m, following the company's new financial guidance. We had increased our valuation from $1,069m in a note dated 8 August 2013 to reflect the licensing deals with GSK and Celgene. The large increase in our earlier note was largely due to the $818m Celgene deal as we had been conservative in valuing MOR202 because there was no clinical data. The contribution from royalties and profits from MOR202 (excluding R&D costs) has increased from $26m to $574m. The next catalysts could be more data on MOR202 and MOR208, possibly presented at the ASH conference in December, or non-proprietary products advancing into Phase III development.

Sensitivities: Performance of proprietary pipeline key

Following the recent licensing deals, MorphoSys's long-term prospects are primarily linked to the progress of its proprietary pipeline through clinical trials and the decisions of GSK with MOR103 and Celgene with MOR202. However, MorphoSys is not solely dependent on these products because of its broad pipeline of antibodies that it created for partners, which now bear most of the developmental risks. So, the company has a lower risk profile than many biotechnology companies.

Financials: Profitable and with a strong balance sheet

MorphoSys will have a cash position of c $400m upon receipt of the upfront payment and equity from Celgene (anti-trust clearance for the deal was given on 10 August 2013). The strong balance sheet will allow MorphoSys to fund its share of co-development costs and invest in the rest of its proprietary pipeline, as well as potentially in-license product or carry out bolt-on acquisitions to acquire new technologies, without needing to raise additional capital.

MorphoSys is expected to report a loss in FY14 due to increases in R&D investments, having been profitable since 2004. We estimate that it could be highly profitable from FY17 (or earlier depending on milestones) if the development of MOR103 and MOR202 progress as hoped. In FY13, MorphoSys is forecast to report an operating profit of €4.2m, following the GSK and Celgene deals.

Outlook: Metamorphosis of an antibody company

MorphoSys has a broad pipeline of clinical assets, with three promising proprietary therapeutic antibodies. The most advanced of its own products, MOR103, has recently been licensed to GlaxoSmithKline in a €450m deal for development in rheumatoid arthritis (RA), multiple sclerosis (MS) and potentially other inflammatory indications. MorphoSys has also partnered MOR202 with Celgene in an $818m co-development deal, which could lead to MorphoSys co-promoting MOR202 in Europe. It will wait until there is more data on its third proprietary clinical product MOR208 before attempting to partner the product, but any deal will probably involve MorphoSys retaining at least co-promotion rights in Europe. It also has 16 antibodies from partnered discovery alliances in clinical trials, the most advanced of which is Roche's Phase III antibody for Alzheimer's disease, gantenerumab.

Following the deals with GSK and Celgene, MorphoSys is primarily a biotech company with a promising portfolio of proprietary products funded by profits from partnered drug discovery. Previously it was mainly an antibody developer for many pharmaceutical companies. It will continue to develop antibodies for other companies (it launched its new antibody platform Ylanthia in Q411 and its 10-year alliance with Novartis will continue for at least four more years); however, its main focus is now on developing the depth and breadth of its proprietary pipeline. MorphoSys has also indicated its intention to create a sales force in Europe (probably in 2017) with the co-development deal with Celgene for MOR202; the same reps could also be used to market MOR208.

Proprietary and licensed pipeline

MorphoSys has established a portfolio of proprietary clinical products (Exhibit 2) with considerable commercial potential. Its lead product, MOR103, has just been partnered with GSK for development in RA, MS and various other indications. MOR202 targets CD38 like Genmab's daratumumab, which was partnered with Janssen in a deal worth potentially over $1.1bn and has shown very promising activity in relapsed or refractory multiple myeloma patients. Finally, MOR208 binds to CD19 and has the potential to displace rituximab (Rituxan, FY12 sales of $7.2m) in the treatment of various hematological cancers.

Exhibit 2: Proprietary and licensed clinical R&D pipeline

Product (target)	Development stage (indication)	Notes
MOR103 (GM-CSF)	Phase II (rheumatoid arthritis, multiple sclerosis)	Completed Phase Ib/IIa trial in active RA (four treatments with placebo, 0.3, 1.0 or 1.5mg/kg iv, n=96, double-blind), MOR103 was well tolerated and showed a strong efficacy signal (ACR20 improvements at four weeks was 17.6 with 0.3mg/kg, 60.8 with 1.0mg/kg and 23.0 with 1.5mg/kg). Primary end point is adverse event rate and safety; secondary end points are various efficacy measures; data expected in Q312. Phase Ib trial in multiple sclerosis (four treatments with placebo, 0.5, 1.0 or 2.0mg/kg iv, n=30, double-blind), primary end point: incidence and severity of adverse events; data expected in H213. A Phase I study with sub-cutaneous formulation showed a favorable pharmacokinetic profile. Phase I (n=63) successfully completed. MorphoSys in-licensed IP relating to role of GM-CSF from Melbourne University. MOR103 was partnered with GSK for an upfront payment of €22.5m, milestones of up to €423m and double-digit royalties on net sales.
MOR208/ Xmab5574 (CD19)	Phase II (chronic lymphocytic leukemia, B-cell acute lymphoblastic leukemia, non-Hodgkin's lymphoma)	Phase I trial in relapsed/refractory CLL/SLL (small lymphocytic lymphoma; n=30, dose escalation study, open label) showed that MOR208 had acceptable toxicity and 12 out of 16 patients on 12mg/kg had a partial response and the other four had stable disease. Phase II study in B-ALL (n=30) is due to start imminently; primary end point is overall response rate. Phase II study in NHL (n=120) is due to start imminently, primary end point is overall response rate. MorphoSys in-licensed MOR208 from Xencor for an upfront payment of $13m, milestone payments and royalties. Agreement with Boehringer Ingelheim to manufacture MOR208 for use in clinical trials and potentially to provide a commercial supply.
MOR202 (CD38)	Phase I/II (multiple myeloma and other hematological cancers)	Phase I/II trial in multiple myeloma (MM) with monotherapy dose escalation stage and then in combination with bortezomib and lenalidomide (open label, n=82). End points are maximum tolerated dose, safety, efficacy, PK and PD data and overall response rate, estimated primary completion date is November 2014. MM tumor cells express CD38 in c 98% of patients. Preclinical data shows MOR202 acts synergistically with lenalidomide and bortezomib. MOR202 was partnered with Celgene for an upfront fee of $92m (€70.8m), an equity investment of $60m (€46.2m), potential development, regulatory and sales milestones of $666m (€511m), and tiered double-digit royalties outside Europe and 50/50 profit share in Europe; costs will be shared on a 33%:67% basis between MorphoSys and Celgene.

Source: Edison Investment Research

MorphoSys also has three programs in drug discovery, which could progress into clinical development in about three years. This includes one in discovery for inflammatory indications, which is being co-developed with Galapagos.

MOR103 – licensed to GSK in $600m deal

MOR103 was out-licensed to GSK in a €450m (c $600m) deal in June 2013, after the product demonstrated promising activity in a Phase I/II trial in RA. The antibody also has potential in MS (data from a Phase Ib is expected in H114), osteoarthritis and various autoimmune indications.

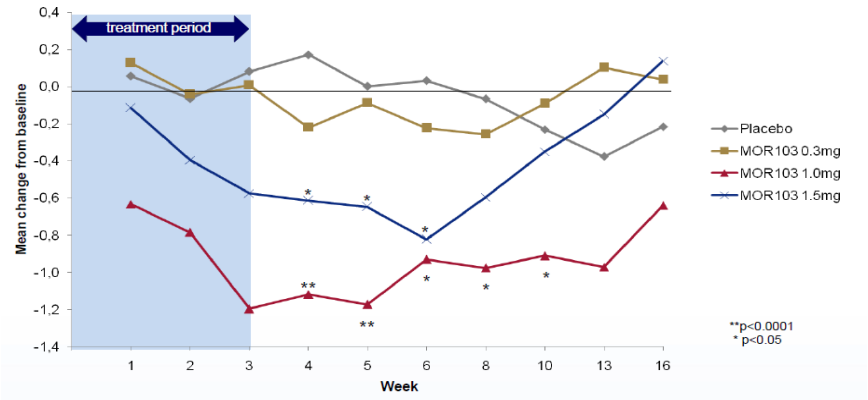
MOR103, which is a HuCAL-derived antibody that binds to GM-CSF (granulocyte-macrophage colony-stimulating factor, HuCAL is MorphoSys's proprietary antibody platform), was well tolerated and shown to reduce the symptoms of RA by various measures with a rapid onset of action in the Phase I/II trial in RA (n=96, exhibits 3 and 4). This suggests that MOR103's activity is comparable to that seen with other approved treatments for RA, although the relative levels of activity will become more apparent in later trials and potential head-to-head studies. MorphoSys has also announced that the subcutaneous formulation is well tolerated and has a favorable pharmacokinetic profile.

Exhibit 3: ACR, EULAR, DAS28 and RAMRIS responses at week four (n=96)

Efficacy measure	Placebo (n=27)	MOR103 0.3mg/kg (n=24)		MOR103 1.0mg/kg (n=22)		MOR103 1.5mg/kg (n=23)	
	measure (n)	measure (n)	Δ vs placebo	measure (n)	Δ vs placebo	measure (n)	Δ vs placebo
ACR20	7.4% (2)	25.0% (6)	17.6% (ns)	68.2% (15)	60.8% (p<0.0001)	30.4% (7)	23.0% (ns)
ACR50	3.7% (1)	4.2% (1)	0.5% (nd)	22.7% (5)	19.0% (nd)	8.7% (2)	5.0% (nd)
ACR70	0.0% (0)	4.2% (1)	4.2% (nd)	4.5% (1)	4.5% (nd)	0.0% (0)	0.0% (nd)
ACR – sub analysis Swollen joints	0.1	-1.7	-1.8 (p<0.05)	-3.5	-3.6 (p<0.05)	-3.3	-3.4 (p<0.05)
ACR – sub analysis Tender joints	2.0	0.1	-2.1 (p<0.05)	-4.8	-6.8 (p<0.05)	-3.7	-5.7 (p<0.05)
EULAR response – Moderate & good	7.4% (2)	37.5% (9)	33.8% (ns)	68.2% (15)	60.8% (p=0.0002)	69.5% (16)	62.1% (p=0.0001)
EULAR response – Good	3.7% (1)	12.5% (3)	8.8% (nd)	22.7% (5)	19.0% (nd)	4.3% (1)	0.6% (nd)
Change from baseline in DAS28	+0.17	0.18	-0.35 (ns)	1.12	1.29 (p<0.0001)	0.61	0.78 (p=0.003)
Change from baseline in RAMRIS	-0.66	-0.37	+0.29 (nd)	-1.50	-0.84 (nd)	-0.50	+0.16 (nd)

Source: Edison Investment Research, Professor Burkhardt, ACR conference 2012. Note: ns = not significant; nd = not disclosed.

Exhibit 4: Mean changes in DAS28 scores from baseline



Source: Professor Burkhardt, ACR conference 2012

GM-CSF causes the activation of macrophages and release of various other cytokines, including TNFα and IL-6. Thus, MOR103 could have greater activity than TNFα inhibitors (eg adalimumab

[Humira] and etanercept [Enbrel]) or IL-6R inhibitors (eg tocilizumab [Actemra] and sarilumab). However, this could result in greater side effects with MOR103 than these other drugs. So far MOR103 has been well tolerated, with no indication of increased susceptibility to infections (two patients in the placebo arm had nasopharyngitis [common cold] and only one in the three MOR103 arms). In addition, there was no indication of pulmonary dysfunction caused by MOR103 (three patients had coughs, which were reported as adverse effects, but none was recorded as being drug related). This might have been expected as patients with the rare autoimmune condition pulmonary alveolar proteinosis (PAP) have pulmonary complications caused by autoantibodies that bind to GM-CSF like MOR103. Reassuringly for the development of MOR103, patients with PAP do not appear to be more sensitive to infections; also, AstraZeneca reported that it did not observe any change in pulmonary parameters in a Phase II study with 233 patients with a related antibody mavrilimumab, which binds to the GM-CSF receptor and is also being developed for RA.

The terms of the licensing deal for MOR103 with GSK, which are comparable to the $480m licensing deal with Abbott (now AbbVie) for Biotest's anti-CD4 antibody (BT-061) in June 2011, are:

- Upfront payment of €22.5m (€20m recognized as revenue on signing, the remaining €2.5m will be recognized during the course of Phase Ib trial in MS, as it covers the remaining costs of this study).
- Potential milestone payments of up to €423m.
- Tiered, double-digit royalties on net sales.

GSK is yet to disclose its development plans, but it is assumed to have in-licensed MOR103 primarily for its potential in RA. At the moment, GSK does not have a franchise in this indication, but it has gradually been developing a pipeline to compete in the >$20bn RA market (Exhibit 5).

Exhibit 5: GSK's rheumatoid arthritis product pipeline

Product (target)	Development stage	Partner	Notes
Sirukumab/CNTO136 (IL-6 antibody)	Phase III	Janssen (J&J)	Two pivotal Phase III trials (SIRROUND-D [n=1,500] and SIRROUND-T [n=990]) began in August 2012 and are due to be completed in H116. In Phase II (n=121), the ACR50 response at week 24 was 60% with 100mg every two weeks and 50% with 100mg every four weeks compared to 37% with placebo. Partnership with Janssen formed in December 2011, no details disclosed.
GSK2941266 /CCX354 (CCR1 receptor small molecule antagonist)	Phase II	ChemoCentryx	Completed a Phase I/II (n=24) and a Phase II (n=160). Further development plans yet to be disclosed. In Phase II study, the ACR20 response was 43% in 100mg twice daily group and 52% in 200mg once daily group compared to 39% with placebo. GSK exercised its option on CCX354 in January 2012 by paying $25m, and could pay further undisclosed milestones and double-digit royalties.
MOR103 (GM-CSF antibody)	Phase II	MorphoSys	Completed Phase I/II trial (n=96). MOR103 was well tolerated with promising activity detected at doses of 1mg/kg and 1.5mg/kg. Further development plans yet to be disclosed. In-licensed from MorphoSys in June 2013 in €450m deal with double-digit royalties.
Otelixizumab (CD-3 antibody)	Phase I	-	Previously developed for Type I diabetes, but failed Phase III trial. Currently in Phase I (n=40) repeat dose trial to assess safety and impact on peripheral T-cells. Alliance with GSK and Tolerx began in 2007, but GSK now owns otelixizumab after Tolerx was shut down in 2011 following Phase III failure.

Source: Edison Investment Research. Note: A Phase III trial with ofatumumab (anti-CD20 antibody) is still ongoing, but the antibody is only included in its oncology pipeline.

It is also possible that GSK will consider developing MOR103 in other indications such as MS and for pain relief in patients with inflammation and osteoarthritis. The Phase Ib study (n=30) in MS is ongoing; it is primarily a safety study, however it could provide an indication of MOR103's potential in MS. A paper published in Nature Immunology indicates that GM-CSF plays a key role in the progression of MS in an animal model of the disease, suggesting that MOR103 could prevent MS from advancing in humans. Also GSK might consider developing MOR103 for severe asthma, given its respiratory franchise and KaloBios is developing its own GM-CSF antibody in this indication.

In RA, there is still considerable competition from new oral and biologic drugs, including from AstraZeneca's mavrilimumab (Exhibit 6), despite about six RA programs being stopped over the last year due to clinical trial failure or commercial reasons. But the recent deal with GSK demonstrates that MOR103 has the potential to be a very successful product. We estimate peak sales of $1.5bn for the antibody.

Exhibit 6: Biologic rheumatoid arthritis treatments in clinical development or on the market

Mechanism	Drugs	Development stage for RA	Notes
TNFα (cytokine) inhibition	Adalimumab (Humira, **Abbott**)	Market	FY12 sales: $9.3bn; approved for RA, JIA, PsA, AS, CD, Ps, UC
	Etanercept (Enbrel, **Amgen/Pfizer**)	Market	FY12 sales: $7.9bn; approved for RA, JIA, PsA, AS & Ps
	Infliximab (Remicade, **J&J/Merck**)	Market	FY12 sales: $8.2bn; approved for RA, PsA, AS, Ps, UC, CD
	Certolizumab-pegol (Cimzia, **UCB**)	Market	FY12 sales: $600m; approved for RA & CD
	Golimumab (Simponi, **J&J/Merck**)	Market	FY12 sales: $938m; approved for RA, PsA & AS
	ATN-103 (**Ablynx**)	Phase II	Further development in RA dependent on partnering
IL-6R (cytokine receptor) inhibition	Tocilizumab (Actemra, **Roche**)	Market	FY12 sales: $896m, approved for RA, JIA
	Sarilumab (**Regeneron/Sanofi**)	Phase III	Being developed for RA
	ALX-0061(Ablynx)	Phase II	Being developed for RA
CD20 (mature B cells receptor) inhibition	Rituximab (Rituxan, **Biogen/Roche**)	Market	FY12 Sales:$1.2bn*, approved for CLL, NHL and RA
	Veltuzumab (**Nycomed/Immunomedics**)	Phase II	Being developed for RA, ITP and NHL
B7 inhibition (T cell inhibitor)	Abatacept (Orencia, **BMS**)	Market	FY12 sales: $1.2bn, approved for RA, JIA
IL-1R inhibition	Anakinra (Kineret, **SOBI**)	Market	FY12 sales: $70m, approved for RA
IL6 (cytokine) inhibition	Sirukumab (**J&J/GSK**)	Phase III	Being developed for RA, lupus nephritis
	Clazakizumab (**BMS/Alder**)	Phase II	Being developed for RA, CD & PsA
	Olokizumab (**UCB/R-Pharm**)	Phase II	Being developed for RA
CD4 (T cell receptor) inhibition	BT-061 (**AbbVie/Biotest**)	Phase II	Being developed for RA, Ps
CD6 (T cell receptor) inhibition	T1h (**Biocon/CIMAB**)	Phase II	Being developed for RA, Ps (approved in India); suppresses T-cell proliferation
GM-CSF (cytokine)	MOR103 (**GSK/MorphoSys**)	Phase II	Being developed for RA, MS
	KB003 (**KaloBios**)	Phase II	Primary indication is severe asthma, but Ph II RA study completed
	Namilumab (**Takeda**)	Phase I	Being developed for RA
GM-CSF receptor inhibition	Mavrilimumab (**AstraZeneca**)	Phase II	Being developed for RA
IL1B (cytokine) inhibition	Gevokizumab/XOMA 052 (**XOMA/Servier**)	Phase II	Being developed for T2D, RA, JIA, gout, Behcet's disease
IL-17 (cytokine) inhibition	Secukinumab/AIN457 (**Novartis**)	Phase III	Being developed for Ps, PsA, RA (in Phase II), AS, and MS
IL-20 (cytokine) inhibition	NN8226 (**Novo Nordisk**)	Phase II	Being developed for RA
IL-21 (cytokine) inhibition	NN8228 (**Novo Nordisk**)	Phase II	Being developed for RA, CD and SLE
IL-12/23 (cytokines) inhibition	Ustekinumab (**J&J**)	Phase III	Being developed for RA, Ps, CD, atopic dermatitis and palmoplantar pustulosis
IL-23 (cytokine) inhibition	Guselkumab (**J&J/MorphoSys**)	Phase II	Being developed for PS, RA and palmoplantar pustulosis
Immune response against TNFα	TNFα-kinoid (**Neovacs**)	Phase II	TNFα conjugated to the highly immunogenic limpet protein, KLH. Being developed for RA, CD
CD3 (T cell receptor) inhibition	Otelixizumab (**GSK**)	Phase I	Being developed for RA, thyroid eye disease (failed Ph III trials in T1D)

Source: Edison Investment Research. Note: RA: rheumatoid arthritis; JIA: juvenile idiopathic arthritis; PsA: Psoriatic arthritis; AS: Ankylosing spondylitis; CD: Crohn's disease; Ps: psoriasis, UC: Ulcerative colitis; CLL: chronic lymphocytic lymphoma; NHL: Non-Hodgkin's lymphoma; SLE: systemic lupus erythematosus; MM: multiple myeloma; CKD: chronic kidney disease; ITP: Immune thrombocytopenic purpura; T1D: Type 1 diabetes; T2D: Type 2 diabetes. *Sales of rituximab for inflammation/autoimmune indications; the drug also generated sales of $6.0bn in oncology indications.

MOR202 – licensed to Celgene in $818m co-development deal

MOR202 (a HuCAL anti-CD38 antibody) is still at an early stage in clinical development without any clinical data available, but its promise has resulted in MorphoSys forming in July 2013 an $818m co-development agreement with Celgene, a leader in the field of hematological cancers. This is partly because of the promising Phase I/II data last year from another anti-CD38 antibody, Genmab's daratumumab. The initial Phase I/II trial is in MM and it is expected that Celgene and MorphoSys will go on to develop MOR202 in a broad range of hematological cancers.

Data from the Phase I dose-escalation stage of the current Phase I/II study in MM is expected in H213. This will provide an initial indication of how MOR208 compares to daratumumab. In a similar trial with daratumumab in MM (n=32), 67% of patients on weekly doses above 4mg/kg for eight weeks achieved at least a minor response (reduction in serum M protein of between 25% and 49% and other criteria). Also daratumumab was shown to have a favorable safety profile, which was a significant concern beforehand, as CD38 is expressed at low and moderate levels by various hematopoietic cells and some solid tissue, although more highly expressed in tumor cells.

The second stage of the Phase I/II trial will assess the safety and activity of MOR202 in combination with lenalidomide. *In vitro* experiments suggest that the two products could act synergistically with lenalidomide up-regulating CD38 in MM cells. Data from this part of the trial could be reported in H214.

MOR202 is one of three anti-CD38 antibodies in clinical development (Exhibit 7). Based on the Phase I trial with SAR650984, MOR202 has potential in NHL, acute myeloid leukemia (AML), acute lymphoblastic leukemia (ALL) and chronic lymphocytic leukemia (CLL), as well as MM. MOR202 is probably about six months behind the other programs, but the co-development deal with Celgene means that this gap is unlikely to grow, and could be reduced because of Celgene's strength in the field of hematological cancers.

The co-development agreement with Celgene has received anti-trust clearance under the US Hart-Scott-Rodino Act and the key terms of the agreement are:

- Celgene will pay an upfront payment of $92m (€70.8m) and make an equity investment of $60m (€46.2m) for 3.4% of MorphoSys. The shares were priced at €57.90 (5% above the closing share price on 9 August 2013, the day before anti-trust clearance was received).
- Celgene could pay milestones totaling $666m (€512m), if all developmental, regulatory and sales milestones are achieved.
- In Europe, profits on MOR202 sales will be shared equally.
- Outside Europe, MorphoSys will receive tiered double-digit royalties on net sales.
- Development costs will be shared 33%:67% by MorphoSys and Celgene respectively, although there is a mechanism to ensure MorphoSys's future is not put at risk by spending obligations.

The terms of the deal are exceptional considering the only data that might have been available is safety data from patients receiving low doses of MOR202 in the dose escalation stage of the trial. However, antibodies targeting CD38 are highly sought after assets; Genmab said there were c 15 companies interested in daratumumab and we assume that interest from these same companies enabled MorphoSys to partner MOR202 in a highly competitive process.

Celgene's main product is lenalidomide (Revlimid). It is the main treatment for MM, is in Phase III development for NHL, MDS (myelodysplastic syndromes) and CLL, and generated revenues of $3.8bn. Celgene's other approved hematological cancer products are azacitidine (Vidaza), romidepsin (Istodax) and Pomalyst (pomalidomide). The strength of its hematological cancer portfolio and the data from preclinical studies suggesting that MOR202 and lenalidomide can act synergistically make Celgene the ideal partner for MorphoSys to co-develop MOR202.

We estimate that MOR202 could be launched in 2017, achieve peak sales of $1.3bn in MM and potentially $1.8bn in other hematological cancer indications.

Exhibit 7: CD38 antibodies in clinical development

Product (target)	Development stage	Indications	Notes
Daratumumab Janssen (J&J)/ Genmab	Phase I/II	MM	Phase I/II trial (n=78) enrolled into two cohorts, in relapsed and refractory multiple myeloma patients. Initial data showed 67% of patients on weekly doses above 4mg/kg for eight weeks had at least a minor response (reduction in serum M protein of between 25% and 49% and other criteria). Secondary endpoints PFS/OS over one year. Expected primary completion date April 2015.
MOR202 MorphoSys	Phase II	MM	Phase I/II trial in MM with monotherapy dose escalation stage and then in combination with bortezomib and lenalidomide (open label, n=82). Endpoints are maximum tolerated dose, safety, efficacy, PK and PD and overall response rate. Expected primary completion date is November 2014. MM tumor cells express CD38 in c 98% of patients.
SAR650984 Sanofi/Immunogen	Phase I	Hematological cancers (MM, AML, ALL, CLL, NHL)	Phase I trial dose escalation study (n=60) in selected CD38 hematological cancers. Primary endpoint, MTD, secondary endpoints, safety, PK and PD, immune response and preliminary activity. Expected study completion date March 2014.

Source: Edison Investment Research

MOR208 – Phase II started

The potential of MOR208 (anti-CD19 antibody) to treat hematological cancers was shown by the initial data from the Phase I study in relapsed or refractory chronic lymphocytic leukemia (CLL, n=27). There are also several other high-profile development programs targeting CD19, which provides a further indication of MOR208's potential.

MorphoSys licensed MOR208 from Xencor rather than develop its own anti-CD19 antibody, as Xencor had already created an antibody with the desired characteristics. MOR208 has a high affinity for CD19 and Xencor had used its proprietary Xmab technology to modify the Fc domain (the tail region of an antibody) to enhance antibody-dependent cell-mediated cytotoxicity (ADCC). CD19 is expressed by B-cells (a class of white blood cell), including its precursor cells so that MOR208 could become an effective treatment for non-Hodgkin's lymphoma (NHL), chronic lymphocytic leukemia (CLL) and acute lymphoblastic leukemia (ALL).

Initial clinical data from the Phase I study in relapsed or refractory chronic lymphocytic leukemia (CLL, n=27) showed that MOR208 had acceptable levels of toxicity and preliminary signs of efficacy. The patients in the trial were heavily pre-treated; the median number of previous therapies was four and all the patients in the trial had had treatment with rituximab. There was only one grade 3/4 serious adverse event at doses below 9mg/kg and only one of 16 patients experienced dose-limiting toxicity at 12mg/kg (a case of neutropenia). In addition, 12 of the 16 patients on 12mg/kg of MOR208 (67%) had a partial response and the remaining four patients had stable diseases. The response in such a heavily pre-treated group of patients suggests that MOR208 has a promising level of anti-tumor activity. Further data from this trial is expected in Q313.

MorphoSys has initiated two Phase II trials with the product used as a monotherapy, one in B-cell ALL (n=30) and the other in non-Hodgkin's lymphoma (NHL, n=120). The trial in NHL has an adaptive design, so that the trial will be enriched with patients with the types of NHL that are shown to respond most to MOR208 during the initial stages of the trial. The final results of the two trials are expected in H214 and H216 respectively, although interim data might be reported.

Assuming that MOR208 continues to demonstrate the promising safety and efficacy profile shown in the Phase I study and is approved, the antibody will face considerable competition from existing anti-CD20 antibodies, including rituximab, and probably other anti-CD19 therapies (Exhibit 8). CD19 and CD20 have similar expression patterns on B-cells, although CD19 is expressed by B-cells at a slightly earlier stage in their development.

At this stage, it is difficult to assess which of the treatments are likely to be the most successful. However, the CD19 therapies have the advantage of targeting a broader range of B-cells and the initial data with them suggests they could have better efficacy than those targeting CD20. MOR208 has delivery advantages over blinatumomab (intravenously over 30-90 minutes compared to continuous intravenous infusion for 28 days), although it is about two years behind blinatumomab in development, and it could have a significant cost advantage over CTL019. There is only limited data on the two antibody-drug conjugates (ADC, SAR3419 and SGN-CD19A), but the dose limiting toxicities (reversible corneal deposits) that have already been identified with dosing every three weeks with SAR3419 suggest that MOR208 will have a better safety profile and be more easily combined with other therapies. So, Edison considers that the main competition for MOR208 will come from MEDI-551, as both are monoclonal antibodies with modified Fc domains. But the clinical data will determine which CD19 therapy has the greatest commercial potential and their abilities to displace the well-established CD20 treatments.

MorphoSys has the potential to take the product to the market with its cash reserves. However, it might decide to partner the product during clinical development to accelerate the process and because of the challenges of competing against the major pharmaceutical companies developing other CD19 therapies. We believe that it is most likely that MorphoSys will look to partner using the

data from one or both of the current Phase II trials, but that it will look to retain co-promotion rights in Europe (and possibly all European marketing rights) so that potentially MOR208 can be marketed by the same sales force as MOR202 in Europe. We estimate that MOR208 could achieve peak sales of $1.2bn and be launched in 2017.

Exhibit 8: CD19 and CD20 antibodies on the market or in development in oncology

Product (target)	Development stage (indications)	Notes
Rituximab* (Rituxan/ MabThera) **Roche/Biogen Idec**	On market (NHL, CLL)	Anti-CD20 antibody. FY12 sales in oncology indications were $6bn. In three registrational studies (monotherapy) in relapsed, refractory NHL (n=166, 37 and 60 [trial in 60pts retreated with rituximab]), ORR was 48%, 57% and 38% respectively; CR was 6%, 14% and 10% respectively; and median duration of response was 11.2, 13.4 and 15.0 months. In previously untreated follicular NHL with rituximab in combination with CVP chemotherapy (cyclophosphamide, vincristine, and prednisone, n=322) median PFS was 2.4 years in R-CVP arm (n=162) vs 1.4 years in CVP arm (n=160). In two studies in diffuse large B-cell NHL (DLBCL) in combination with CHOP (cyclophosphamide, adriamycin, vincristine, and prednisone, n=632, 399), OS at two years was 74% vs 63% and 69% vs 58%. In two trials in CLL in combination with FC chemotherapy (fludarabine and cyclophosphamide, n=817, 552), median PFS was 39.8 vs 31.5 months and 26.7 vs 21.7 months.
Ofatumumab (Arzerra) **GSK/Genmab**	On market (CLL)	Anti-CD20 antibody. Total Arzerra FY12 sales £60m. Arzerra is indicated for CLL patients refractory to fludarabine and alemtuzumab. In registrational study in relapsed or refractory CLL (n=154), ORR was 42%, median duration of response was 6.5m, CR was 0%. Phase II trial in relapsed and untreated CLL in combination with bendamustine, untreated CLL n=44, ORR 95%, CR 43%, relapsed CLL n=53, OR 74%, CR 11%. Forthcoming data from five other trials are due in the next year to 18m including results from a Phase III study (n=447) of ofatumumab in combination with chlorambucil in front line CLL in H113. Arzerra is in Phase III trials in follicular lymphoma and DLBCL.
Obinutuzumab/ GA101 **Roche/ Biogen Idec**	Phase III (NHL, CLL)	Anti-CD20 antibody with modified glycosylation pattern due to GlycoMab technology. Ongoing Phase III trials in: DLBCL, front-line indolent NHL, refractory indolent NHL. In a Phase III trial in CLL (previously untreated, n=781) to compare obinutuzumab and rituximab in combination with chlorambucil, ORR was 75.5% vs 65.9%, CR was 22.2% vs 8.3% and median PFS was 23.0 vs 15.7 months. FDA has granted obinutuzumab Breakthrough Therapy Designation and priority review, PDUFA date in CLL is 20 October 2013.
Veltuzumab **Immunomedics/ Nycomed**	Phase II (NHL)	Anti-CD20 antibody. Two Phase II studies in combination with epratuzumab in relapsed/refractory aggressive NHL (n=70) and B-cell ALL are ongoing. In a Phase I study in NHL (n=82), ORR of 44% and CR of 27% in patients with follicular lymphoma (n=55); PR of 43% in patients with DLBCL (n=7); and antibody appears to be active at doses less than those typically used with rituximab.
Blinatumomab **Amgen**	Phase III (ALL, DLBCL)	BiTE antibody (bi-specific CD3/CD19 antibody). Five Phase II trials in ALL and one in DLBCL are ongoing. In Phase II study of blinatumomab in relapsed and refractory ALL, 66% complete remission rate (n=18) in two treatment cycles.
CTL019 **Novartis**	Phase II (ALL, CLL and hem. tumors)	Anti-CD19 T-cell therapy (T-cells are taken from a patient, modified to express a protein that binds to CD19 and re-infused into the patient). Currently in confirmatory trials for ALL, CLL and other hematological tumors.
SAR3419 **Sanofi/ Immunogen**	Phase II (DLBCL, ALL, NHL)	An anti-CD19 DM4-loaded ADC. Two Phase II trials in DLBCL (one in combination with rituximab) and one in ALL are ongoing. In a Phase I study in NHL with weekly dosing at 55mg/m^2 with 21 evaluable patients: CR14.3%, PR 14.3%; at an earlier stage of the study, reversible corneal deposits were dose limiting with dosing every three weeks at 160 mg/m^2.
MEDI-551 **AstraZeneca**	Phase II (CLL)	Anti-CD19 antibody modified with AstraZeneca's YTE technology to enhance activity. Phase II studies in relapsed or refractory CLL in combination with bendamustine vs rituximab and in DLBCL in combination with ICE/DHAP vs rituximab are underway. In Phase I/II study in relapsed/refractory B-cell malignancies (n=63): CR 11.6%, PR: 14%, SD 48.8%).
MOR208 **MorphoSys**	Phase II (NHL, ALL)	Anti-CD19 antibody modified with Xencor's Xmab technology to enhance activity. Two Phase II trials (monotherapy) in NHL (n=120) and the other in B-cell ALL(n=30) are ongoing.
SGN-CD19A **Seattle Genetics**	Phase I (hem. tumors)	An anti-CD19 MMAF-loaded ADC. Two Phase I studies in B-cell lymphomas and leukaemias are ongoing.

Source: Edison Investment Research. Note: *Rituximab is also approved for RA and there are various CD20 biosimilars of rituximab in development. ADC is an antibody drug conjugate.

Pipeline from antibody alliances

MorphoSys also has a broad pipeline of antibodies developed through antibody development alliances (Exhibit 9). It still has some active collaborations, including its 10-year alliance with Novartis, which runs until 2017 (with a potential two-year extension), from which it earns c €40m a year. The agreement between Novartis and MorphoSys was amended in November 2012, so that MorphoSys will use the Ylanthia platform instead of HuCAL in all new antibody programs.

The return from each development alliance is modest compared to that from MorphoSys's proprietary pipeline. The typical deal terms for its HuCAL alliances are shown in Exhibit 10. However, there is no financial risk involved with these programs and they have enabled the company to develop its own pipeline while remaining profitable since 2004.

MorphoSys is able to form new alliances with its Ylanthia platform (the Novartis alliance had limited MorphoSys's ability to from collaborations involving its HuCAL platform). However, major new

alliances are unlikely to be formed as antibody creation is increasingly a standard process. So, companies will only probably use MorphoSys to develop antibodies against difficult targets, such as GPCR proteins. This is one of the reasons why MorphoSys formed a technology alliance with Heptares in February 2013 to help it develop antibodies against GPCRs; about a third of approved drugs target this class of proteins, but so far only one such antibody is approved. Exhibit 11 details MorphoSys's current antibody collaborations.

Exhibit 9: The clinical R&D pipeline from antibody discovery alliances

Product (target)	Development stage (Indication)	Partner	Notes
Gantenerumab (ß amyloid)	Phase III (Alzheimer's disease)	Roche	Phase III with prodromal Alzheimer's disease (placebo, n=770, double-blind). Primary endpoint is change in Clinical Dementia Rating scale Sum of Boxes (CDR-SOB) and change in brain amyloid. First patient treated: Q410; estimated completion date: September 2016. The trial could be used to support a marketing application for the product. Completed Phase I study in patients with mild to moderate AD (n=60), analysis of 16 patients showed a dose dependent reduction in brain amyloid level.
Guselkumab/ CNTO1959 (IL-23p19)	Phase II (psoriasis, palmoplantar pustulosis, RA)	J&J (Janssen Biotech)	Phase II in moderate-to-severe psoriasis (placebo and adalimumab, n=280, double-blind), primary endpoint: physician's global assessment (PGA) score; estimated completion date: February 2014. Phase II in palmo-plantar pustulosis (placebo, n=63, double-blind), primary endpoint: change in PPSI total score, estimated completion date: October 2014. Phase II in RA (placebo and ustekinumab, n=274, double-blind), primary endpoint: ACR20 response at 28 weeks; estimated completion date: June 2014. Phase I trial in healthy people (n= 47) and patients with moderate-to-severe psoriasis (n=24), and a Phase I study in Japanese patients with moderate-to-severe psoriasis (n=32, double-blind) have been completed; no data published.
Undisclosed	Undisclosed	Novartis	No details have been disclosed because of Novartis's commercial considerations, but Phase II trial due to be completed in H213.
BHQ880 (DKK1)	Phase II (multiple myeloma)	Novartis	Phase II study in patients with MM and renal insufficiency (n=144); primary endpoint is time to first SRE; estimated completion date is 2016. Phase II trial in smouldering myeloma (n=40); primary endpoint is ORR; expected completion date is October 2013. Phase I/II study completed in relapsed/refractory myeloma (MM) patients (in combination with zoledronic acid and standard of care chemotherapy, n=267). Data from the Phase I portion showed increased levels of biomarkers associated with bone formation.
BYM338 (Act RIIB*)	Phase II (cachexia in cancer patients, cachexia in COPD patients sporadic inclusion body myositis, sarcopenia)	Novartis	Phase II study in cachexia patients with cancer (n=50); primary endpoint is increase in thigh muscle volume in eight weeks; estimated primary completion date: imminent. Phase II study in COPD patients with cachexia (n=60); primary endpoint: increase in thigh muscle volume in six months; estimated primary completion date is September 2014. Phase II in sarcopenia (n=40); primary endpoint: change in thigh muscle at 24 weeks; estimated completion date is December 2013. Phase II study in mechanically ventilated patients (n=30); primary endpoint: increase in thigh muscle volume at 14 days; estimated primary completion date is February 2014. Phase II in sporadic inclusion body myositis (n=12) trial completed.
LFG316* (Complement C5*)	Phase II (AMD, MCP)	Novartis	Phase II trial in advanced age-related macular degeneration (n=120); primary endpoint: growth of geographic atrophy lesions, expected completion date: June 2014. Phase II study in AMD (n=57), primary endpoint: number of treatments with anti-VEGF therapy, estimated completion date: August 2013. Phase II study in multifocal choroiditis and panuveitis (MCP, n=24), primary endpoint: clinical response rate, estimated completion date: July 2013. Phase I trial in patients with AMD (open label, n=30); trial completed.
OMP-59R5 (hNotch 2/3*)	Phase II (pancreatic cancer, small-cell lung cancer)	OncoMed/ GSK	Phase I/II study in pancreatic cancer with gemcitabine and nab-paclitaxel (n=154); primary endpoints: safety and PFS; estimated completion date: 2016. Phase I/II study in SCLC with cisplatin and etoposide (n=80); primary endpoints: safety and PFS; estimated completion date: 2017. Phase I (open label, n=44) to assess MTD and preliminary efficacy. Estimated completion date: August 2013.
CNTO3157 (TLR3*)	Phase I (asthma)	J&J (Janssen Biotech)	Phase I trial in healthy and asthmatic people inoculated with rhinovirus (n=72, double-blind); primary endpoint: reduction in FEV1 post inoculation; estimated completion date: November 2014. Phase I trial in healthy people (single ascending dose, n= 56, double-blind) and patients with asthma (multiple ascending doses, n=16, double-blind); trial completed, no data published.
OMP-18R5 (Frizzled 7)	Phase I (solid tumors)	OncoMed/ Bayer	Phase I dose escalation study (open label, n=44). Trial to assess MTD, safety, PK profile and preliminary efficacy. Estimated completion date: June 2014.
BI 836845* (IGF1, IGF2*)	Phase I (solid tumors)	Boehringer Ingelheim	Two Phase I dose escalation studies (both open label and n=56 and 72). Trials to assess MTD, PK profile, immunogenicity and preliminary efficacy. Estimated completion dates are April 2014 and December 2014.
BAY94-9343 (mesothelin)	Phase I (solid tumors)	Bayer	Phase I dose escalation study (open label, n=58). Trial to assess maximum tolerated dose, safety, PK profile, immunogenicity and preliminary efficacy. Estimated completion date is August 2014. BAY94-9343 is an antibody drug conjugate (ADC).
LJM716 (HER3)	Phase I (oesophageal, head & neck, breast and gastric cancer)	Novartis	Phase I dose escalation study (n=50) in squamous cell carcinoma of head and neck, HER2+ breast or gastric cancer, estimated completion date: June 2014. Phase I dose escalation study (n=50) in combination with trastuzumab in HER2+ breast or gastric cancer, estimated completion date: August 2014. Phase I dose escalation study (n=50) in combination with BYL719 (PI3K inhibitor) in oesophageal squamous cell carcinoma, estimated completion date: 2016.
VAY736 (BAFF-R)	Phase I (inflammation)	Novartis	-
Undisclosed	Phase I (cancer)	Pfizer	Phase I trial initiated in December 2010.
Undisclosed	Phase I (inflam)	J&J	-
Undisclosed	Phase I (opthal)	Novartis	Phase I trial initiated in May 2013

Source: Edison Investment Research, MorphoSys, ClinicalTrials.gov. Note: *Information not disclosed or confirmed by MorphoSys.

Exhibit 10: Typical deal structure of antibody development deals

Milestone/royalties	Value	Notes
License fee and R&D funding	$2.0-3.2m	c 50% margin on development costs
Start of Phase I milestone	$1.3-2.6m	
Start of Phase III milestone	$2.6-4.6m	
BLA and approval milestones	$4.6-6.5m	
Royalties	c 5%	

Source: Edison Investment Research

Exhibit 11: MorphoSys's active antibody collaborations

Partner	Therapeutic areas	Notes
ContraFect	Infections	The five-year collaboration was signed in 2011. ContraFect will receive access to HuCAL PLATINIUM; MorphoSys will earn annual license fees and potential milestones and royalties.
Galapagos	Bone and joint diseases	Collaboration initiated in 2008 to develop treatments of diseases that include rheumatoid arthritis, osteoarthritis and osteoporosis. Galapagos generates the antibody targets and MorphoSys produces the fully human antibodies against them. The resultant antibodies will be developed until proof-of-concept clinical trials have been completed, before being partnered for subsequent development and marketing. All revenues and all costs are shared equally.
Novartis	Various	In December 2007, Novartis and MorphoSys formed a 10-year strategic alliance with a two-year option. MorphoSys will receive €400m over the 10 years, as well as milestones (potentially over $1bn, >€250m risk-adjusted). There is a steady state of 20 discovery programs, with c 75 FTEs assigned. The alliance terms were amended in December 2012 so that MorphoSys will use the Ylanthia platform instead of HuCAL; also the two co-development programs are now being taken forward solely by Novartis. Four therapeutic antibodies from the alliance are in Phase II clinical trials and three more are Phase I studies.
Pfizer	Various	Pfizer has signed a 10-year agreement to use the Slonomics technology during the development of therapeutic proteins. MorphoSys has received an upfront payment and will be paid annual license fees over the patent life of the Slonomics technology (until 2023). MorphoSys developed therapeutic antibodies with HuCAL GOLD for Pfizer from 2003 to 2011.

Source: Edison Investment Research. Note: MorphoSys has completed collaborations with Astellas, Bayer Schering, Boehringer Ingelheim, Daiichi-Sankyo, J&J, Merck & Co, OncoMed, ProChon Biotech, Roche and Shionogi. The partnership with Absynth Biologics was terminated in Q113.

The most valuable product in MorphoSys's non-proprietary pipeline is Roche's gantenerumab for Alzheimer's disease (AD); we value potential royalties from gantenerumab at €54m. In June 2012 Roche expanded the trial with gantenerumab into a pivotal Phase III trial by increasing the number of patients in the trial from 360 to 770. This could be sufficient to support the filing of the product, although a further trial with c 1,000 patients is likely to be required. There could be interim data reported in H213. However, this is most likely to be safety data only so that there is not a statistical penalty, which would make it harder to demonstrate a significant reduction in disease progression with gantenerumab.

Gantenerumab is now one of the most advanced products targeting β-amyloid for the treatment of AD, following the setbacks with Pfizer's bapineuzumab and Eli Lily's solanezumab. Unlike the Phase III studies with the latter two antibodies, the Phase III trial with gantenerumab is in patients with prodromal AD (early AD) and not mild-to-moderate AD. This should increase the likelihood of gantenerumab demonstrating efficacy, as there was a significant lowering of β-amyloid levels in patients with prodromal AD in a small Phase II trial (n=16). Also, subgroup analysis of the Phase III trials with solanezumab suggested that there was a slowing in the progression of AD in those patients with mild AD (using pooled data from the two EXPEDITION trials, there was a 34% reduction in cognitive decline [p=0.001] and a 17% reduction in functional decline [not significant, p=0.057]), which has led to Eli Lilly starting a third Phase III trial in patients with mild AD (n=2,100).

Guselkumab (CNTO1959) also has considerable potential in psoriasis and possibly in RA. J&J is highlighting its promise, after a Phase I study (n=71) showed that all patients in the 300mg treatment arm achieved a PASI-75 response (a 75% reduction in level of psoriasis). It has also started a Phase II trial in RA to assess the efficacy of guselkumab compared to ustekinumab (Stelera) in this indication, with a view to taking one of the products into Phase III. J&J is planning to file the antibody for approval in psoriasis, and possibly RA, by 2017.

The changes in the non-proprietary pipeline over the last year are: OMP-59R5 entering Phase II development with trials in pancreatic cancer and small-cell lung cancer; Novartis moving an

unnamed ophthalmology antibody into Phase I; and Janssen (J&J) terminating development of carlumab in idiopathic pulmonary fibrosis (IPF). The nature of drug development means that setbacks such as the one with carlumab are inevitable. However, the breadth of its non-proprietary pipeline means that the stopping of this program does not have a material effect on the prospects of the company.

Over the coming year partners are expected to complete a number of clinical trials, which could result in products advancing to the next stage of development, although data might not be published. Phase II trials with LFG316, BYM338, BHQ880 and Novartis's undisclosed product are due to be completed in H213, and ones with guselkumab (CNTO1959) and LFG316 in FY14. The most likely of these products to advance into Phase III is BYM338; the Phase II program includes five trials assessing the product's ability to increase muscle volume in different indications (one in sporadic inclusion body myositis [SIBM] has been completed) and Novartis plans to file BYM338 for approval in SIBM in 2016.

Diversifying beyond antibodies

MorphoSys has made an equity investment of €0.9m for 19.98% in the private company Lanthio Pharma as part of a €4.8m Series A investment round and will collaborate with the company to develop the LanthioPep technology.

Lanthio Pharma is developing a potential new class of therapeutic peptides, lantipeptides, which are stapled or constrained peptides. These products are highly selective in their binding to other proteins, like monoclonal antibodies, but have some of the characteristics of small molecule drugs such as the ability to target intracellular targets due to their size (500-5,000 daltons; a monoclonal antibody is c 150kDa). Lanthio Pharma's lead product, PanCyte, is expected to start clinical development in diabetes and limb ischemia and is out-licensed to Tarix Pharmaceuticals.

MorphoSys will work with Lanthio Pharma to develop the diversity of the lantipeptide libraries and will have preferred rights to exclusively license the LanthioPep technology for drug discovery. This alliance is an initial step by MorphoSys to expand its drug development capabilities beyond monoclonal antibodies.

Sensitivities

MorphoSys's prospects largely depend on the outcome of clinical trials, in particular those with its proprietary pipeline, as with most biotechnology companies. However, the downside is limited by the breadth of its pipeline of non-proprietary products, in which partners bear most of the development risk, antibody development alliances and the strength of its balance sheet. So MorphoSys's risk profile is considerably lower than that of other drug discovery and development companies, and a clinical trial failure does not put the future of the company at risk.

The development risk associated with monoclonal antibodies is lower than that with small molecules because of their greater specificity; c 25% of monoclonal antibodies successfully complete clinical trials compared with less than 10% of small chemical entities (Tufts Centre for the study of Drug Development). But there is still significant commercial risk for many of the antibody programs because of competition from other products on the market or in development. MorphoSys is also sensitive to the behavior of its partners due to their strategic considerations; this is particularly the case with GSK and Celgene and their decisions regarding MOR103 and MOR202.

MorphoSys has indicated that it is looking to acquire new technologies and in-license products. The company's ability to identify suitable opportunities and purchase or license them on favorable terms will be important for it to remain an important development partner for big pharmaceutical companies and to strengthen its proprietary pipeline.

Valuation

Our valuation of MorphoSys has increased slightly from $1,890 to $1,895m ($39.70 per ADR) following the anti-trust clearance for the deal with Celgene and the new financial guidance. The key assumptions for the risk-adjusted, sum-of-the-parts DCF valuation are detailed in Exhibit 12.

Exhibit 12: Valuation of MorphoSys

Value driver	Value ($m)	Value per ADR ($)	Notes
Partnered discovery	188.4	3.95	DCF valuation of cash flows until 2025; sales in FY12 of €58m grow at a CAGR of 4.8% for five years; growth rate is then expected to decline to 2% over next four years (includes potential milestones); WACC=10%.
MOR 103 royalties in RA	159.9	3.35	For RA, launch date: 2018; peak sales: $1.3bn; risk adjustment: 30%; royalty: 15%.
MOR103 royalties in MS	88.8	1.86	For MS, launch date: 2018; peak sales: $1.5bn; risk adjustment: 15%; royalty: 15%.
MOR 103 milestones	110.7	2.32	Risk-adjusted milestones: €50m in 2015, €50m in 2016, €50m in 2017, €150m in 2018, €50m in 2019.
MOR 202 royalties outside Europe	180.2	3.78	For MM, launch date: 2017; peak sales: $725m; risk adjustment: 30%; royalty: 17.5%. For NHL and leukemia, launch date: 2018; peak sales: $960m; risk adjustment: 15%; royalty: 17.5%.
MOR 202 profits in Europe	293.5	6.15	For MM, launch date: 2017; peak sales: $600m; risk adjustment: 30%; margin: 30%. For NHL and leukemia, launch date: 2018; peak sales: $845m; risk adjustment: 15%; margin: 30%.
MOR202 milestones	100.3	2.10	Risk-adjusted milestones: $30m in 2015, $50m in 2015, $100m in 2016, $150m in 2017, $50m in 2018, $50m in 2019.
MOR 208 royalties outside Europe	48.3	1.01	For CLL, ALL and NHL, launch date: 2017; peak sales: $540m; risk adjustment: 30%; royalty: 12.5% (effective rate after royalties to Xencor).
MOR208 profits in Europe	138.2	2.90	For CLL, ALL and NHL, launch date: 2017; peak sales: $644m; risk adjustment: 30%; margin (after royalties to Xencor): 27.5%.
Gantenerumab* royalties	73.2	1.53	For AD, launch date: 2018; peak sales: $1.8bn; risk adjustment: 40%; royalty: 5%.
BHQ880* royalties	18.4	0.39	For MM, launch date: 2016; peak sales: $536m; risk adjustment: 30%; royalty: 5%.
BYM338* royalties	50.7	1.06	For cachexia, launch date: 2017; peak sales: $1.1bn; risk adjustment: 40%; royalty: 5%.
Guselkumab* royalties	67.0	1.40	For psoriasis and RA, launch date: 2016; peak sales: $1.7bn; risk adjustment: 30%; royalty: 5%.
LFG316* royalties	27.9	0.58	For AMD, launch date: 2017; peak sales: $875m; risk adjustment: 30%; royalty: 5%.
CNTO3157* royalties	24.8	0.52	For asthma, launch date: 2019; peak sales: $740m; risk adjustment: 10%; royalty: 5%.
OMP-59R5*	26.8	0.56	For cancer, launch date: 2017; peak sales: $750m; risk adjustment: 30%; royalty: 5%.
Other royalties*	45.3	0.95	OMP-18R5*, BI 836845*, PFE-1*, LJM716* and BAY 94-9343* for cancer and, VAY736* for inflammation, launch date: 2018-19; peak sales per product: $750m; risk adjustment: 10%; royalty: 5%.
Cost of proprietary drug discovery	(130.8)	(2.74)	Risk-adjusted DCF valuation of cash flows until 2018; WACC: 12.5%.
Unallocated costs	(63.0)	(1.32)	DCF valuation of cash flows until 2018; WACC: 12.5%.
Other	46.1	0.97	Grants, capital expenditure, depreciation, and changes in working capital.
Net cash	400.0	8.38	Net cash at Q213 and upfront payments and equity investment from GSK and Celgene.
Total	**1,894.6**	**39.70**	

Source: Edison Investment Research. Note: WACC of 12.5% was used on all potential product royalties. Tax rate: 30%. *Non-proprietary products.

In a note published on 8 August 2013, we increased our valuation substantially from $1,045m to $1,890m because of the Celgene agreement (the GSK deal was largely reflected in our previous valuation). We had valued MOR202 at only $26m as there was no clinical data on the product; this has been increased to $574m (excluding the upfront payment and equity investment totaling $152m). Before, we only valued potential royalties from MM (peak sales of $360m, 17.5% global royalty rate); following the deal, we have increased potential peak sales in MM to $1.3bn (as Celgene is the market leader in MM, lenalidomide generated sales of $3.8bn, largely in MM), incorporated co-promotion of MOR202 in Europe (profit margin: 30%), added potential royalties and profits from sales in NHL and leukemia, and included risk-adjusted milestones. We also increased our valuation of MOR208 from $88m to $186m, primarily because we now expect MorphoSys to co-promote the product in Europe. But the cost of proprietary drug discovery has increased from €70m to €131m to reflect the extra development costs associated with taking MOR202 and MOR208 to the market in Europe.

The value of any royalties from unnamed clinical programs is excluded from our calculations. This includes the unnamed Novartis Phase II program, which could be advanced into Phase III in the coming year.

The main catalysts for the shares over the next 12 months could be clinical data from the Phase I study in CLL with MOR208 and the initial stage of Phase I/II study in MM with MOR202, which could be presented at the American Society of Hematology (ASH) conference in December 2013. Also its partners could progress some non-proprietary products into Phase III development.

The ADRs and shares generally trade in line with each other; however, there are variations at times because of the limited liquidity of the ADRs.

Financials

MorphoSys has maintained a strong balance sheet for many years, and its cash position has been strengthened further by the two licensing deals. We estimate that the company will have a net cash position of c $400m following the $60m investment by Celgene. This means that MorphoSys can fulfill its co-development commitments for MOR202, increase its investment in its proprietary pipeline and in-license pre-clinical/Phase I assets or complete bolt-on acquisitions. All of these activities should be possible without the company needing to raise additional capital from the markets.

The company historically focused on maintaining profitability, and it has achieved this since 2004. But this is no longer a strategic objective of MorphoSys as it looks to maximise the value of its proprietary pipeline. Following the two deals, we expect the company will maintain profitability in FY13, largely due to €20m of the €22.5m upfront payment from GSK being recognized on the signing of deal. However, the company is forecast to report a loss in subsequent years as it increases its proprietary R&D spending (our estimates exclude potential milestones for proprietary products or revenues for marketed products).

We have amended our estimates from our note of 8 August, as indicated in Exhibit 13, to reflect the new financial guidance on completion of the Celgene deal and the issuance of 0.80m shares at a share price of €57.90 to Celgene. Our revenue estimates assume that €2.5m of the GSK upfront is recognized between June 2013 and March 2014 (€20m of the GSK upfront was recognized as revenue in Q213) and the $92m (€70.8m) upfront payment from Celgene is recognized over the next five years. Despite the extra revenues, losses are also expected to increase largely in FY14 and FY15, because of MorphoSys's contribution to the development costs of MOR202 and extra investment in the rest of its proprietary pipeline. In total, we estimate that the cost of the MOR202 program for MorphoSys will be c €150m.

If the MOR202 and MOR103 development programs proceed as hoped and they are launched in 2017 and 2018, respectively, MorphoSys could become highly profitable from FY17, initially from major milestones and subsequently from royalties and its share of profits from the co-promotion of MOR202 in Europe.

Exhibit 13: Summary of changes to estimates

	Sales			PBT			EPS		
	Old	New	% change	Old	New	% change	Old	New	% change
2013e	77.2	77.2	0.0	5.8	10.1	72.5	25.0	37.7	50.1
2014e	63.7	63.7	0.0	(22.3)	(22.1)	N/A	(60.4)	(59.9)	N/A

Source: Edison Investment Research. Note: All figures are in €m except for EPS, which are in cents.

Exhibit 14: Financial summary

€'000s	2010	2011	2012	2013e	2014e	2015e
Year end 31 December	IFRS	IFRS	IFRS	IFRS	IFRS	IFRS
PROFIT & LOSS						
Revenue	87,036	81,717	51,917	77,197	63,720	65,359
Cost of Sales	(7,284)	(0)	0	0	0	0
Gross Profit	79,752	81,717	51,917	77,197	63,720	65,359
EBITDA	15,969	17,826	8,802	8,940	(24,080)	(29,316)
Operating Profit (before GW and except.)	13,834	19,535	6,542	8,491	(24,612)	(29,955)
Intangible Amortization	(3,985)	(8,338)	(4,050)	(4,265)	(3,983)	(3,555)
Exceptionals/Other	0	0	0	0	0	0
Operating Profit	9,849	11,197	2,492	4,225	(28,595)	(33,510)
Net Interest	4,089	1,412	560	1,570	2,498	2,232
Exceptionals/Other	(767)	(2,139)	0	0	0	0
Profit Before Tax (norm)	17,923	20,947	7,102	10,061	(22,115)	(27,723)
Profit Before Tax (FRS 3)	13,172	10,469	3,052	5,796	(26,098)	(31,277)
Tax	(3,975)	(2,926)	(686)	(1,247)	7,829	9,383
Discontinued operations	0	673	(424)	5,984	0	0
Profit After Tax (norm)	13,948	18,021	6,416	8,814	(14,285)	(18,339)
Profit After Tax (FRS 3)	9,196	8,216	1,942	10,533	(18,268)	(21,894)
Average Number of Shares Outstanding (m)	22.7	22.9	23.0	23.4	23.9	23.9
EPS - normalised (c)	59.2	69.4	27.9	37.7	(59.9)	(76.9)
EPS - FRS 3 (c)	41.6	35.9	8.4	45.1	(76.6)	(91.8)
Dividend per share (c)	0.0	0.0	0.0	0.0	0.0	0.0
Gross Margin (%)	91.6	100.0	100.0	100.0	100.0	100.0
EBITDA Margin (%)	18.3	21.8	17.0	11.6	-37.8	-44.9
Operating Margin (before GW and except.) (%)	N/A	N/A	N/A	N/A	N/A	N/A
BALANCE SHEET						
Fixed Assets	80,047	73,718	81,430	45,402	43,117	41,211
Intangible Assets	69,208	66,028	35,012	35,079	32,052	29,478
Tangible Assets	6,190	6,106	3,192	3,266	4,008	4,676
Other	4,649	1,583	43,226	7,056	7,056	7,056
Current Assets	132,506	154,693	142,859	305,732	270,099	236,232
Stocks	4,135	3,281	757	741	741	741
Debtors	15,009	12,203	8,924	12,690	10,475	10,744
Cash	108,422	134,365	120,412	265,767	239,520	196,000
Other	4,939	4,843	12,765	26,534	19,363	28,747
Current Liabilities	(21,351)	(23,751)	(11,918)	(35,825)	(30,889)	(30,913)
Creditors	(15,615)	(19,111)	(10,660)	(15,439)	(12,744)	(13,072)
Short term borrowings	0	0	0	0	0	0
Deferred revenues	(3,182)	(1,338)	(628)	(18,251)	(17,694)	(17,746)
Other short term liabilities	(2,554)	(3,302)	(630)	(2,135)	(450)	(95)
Long Term Liabilities	(5,281)	(7,524)	(10,361)	(54,559)	(37,343)	(20,937)
Long term borrowings	(128)	(74)	(74)	(74)	(74)	(74)
Deferred revenues	(691)	(6,047)	(5,915)	(54,196)	(36,980)	(20,574)
Other long term liabilities	(4,463)	(1,403)	(4,372)	(290)	(290)	(290)
Net Assets	185,922	197,136	202,010	260,749	244,984	225,593
CASH FLOW						
Operating Cash Flow	4,571	28,564	2,077	77,202	(39,829)	(43,109)
Net Interest	121	358	179	1,107	2,498	2,232
Tax	(2,160)	(1,852)	(466)	(3,841)	(1,685)	(355)
Capex	(13,810)	(3,453)	(2,311)	(4,974)	(2,230)	(2,288)
Acquisitions/disposals	(18,096)	0	0	36,581	0	0
Financing	2,836	1,377	1,607	43,942	0	0
Dividends	0	0	0	0	0	0
Other	(640)	0	(65)	(2)	0	0
Net Cash Flow	(27,178)	24,994	1,020	150,014	(41,246)	(43,520)
Opening net debt/(cash)	(135,106)	(108,295)	(134,291)	(130,338)	(280,693)	(239,447)
HP finance leases initiated	0	0	0	0	0	0
Exchange rate movements	(51)	(177)	(69)	14	0	0
Other	418	1,178	(4,904)	326	0	(0)
Closing net debt/(cash)	(108,295)	(134,291)	(130,338)	(280,693)	(239,447)	(195,927)

Source: Edison Investment Research, company accounts. Note: FY12 and FY13 net cash includes interest-bearing loans granted by MorphoSys of €10m and €15m respectively, which are in the balance sheet under 'other current assets'.

EDISON

Contact details	Revenue by geography
Lena-Christ-Str 48 82152 Martinsried/Planegg Germany +49 (0) 89 899 270 www.morphosys.com	N/A

CAGR metrics		Profitability metrics		Balance sheet metrics		Sensitivities evaluation	
EPS 10-14e	N/A	ROCE 13e	N/A	Gearing 13e	N/A	Litigation/regulatory	●
EPS 12-14e	N/A	Avg ROCE 10-14e	N/A	Interest cover 13e	N/A	Pension	○
EBITDA 10-14e	N/A	ROE 13e	N/A	CA/CL 13e	N/A	Currency	◖
EBITDA 12-14e	N/A	Gross margin 13e	N/A	Stock days 13e	N/A	Stock overhang	○
Sales 10-14e	N/A	Operating margin 13e	N/A	Debt days 13e	N/A	Interest rates	○
Sales 12-14e	N/A	Gr mgn/ Op mgn 13e	N/A	Credit days 13e	N/A	Oil/commodity prices	○

Management team

CEO: Dr Simon Moroney	Chairman: Dr Gerald Möller
Dr Simon Moroney is one of the founders of MorphoSys. He has held positions at Harvard Medical School, the University of British Columbia and the University of Cambridge. He also worked on the first generation of anti-cancer antibody conjugates at ImmunoGen Inc.	Dr Gerald Möller has over 30 years of experience in senior management positions in the pharma and diagnostics industry. He was CEO of Boehringer Mannheim Group and on the executive committee at Roche. He is also chairman of FIND and chairman of the supervisory board at BioAgency AG.
CFO: Jens Holstein	**Chief development officer: Dr Arndt Schottelius**
Jens Holstein became CFO in May 2011. He held various general management and financial positions at Fresenius between 1995 and 2010, including being CFO of Fresenius Kabi Asia Pacific.	Dr Arndt Schottelius became CDO in 2008, having been medical director of the Immunology Department at Genentech. Previously he has worked at Berlex Biosciences and Schering AG.

Principal shareholders	(%)
Novartis	6.4
Biotechnology Value Fund	6.0
AstraZeneca	5.2
Perceptive Advisors	5.0
Morgan Stanley	4.3
Oppenheimer Funds	4.3
Celgene	3.4

Companies named in this report

AbbVie (US:ABBV), Amgen (US:AMGN), AstraZeneca (LON:AZN), Bayer (GR:BAYN), Biogen Idec (US:BIIB), Boehringer Ingelheim, Bristol-Myers Squibb (US:BMY), Celgene (US:CELG), Elan (ID:ELN), Eli Lilly (US:LLY), Galapagos (BB:GLPG), Genmab (DC:GEN),GlaxoSmithKline (LON:GSK), Immuogen (US:IMGN), J&J (US:JNJ), Merck & Co (US:MRK), Merck KGaA (GR:MRK) , Novartis (VX:NOVN), Novo Nordisk (NVO), OncoMed (US:OMED), Pfizer (US:PFE), Roche (VX:ROG), Sanofi (FR:SAN), UCB (BB:UCB), Xencor

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