EDISON

Achillion Pharmaceuticals

Development update

Pipeline advancing

Pharma & biotech

Achillion recently announced that its partner, Janssen, has fully enrolled its 365-patient Phase IIb trial testing the triple combination of ALS-022335, simeprevir and odalasvir (together known as JNJ-4178) to treat hepatitis C patients, with results expected in H217. Importantly, the trial will be testing six- and eight-week treatment durations (the current standard treatment duration is 8-12 weeks). Achillion also recently initiated patient dosing in a Phase II trial of ACH-4471 in treatment naïve PNH patients.

Year end	Revenue ($m)	PTP* ($m)	EPS* ($)	DPS ($)	P/E (x)	Yield (%)
12/15	66.1	(3.9)	(0.03)	0.0	N/A	N/A
12/16	15.0	(50.7)	(0.37)	0.0	N/A	N/A
12/17e	0.0	(85.0)	(0.59)	0.0	N/A	N/A
12/18e	0.0	(89.2)	(0.59)	0.0	N/A	N/A

Note: *PTP and EPS are normalized, excluding amortization of acquired intangibles, exceptional items and share-based payments.

Janssen triple combo Phase IIb fully enrolled

Following positive data in which the combination of ALS-022335, simeprevir and odalasvir for the treatment of genotype 1 hepatitis C virus (HCV) achieved a 100% sustained virologic response at 12 weeks post treatment (SVR12) in all patients (n=60) for both six- and eight-week treatment durations, Janssen decided to move forward with a 365-patient Phase IIb, which is now fully enrolled. Data is expected in H217 and advancement to Phase III is currently expected in 2018 (previously estimated to be 2017).

Competitive program from Merck may be in trouble

Merck recently announced that it is taking a $2.9bn asset impairment charge on MK-3682, which is part of its triple combination regimen with grazoprevir and elbasvir to treat HCV, leaving $240m in intangible asset value. It had been the main reason for its $3.9bn acquisition of Idenix. While Merck is continuing to develop the triple combination, this may be a signal that the company's expectations are low.

The factor D engine

Besides advancing ACH-4471 into Phase II for PNH, Achillion will be moving the drug into Phase II to treat C3 glomerulopathy (C3G) in H217. Additionally, a next-generation oral factor D inhibitor should enter Phase I and an ophthalmic factor D inhibitor should be selected for clinical development by the end of 2017.

Valuation: $2.41bn or $17.64 per share

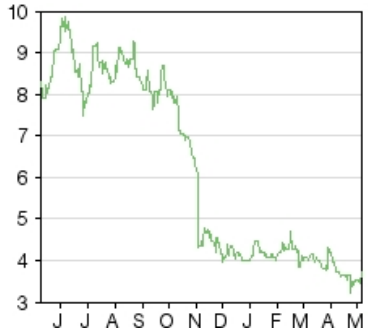
We have lowered our valuation from $2.75bn or $20.15 per basic share to $2.41bn or $17.64 per share, mainly because our estimated launch date for JNJ-4178 is now 2020 (previously 2019) due to the new expectation for a 2018 Phase III start, as well as the removal of genotype 3 patients from our model as JNJ-4178 will not be developed for that subgroup of patients. Achillion ended Q117 with $386.6m in cash and investments, which we expect to be sufficient to reach profitability, currently expected to occur in 2020.

8 May 2017

Price	**US$3.71**
Market cap	**US$507m**

Net cash ($m) at 31 March 2017	387
Shares in issue	136.7m
Free float	69.1%
Code	ACHN
Primary exchange	NASDAQ
Secondary exchange	N/A

Share price performance



%	1m	3m	12m
Abs	(2.4)	(14.1)	(53.2)
Rel (local)	(4.3)	(17.8)	(60.0)

52-week high/low	US$9.9	US$3.2

Business description

Achillion Pharmaceuticals is engaged in the discovery and development of treatments for chronic hepatitis C virus (HCV) and progressing compounds from its research platform in its novel factor D program. The company is collaborating with Janssen Pharmaceuticals (J&J) to develop and commercialize its HCV franchise including a promising combination treatment, which holds the potential to be best in class.

Next events

ACH-4471 Phase II interim results	Q217
JNJ-4178 Phase IIb results	H217

Analysts

Maxim Jacobs	+1 646 653 7027
Nathaniel Calloway	+1 646 653 7036

healthcare@edisongroup.com

Edison profile page

HCV program progressing

Janssen, partnered with Achillion for its triple combination drug for HCV dubbed JNJ-4178, has fully enrolled a 365-patient Phase IIb trial dubbed Omega-1. It has enrolled patients with genotype 1, 2, 4, 5 and 6 HCV infections who were either treatment naïve or failed interferon ± ribavirin therapy. They will be dosed once daily with 800mg of AL-335, 25mg of odalasvir (ODV) and 75mg of simeprevir (SMV). Results from the trial are expected in H217. Importantly, it will be testing six- and eight-week treatment durations.

Full data from the Phase IIa trial (see Exhibit 1) were presented at the European Association for the Study of the Liver (EASL) meeting in Amsterdam recently. All genotype 1 patients treated with the triple regimen at all dosing levels achieved a sustained virologic response (SVR, undetectable viral load) measured 24 weeks following the end of treatment (SVR24). This included patients who were only treated for six weeks. The high rate of SVR24 observed after only six weeks of treatment compares favorably to other studies of HCV treatments. The fastest current treatment recommended by the FDA is Harvoni, which can be considered for an eight-week course in genotype 1 patients without cirrhosis and a viral load below 6m IU/mL.

Exhibit 1: Triple regimen Phase IIa results

Cohort	AL-335 (mg QD)	ODV (mg)	SMV (mg QD)	Genotype	Dosing duration (weeks)	Number (%) with undetectable HCV RNA at SVR24
1	400	50 QD	100	1	8	20/20 (100%)
2	800	50 QOD	75	1	8	20/20 (100%)
3	800	50 QOD	75	1	6	20/20 (100%)
4	800	50 QOD	-	1	8	21/25 (84%)
5	800	50 QOD	-	1	12	7/8 (88%)
6	800	50 QOD	75	3	8	0/5 (0%) - SVR12
7	800	50 QOD	75	3	12	10/13 (77%) - SVR12

Source: Achillion, EASL 2017. Note: QOD: every other day; QD every day.

Unfortunately, genotype 3 patients did not achieve the same virologic response as seen in genotype 1 patients. The SVR12 (SVR measured 12 weeks after the end of treatment) was 0% in the 8-week cohort and 77% in the 12-week cohort. This is likely due to a lack of effectiveness of SMV, one of the triple regimen components, in targeting genotype 3 (it is potent in genotype 1, 2, 4, 5 and 6 patients). Due to these results, JNJ-4178 will no longer be developed in genotype 3 patients. While making up approximately 30% of all HCV patients globally, they make up around 10% of those in the US, less than 1% of those in Japan and 25% of those in western Europe (73% of the world's genotype 3 patients are in South Asia).[1]

Competitive program update

While JNJ-4178 continues to progress, Merck appears to be lowering expectations for its own similarly structured triple combination product (also containing a nucleoside, a protease inhibitor and an NS5a inhibitor). MK-3682, which is part of that regimen, which as a whole is called MK-3682B, was acquired in the $3.9bn acquisition of Idenix. Merck recently announced that it is taking a $2.9bn asset impairment charge on the product, leaving only $240m in intangible asset value on the books. Merck stated that the evaluation of the asset value was triggered by "recent changes to the product profile, as well as changes to its expectations for pricing and the market opportunity".

Phase II results of the MK-3682B regimen presented at the 2016 Liver Meeting in November suggest that it may have an inferior product profile to JNJ-4178 at eight weeks (especially in genotype 1 patients, who make up the bulk of the market) given that many of the MK-3682B patients were also on ribavirin concurrently (see Exhibit 2).

1 Messina J et al., *Hepatology* 2015; 61:77-87

Exhibit 2: SVR-12 rates for Merck's MK-3682B regimen ± ribavirin in HCV patients

Population	N	8 weeks	12 weeks	16 weeks
GT1a	90	93% (39/42)	98% (47/48)	-
GT1b	86	98% (45/46)	100% (40/40)	-
GT2	151	86% (54/63)	97% (60/62)	100% (26/26)
GT3	337	95% (98/103)	97% (155/159)	96% (72/75)

Source: Merck, The Liver Meeting 2016

ACH-4471 and more

Achillion also announced that its lead factor D inhibitor, ACH-4471, has progressed into Phase II in PNH patients and that two patients have completed 28 days of dosing, and that each continues to receive longer-term treatment. Interim results are expected in the second quarter.

The company had announced in November of 2016 that there were Grade 3 and 4 ALT elevations in two subjects in the multiple ascending dose (MAD) trial of ACH-4471 in healthy volunteers at the mid (500mg) and high (800mg) doses. However, the ALT elevation in both subjects was self-limiting, resolved without further treatment and showed no signs of affecting liver function.

Besides advancing ACH-4471 into Phase II for PNH, Achillion will be moving the drug into Phase II to treat C3G in H217. Additionally, a next generation oral factor D inhibitor should enter Phase I by the end of 2017. Also, Achillion is very actively advancing its ophthalmology portfolio with several internally discovered factor D inhibitors that are being developed with the goal of administering them ocularly at a minimum of three-month intervals with a focus on dry AMD/geographic atrophy. The company should select a lead compound for development by year-end.

Valuation

We have lowered our valuation from $2.75bn or $20.15 per basic share to $2.41bn or $17.64 per share, mainly because our estimated launch date for JNJ-4178 is now 2020 (previously 2019) due to the new expectation for a 2018 Phase III start, as well as the removal of genotype 3 patients from our model as JNJ-4178 will not be developed for that subgroup of patients. Our global peak sales estimates have been reduced from $4.2bn to $3.7bn.

Exhibit 3: Achillion valuation table

Product	Main Indication	Status	Prob. of success	Launch year	Peak sales ($m)	Patent protection	Royalty	rNPV
JNJ-4178	US, HCV	Phase II	60%	2020	$1,901	2029	12-24%	$583
JNJ-4178	EU Big-5, HCV	Phase II	60%	2020	$975	2029	12-24%	$297
JNJ-4178	Japan, HCV	Phase II	60%	2020	$813	2029	12-24%	$331
Milestones								$584
ACH-4471	PNH	Phase II	20%	2021	$694	2034	N/A	$229
Total								$2,024
Cash and cash equivalents (31 March 2017) ($m)								$387
Total firm value ($m)								$2,411
Total basic shares (m)								137
Value per basic share ($)								$17.64
Stock options(m)								10.7
Weighted average exercise price ($)								$7.25
Cash on exercise ($m)								$77.5
Total firm value ($m)								$2,488
Total number of shares								147.4
Diluted value per share ($)								$16.88

Source: Achillion Pharmaceuticals accounts, Edison Investment Research

Financials

Achillion ended Q117 with $386.6m in cash and investments, down only marginally from $391m at the end of Q416, mainly due to a $15m milestone payment received from the Janssen collaboration. We expect cash levels to be sufficient to fund the ongoing development programs through the commercialization of odalasvir, which will trigger additional significant milestone payments from partner Janssen. The company has provided 2017 financial guidance. R&D expenses during 2017 are expected to be $75-80m (vs our previous estimate of $67m) with net cash used in operating activities of $70-75m (vs our previous estimate of $76m). With that in mind, we have increased our expectations for operational spending (including R&D and SG&A) for 2017 from $89.8m to $98.2m. We have also introduced 2018 estimates with R&D expenses at $80m and SG&A at $22m with a total of $102m in operational spending.

Exhibit 4: Financial summary

($000s)	2012	2013	2014	2015	2016	2017e	2018e
Year end 31 December	IFRS	IFRS	IFRS	IFRS	IFRS	IFRS	IFRS
PROFIT & LOSS							
Revenue	2,607	0	0	66,122	15,000	0	0
Cost of Sales	0	0	0	0	0	0	0
Gross Profit	2,607	0	0	66,122	15,000	0	0
EBITDA	(42,953)	(53,157)	(61,664)	(4,341)	(52,904)	(85,894)	(89,220)
Operating Profit (before amort. and except.)	(43,361)	(53,556)	(62,153)	(5,035)	(53,859)	(86,899)	(90,275)
Intangible Amortisation	0	0	0	0	0	0	0
Exceptionals	0	0	0	0	0	0	0
Stock options	(3,932)	(5,920)	(7,273)	(10,072)	(11,006)	(11,336)	(11,676)
Operating Profit	(47,293)	(59,476)	(69,426)	(15,107)	(64,865)	(98,235)	(101,951)
Net Interest	166	529	418	1,133	3,159	1,886	1,112
Pre-Tax Profit (norm)	(43,195)	(53,027)	(61,735)	(3,902)	(50,700)	(85,012)	(89,163)
Pre-Tax Profit (FRS 3)	(47,127)	(58,947)	(69,008)	(13,974)	(61,706)	(96,348)	(100,839)
Tax	0	0	0	0	0	0	0
Profit After Tax (norm)	(43,195)	(53,027)	(61,735)	(3,902)	(50,700)	(85,012)	(89,163)
Profit After Tax (FRS 3)	(47,127)	(58,947)	(69,008)	(13,974)	(61,706)	(96,348)	(100,839)
Average Number of Shares Outstanding (m)	73.97	93.98	98.37	125.59	136.67	143.50	150.68
EPS - normalized ($)	(0.58)	(0.56)	(0.63)	(0.03)	(0.37)	(0.59)	(0.59)
EPS - normalized and fully diluted ($)	(0.58)	(0.51)	(0.56)	(0.03)	(0.35)	(0.56)	(0.56)
EPS - (IFRS) ($)	(0.64)	(0.63)	(0.70)	(0.11)	(0.45)	(0.67)	(0.67)
Dividend per share (c)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gross Margin (%)	100.0	N/A	N/A	N/A	N/A	N/A	N/A
EBITDA Margin (%)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Operating Margin (before GW and except.) (%)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BALANCE SHEET							
Fixed Assets	1,503	1,344	1,780	1,785	3,531	5,202	6,912
Intangible Assets	0	0	0	0	0	0	0
Tangible Assets	1,247	1,265	1,726	1,735	3,479	5,107	6,817
Restricted cash	152	152	152	152	152	152	152
Investments	256	79	54	50	52	95	95
Current Assets	79,875	160,921	154,875	462,588	410,192	324,954	237,442
Inventory	0	0	0	0	0	0	0
Accounts recievable, net	277	480	95	506	15,256	306	356
Cash and cash equivalents	77,418	157,989	152,879	459,341	391,476	321,188	233,626
Other	2,180	2,452	1,901	2,741	3,460	3,460	3,460
Current Liabilities	(9,136)	(9,403)	(13,059)	(14,658)	(13,971)	(12,194)	(12,219)
Creditors	(8,786)	(9,112)	(12,864)	(14,435)	(13,620)	(11,868)	(11,918)
Short term borrowings	(350)	(291)	(195)	(223)	(351)	(326)	(301)
Long Term Liabilities	(347)	(56)	(279)	(231)	(450)	(285)	(285)
Long term borrowings	(347)	(56)	(279)	(231)	(450)	(285)	(285)
Other long term liabilities	0	0	0	0	0	0	0
Net Assets	71,895	152,806	143,317	449,484	399,302	317,677	231,850
CASH FLOW							
Operating Cash Flow	(46,700)	(54,165)	(55,942)	4,444	(68,812)	(72,276)	(88,800)
Net Interest	166	529	418	1,133	3,159	1,886	1,112
Tax	0	0	0	0	0	0	0
Capex	(656)	(408)	(947)	(704)	(2,508)	(2,633)	(2,765)
Acquisitions/disposals	0	0	0	0	0	0	0
Financing	44,235	133,951	52,264	301,158	322	372	422
Net Cash Flow	(2,955)	79,907	(4,207)	306,031	(67,839)	(72,651)	(90,031)
Opening net debt/(cash)	(79,725)	(76,873)	(157,794)	(152,557)	(459,039)	(390,827)	(320,728)
HP finance leases initiated	0	0	0	0	0	0	0
Other	103	1,014	(1,030)	451	(373)	2,552	2,494
Closing net debt/(cash)	(76,873)	(157,794)	(152,557)	(459,039)	(390,827)	(320,728)	(233,191)

Source: Achillion Pharmaceuticals accounts, Edison Investment Research

Frankfurt +49 (0)69 78 8076 960
Schumannstrasse 34b
60325 Frankfurt
Germany

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

New York +1 646 653 7026
245 Park Avenue, 39th Floor
10167, New York
US

Sydney +61 (0)2 9258 1161
Level 25, Aurora Place
88 Phillip St, Sydney
NSW 2000, Australia