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Equity Research

Industry Update

November 3, 2017

■ Biotechnology

Highlights From Galapagos And Vertex Analyst Meetings At NACFC

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The Cowen Insight

Last night, we attended investor events hosted by GLPG and VRTX at the ongoing North American Cystic Fibrosis Conference (NACFC). Both companies provided incremental updates on their cystic fibrosis programs. VRTX's triple regimens are on track to enter pivotal trials during H1:18. Database lock has occurred in GLPG's ALBATROSS trial, and results are expected shortly. Other highlights follow.

Tez/Iva Launch To Focus On Patients Who Have discontinued Orkambi

Vertex has developed tezacaftor/ivacaftor as a successor doublet therapy to Orkambi (lumacaftor/ivacaftor). Management believes the vast majority of Orkambi-eligible patients in the U.S. have initiated therapy with it. However, management estimates that only ~70% of eligible patients are currently on Orkambi with the primary reason for discontinuation early adverse events such as chest tightness. Our consultants note some women of childbearing age are also reluctant to pursue or stay on therapy due to a DDI with hormonal contraception. In clinical trials, Vertex has consistently shown that patients initiating tez/iva do not experience chest tightness. In addition, a DDI study presented at NACFC shows that tez/iva does not interact with hormonal contraceptives. In totality, management believes the AE and DDI profile of tez/iva is essentially identical to ivacaftor monotherapy. Consequently, upon approval Vertex plans to target patients that previously tried but discontinued Orkambi. Vertex notes that this population is enriched for the earliest (and therefore most motivated) adoptors of Orkambi. Consequently, rapid penetration of this patient population would appear possible.

Vertex To Advance Two Triplet Regimens To Phase III, And Commercialize The One That Produces The Best Data

In order to increase efficacy in F508del homozygous patients and expand the CF franchise into F508del Het-Min patients, Vertex is developing four second generation correctors (VX-440, VX-152, VX-659, and VX-445) for use in combination with tez/iva. VX-440, VX-152 and VX-659 produced clear proof-of-concept data in July and a Phase I/II trial of VX-659 is currently underway. Additional data from each regimen is expected in H1:18. Upon receipt of this data, Vertex expects to select up to 2 regimens to bring forward into pivotal development. One regimen is expected to consist of tez/iva + one second generation corrector and be dosed BID. A second regimen will swap out ivacaftor for VX-561 (deuterated ivacaftor), incorporate a different second generation corrector, and be dosed QD. Managment believes that VX-440, VX-152, and VX-659 all appeared similarly efficacious in Phase II, and that the small patient numbers in the study make it impossible to draw any conclusions about their relative efficacy. Therefore, tolerability, convenience, etc. could be important differentiators used to select the lead molecules to advance to Phase III. On this front, management reports it has completed and continues to conduct additional clinical DDI studies.

Management continues to consult with the FDA regarding ways for the pivotal trials to be shortened relative to Orkambi or Kalydeco's pivotal programs. Vertex believes short-term efficacy (FEV1) can be established with as little as 4-8 weeks of treatment

Please see pages 4 to 8 of this report for important disclosures.

and longer-term efficacy (exacerbations) could need as few as 24 weeks of follow-up. The primary "controversy" with the FDA appears to be how large of a safety database will be required in order to support approval of a potentially lifelong therapy. Management indicates once pivotal data is generated it will select the best regimen based upon efficacy (both short and long-term) and tolerability and file just one triple regimen for approval. If the BID regimen proves superior in Phase III, Vertex believes it could conduct a post-approval PK study using VX-561 to secure the subsequent approval of a QD regimen.

Galapagos Testing Individual CFTR Correctors On Top Of Approved Vertex Therapies

Galapagos is simultaneously developing all three components of its potential triplet therapies. Management is conducting several trials of individual components in order to derisk to overall triplet. Galapagos reports that database lock has now occurred in the ALBATROSS trial of ivacaftor +/-GLPG2222 in gating mutation patients (F508del/G551D) and data release will occur shortly. The goal of this trial is to establish that '2222 is being dosed in the appropriate (active) range. Given the recent failure of tez/iva vs. ivacaftor Phase III in this population management thinks it is unlikely that '2222 will show a benefit on FEV1. However, management is hopeful that a PD signal will be detected through an impact on sweat chloride. Nonetheless, we note that Vertex also conducted a Phase II of teva/iva in F508del/G551D patients that was of similar design to the ALBATROSS study (VRTX's trial had 14 patients on each arm of active therapy and 4 on placebo, while ALBATROSS has 14 on each arm of active therapy and 7 on placebo). Data were presented at NACFC in 2014 and demonstrated a 4.6 percentage point change vs. baseline in FEV1, and a 7.0 mmol/L decrease in sweat chloride, for teza/iva. This suggests that changes in FEV1 in ALBATROSS appear possible given the small patient numbers; whether they suggest differentiation of '2222 vs. tezacaftor is unclear.

The FLAMINGO trial is testing '2222 monotherapy in F508del homozygous patients. This trial is expected to report data in early 2018. Management reports its primary objective in this trial is demonstration that '2222 does not cause lumacaftor-like chest tightness in this population. Galapagos believes any improvement in FEV1 would be a bonus.

Galapagos has also recently initiated the Phase II PELICAN trial in Germany. This trial will enroll F508del homozygous patients on a stable dose of Orkambi for at least 4 weeks to receive GLPG2737 (second generation corrector). The objective of this trial is to establish an exposure level for '2737 that generates efficacy on FEV1. This exposure will then be used to calculate a combination dose with '2222 and Galapagos-owned potentiators.

Galapagos' Potentiators Ready For Advancement Into Triple Combinations

Galapagos' lead potentiators are GLPG2451 and GLPG3067. A long lived active metabolite of '2451 required additional preclinical toxicity and healthy volunteer studies before regulators would allow advancement into longer duration dosing (and even longer exposures) of CF patients. Management reports once this data was generated UK regulators had no issue approving Galapagos' clinical trial plan. Galapagos plans to advance '2451 using a single loading dose of 35mg followed by daily doses of 1.5mg starting on day 14. Formal CTAs are now being submitted to European regulators for a triplet trial of '2451+'2222+'2737 in F508del homozygous and het min patients. Enrollment is expected to begin by YE:17.

Phase I data in healthy volunteers for '3067 was reported at NACFC. This data included a report of one case each of rash and LFT elevation. Management reports these events resolved and therefore it does not consider either to be a concern. Therefore, a triplet regimen of '3067+'2222+'2737 is expected to start dosing in

healthy volunteers around YE and move into CF patients in H1:18. Both triplet trials are expected to be conducted exclusively outside of the U.S. While the trials are being conducted management expects to open U.S. INDs covering the regimens. The structure of these INDs (multiple individual molecule INDs or a novel multi-molecule INDs) is currently the subject of discussions with the FDA.

After completion of these initial triplet trials, management hopes to have established proof-of-concept for its triplet(s). However, additional dose ranging work is likely to be necessary in order to establish the ideal dosing regimen. Galapagos reports that regulators view this as a company not regulatory risk. Therefore, management is unsure if this work will be conducted as a Phase IIb trial or within Phase III development. Galapagos' partner AbbVie is expected to have significant input in this decision as the partnership agreement stipulates that Galapagos is responsible for conducting all Phase II development and AbbVie must conduct all Phase III development.

Ticker	Rating	Price*	Price Target	Ticker	Rating	Price*	Price Target
GLPG	Outperform	$99.76	--	**VRTX**	Outperform	$144.90	$200.00

**As of 11/02/2017*

Valuation Methodology And Risks

Valuation Methodology

Biotechnology:

In calculating our 12-month target price, we employ one or more valuation methodologies, which include a discounted earnings analysis, discounted cash flow analysis, net present value analysis and/or a comparable company analysis. These analyses may or may not require the use of objective measures such as price-to-earnings or price-to-sales multiples as well as subjective measures such as discount rates.

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Investment Risks

Biotechnology:

There are multiple risks that are inherent with an investment in the biotechnology sector. Beyond systemic risk, there is also clinical, regulatory, and commercial risk. Additionally, biotechnology companies require significant amounts of capital in order to develop their clinical programs. The capital-raising environment is always changing and there is risk that necessary capital to complete development may not be readily available.

Addendum

Stocks Mentioned In Important Disclosures

Ticker	Company Name
GLPG	Galapagos NV (ADR)
VRTX	Vertex

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The recommendation contained in this report was produced at November 03, 2017, 09:56 ET. and disseminated at November 03, 2017, 09:56 ET.

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Assumption: The expected total return calculation includes anticipated dividend yield

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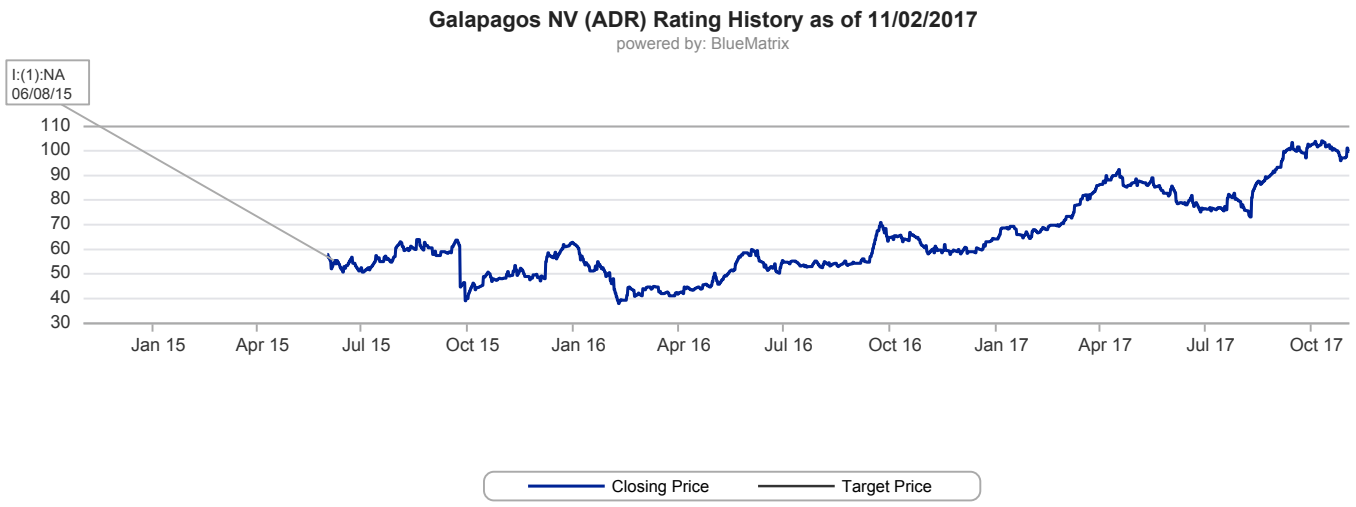

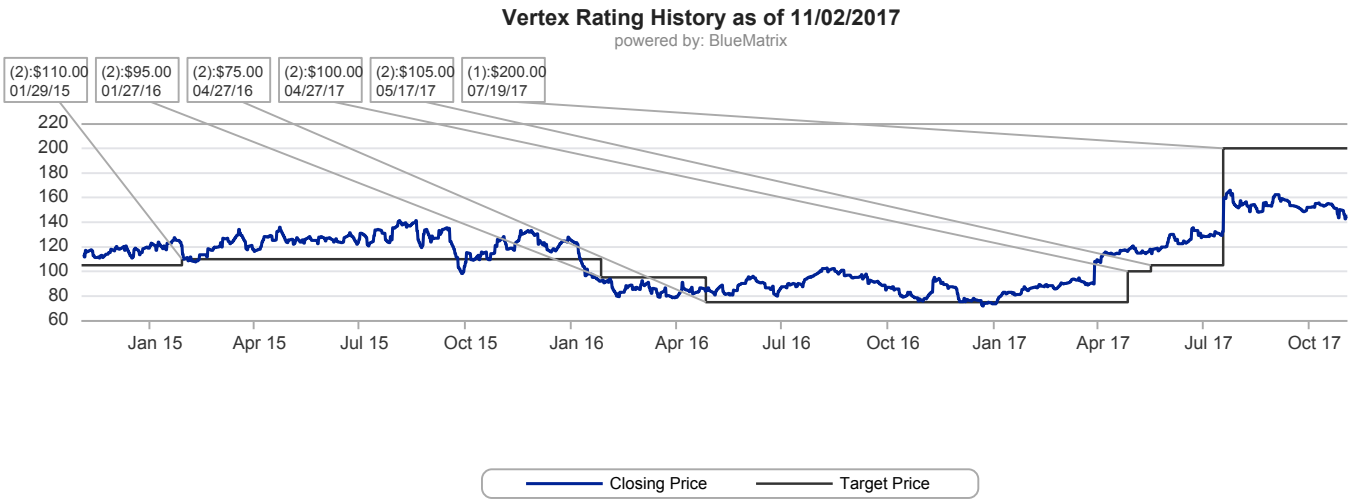

Legend for Price Chart:

I = Initiation | 1 = Outperform | 2 = Market Perform | 3 = Underperform | UR = Price Target Under Review | T = Terminated Coverage | $xx = Price Target | NA = Not Available | S=Suspended

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