Vitae Pharmaceuticals

(VTAE-NASDAQ)

Stock Rating: **Outperform**
Industry Rating: **Outperform**

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Broad Pipeline Addressing Large Markets: Initiating With Outperform

Investment Thesis

We are initiating coverage of Vitae Therapeutics (VTAE) with an Outperform rating and $11 price target. Our favorable rating is supported by an efficient structure-based drug design platform, a deep pipeline of highly selective small-molecule drugs across multiple therapeutic categories and several opportunities for proof-of-concept data in 2015. With five separate drug development candidates and a balanced mix of partnered assets and proprietary programs, we would highlight VTP-43742 for autoimmune disease and VTP-34072 for metabolic disease as key value drivers for VTAE over the next 12 months. VTP-43742 is currently in phase 1 development for patients with psoriasis (PsO) and should have proof-of-concept data in 2H15, with an opportunity to broaden into other autoimmune diseases, like multiple sclerosis (MS) subsequently. Biologic rationale for an inhibitor of RORγt in autoimmune disease is compelling, based on recent feedback at the Boston MS meeting, and pre-clinical data suggests strong effect in autoimmune disease. Following success of oral drugs like GILENYA and TECFIDERA in MS, and recent launch of OTEZLA for PsO we believe that Vitae's VTP-43742 could enter a $10B+ category with features of differentiation, and as such expect proof-of-concept data in 2015 to attract large pharma interest. Vitae's diabetes drug candidate VTP-34072 is already partnered with large pharma Boehringer Ingelheim and has a high profile, yet difficult target in 11β HSD1, which as yet has been unsuccessfully targeted by multiple large pharma companies including Roche and Eli Lilly. As such, positive data for VTP-34072 in 2015 could substantially validate Vitae's platform and generate greater interest in earlier stage assets, including BACE inhibitor VTP-37948 for Alzheimer's disease.

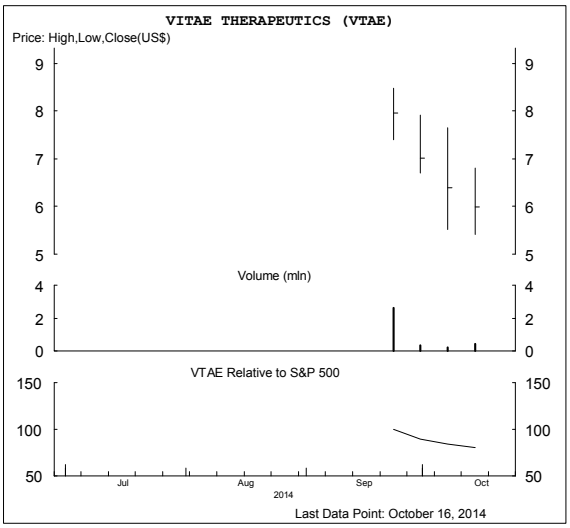
Forecast & Valuation

We forecast losses annually for 2014-2020. We anticipate initial profitability in 2021 with EPS of $0.96. We arrive at our $11 price target by applying a 20x multiple to our 2022E EPS estimate of $2.70 and discounting at 30%.

Recommendation

We rate VTAE shares Outperform.

Price (17-Oct)	$6.30	**52-Week High**	$8.48
Target Price	$11.00	**52-Week Low**	$5.41



(FY-Dec.)	2012A	2013A	2014E	2015E
EPS	$0.02	$0.09	- $1.42	- $1.72
P/E			na	na
CFPS	na	na	na	na
P/CFPS			na	na
Rev. ($mm)	$22	$23	$2	$0
EV ($mm)	na	na	$93	$93
EBITDA ($mm)	$2	$2	-$22	-$26
EV/EBITDA	na	na	na	na

Quarterly EPS	**Q1**	**Q2**	**Q3**	**Q4**
2012A	na	na	na	na
2013A	na	na	na	na
2014E	-$0.36a	-$0.36a	-$0.35	-$0.35

Dividend	$0.00	**Yield**	0.0%
Book Value	$0.52	**Price/Book**	12.1x
Shares O/S (mm)	17.4	**Mkt. Cap (mm)**	$110
Float O/S (mm)	6.4	**Float Cap (mm)**	$40
Wkly Vol (000s)	1,067	**Wkly $ Vol (mm)**	$8.0
Net Debt ($mm)	-$16	**Next Rep. Date**	na

Notes: All values in US$
First Call Mean Estimates: Not Available

Please refer to pages 57 to 60 for Important Disclosures, including the Analyst's Certification.

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Review of Financials

We estimate initial launch of VTP-34072 in both the U.S. and EU in 2020. In the U.S., we anticipate first year sales of $150 million of which we estimate Vitae will earn a 15% royalty, or roughly $22.5 million. We believe sales in the U.S. will increase steadily to $1.1 billion in 2025, which would earn Vitae roughly $169 million in royalties. For the EU, we project sales in 2020 of $75 million with the same 15% royalty, earning Vitae roughly $11.3 million. We believe that EU sales will increase steadily as well to roughly $563 million in 2025, which would earn Vitae roughly $84 million in royalties.

For VTP-43742, we expect a U.S. launch in 2020 with sales of $13 million with a 15% royalty garnering Vitae roughly $2 million. We anticipate sales increasing to roughly $1.3 billion in 2025, which would earn Vitae roughly $188 million in royalties. For VTP-43742 launching in the EU in 2020, we similarly expect sales of roughly $13 million and the same 15% royalty earning Vitae $2 million. We expect sales to increase to $1.3 billion by 2025, with Vitae thus earning roughly $188 million in royalties.

We forecast initial profitability for Vitae in 2021 with EPS of $0.96. These 2021 earnings come on a revenue base of roughly $97 million. We anticipate this revenue stream to increase steadily to roughly $630 million in 2025.

Valuation

We arrive at our $11 price target by applying a 20x multiple to 2022 EPS estimate of $2.70 and discounting at 30%.

Our sum-of-the-parts NPV analysis suggests a present value of $10 per share for the product pipeline, including cash. Our product NPV is driven by estimates for VTP-34072 in Type 2 diabetes and VTP-43742 in psoriasis. For VTP-34072, we assume U.S. launch in 2020 with 12.5% likelihood of success and a 10% discount rate. For the EU launch of VTP-34072, we assume launch in 2020 with a 12.5% likelihood of success and a 10% discount rate. In terms of VTP-43742, we assume U.S. launch in 2020 with a 12.5% likelihood of success and 10% discount rate. For VTP-43742 in the EU, we assume a launch in 2020 with a 12.5% likelihood of success and 10% discount rate.

We base our valuation of VTAE on a relative value P/E multiple on future earnings. We arrive at our $11 price target by applying a 20x multiple to 2022 EPS estimate of $2.70 and discounting at 30% per year. Our $11 price target can also be supported by the probability-adjusted NPV of VTP-34072 and VTP-43742.

In evaluating development-stage biotech comparables, we believe that ChemoCentryx (CCXI), and Five Prime Therapeutics (FPRX) are the most suitable comparables with enterprise values (EV) of $100 million and $122 million, respectively. At an EV of roughly $89 million, VTAE trades at a discount to the average EV of these comparables.

Exhibit 1: Vitae Pharmaceuticals Comps

VARIOUS SMALL PROGRAM COMPANIES						
Company	**Ticker**	**Market Cap (M)**	**Cash (M)**	**EV (M)**	**Stage of Development**	**Therapeutic Focus**
Acceleron Pharma	XLRN	$894.1	$204.3	$689.9	Phase 2	Cancer/Renal
Biodel	BIOD	$27.2	$24.5	$2.8	Phase 2	Diabetes
ChemoCentryx	CCXI	$190.7	$99.9	$90.9	Phase 2	Renal Disease
Esperion Therapeutics	ESPR	$368.2	$59.7	$313.4	Phase 2	Dyslipidemia
Five Prime Pharmaceuticals	FPRX	$258.2	$140.6	$118.3	Phase 1	Autoimmune/Cancer
Halozyme Therapeutics	HALO	$1,060.1	$147.6	$962.3	Phase 3	Diabetes/Cancer
Oramed Pharmaceuticals	ORMP	$65.1	$54.2	$10.9	Phase 2	Dermatology
Xenoport	XNPT	$369.5	$124.9	$244.6	Phase 2	Diabetes
Mean		$404.2		$304.1		
Median		313.2		181.4		
Vitae Pharmaceuticals	VTAE	$99.2	$18.1	$88.6	Phase 2	Diabetes/Psoriasis

VITAE PHARMACEUTICALS SUM-OF-THE-PARTS					
Product & Indication	**Market**	**Launch Year**	**Peak Royalties ($M)**	**Probability**	**NPV ($M)**
VTP-34072 - Diabetes	U.S.	2020	$168.8	13%	$46.4
VTP-34072 - Diabetes	EU	2020	84.4	13%	23.2
VTP-43742 - Psoriasis	U.S.	2020	187.9	13%	53.2
VTP-43742 - Psoriasis	EU	2020	187.9	13%	53.2
Total					$176.0

Source: Company reports, Thomson Reuters, and BMO Capital Markets.

Company Overview

Vitae Pharmaceuticals is a development-stage biotechnology company with an industry-leading structure-based drug discovery platform and a focus on developing small-molecule drugs for disease conditions with large market opportunities coupled with significant unmet needs.

Vitae's proprietary structure-based drug discovery platform, Contour, has enabled the company to rapidly discover novel compounds for traditionally hard-to-drug targets. The Contour platform computationally builds a drug-like molecule in the active site of the protein target and then predicts how tightly the molecule binds. Using this platform, Vitae has built a growing portfolio of product candidates for validated therapeutic targets, against which the industry has traditionally struggled to develop drugs due to challenges related to potency, selectivity, and pharmacokinetics.

Vitae's most advanced product candidate, VTP-34072, is in phase 2 development for the treatment of type 2 diabetes. VTP-34072 inhibits 11β hydroxysteroid dehydrogenase type 1 (11β HSD1), an enzyme responsible for the production of cortisol, which plays an important role in the pathogenesis of metabolic syndrome. Because of its unique mechanism of action, VTP-34072 may have a differentiated profile compared with other oral anti-diabetic agents. In addition to a potential effect in glucose lowering, VTP-34072 could also exert a positive impact on certain cardiovascular and metabolic risk factors associated with metabolic syndrome, which afflicts approximately 85% of type 2 diabetics.

Two phase 1 trials have been completed for VTP-34072, including a single-ascending dose study in 72 overweight/obese healthy volunteers and a multiple-ascending dose study evaluating 2 weeks of treatment in 70 overweight/obese type 2 diabetic patients. In both studies, VTP-34072 inhibited the activity of 11β HSD1 in adipose tissue by >90% in multiple dose groups. In addition, VTP-34072 was described as well tolerated and demonstrated a pharmacokinetic profile consistent with once-daily oral dosing.

A randomized, placebo-controlled, double-blind phase 2 trial of VTP-34072 in type 2 diabetic patients was initiated in July 2014. The study was designed to evaluate 4 weeks of treatment with one of three doses of once-daily VTP34072 in 126 overweight type 2 diabetic patients. The endpoints of the study includes safety, tolerability, and glucose lowering. Data from the phase 2 study are expected in 1H15.

Vitae's second most advanced product candidate, VTP-37948, is a β-secretase (BACE) inhibitor being developed for the treatment of Alzheimer's disease (AD). A hallmark of AD is the accumulation of amyloid-beta (Aβ) peptide in forms of extracellular plaques in the brain. BACE is an enzyme responsible for the first of two cleavage steps that lead to the generation of Aβ peptide from the amyloid precursor protein (APP). Human genetic studies have demonstrated that a mutation in the APP protein at the BACE cleavage site (A673T) that suppresses cleavage is associated with a 7.5-fold decrease in the incidence of AD. Therefore, targeting the activity of BACE could have therapeutic benefit for patients with AD.

In preclinical studies, VTP-37948 demonstrated highly potent and selective inhibition of BACE in the brain, with up to 95% lowering of brain Aβ levels. VTP-37948 is currently in two phase 1 clinical trials involving a total of 68 healthy volunteers. The first trial includes endpoints of safety, tolerability, and pharmacokinetics, whereas the second trial will additionally assess the

effects of VTP-37948 on Aβ concentration in the cerebrospinal fluid (CSF). Results from both trials are expected in 4Q14.

Both VTP-34072 and VTP-37948 are partnered with Boehringer Ingelheim (BI), and have generated $152 million in funding to Vitae to date. Vitae is also eligible to receive up to $278.0 million for VTP-34072 and $326.0 million for VTP-37948 in additional milestone payments, as well as tiered royalty payments ranging from upper single-digit to low double-digit percentages on the net sales of potential future products.

In addition to the partnered programs, Vitae also has three wholly owned product candidates that are advancing in preclinical studies. These include VTP-43742 for the treatment of autoimmune disorders, VTP-38443 for the treatment of acute coronary syndrome, and VTP-38543 for the treatment of atopic dermatitis. Vitae intends to retain rights to these product candidates and develop and commercialize them by itself. However, Vitae may also partner these programs if doing so can accelerate the programs and generate non-dilutive capital.

VTP-43742 is an inhibitor of RAR-Related Orphan Receptor gamma-t (RORγt), a nuclear hormone receptor essential for the formation and function of a class of T cells known as Th17 cells. Th17 cells play a crucial role in the pathophysiology of many human autoimmune disorders, including psoriasis and multiple sclerosis. In fact, monoclonal antibodies targeting IL-17, a key proinflammatory cytokine produced by Th17 cells, have demonstrated promising clinical activities in a several autoimmune disorders, including psoriasis, MS, rheumatoid arthritis and ankylosing spondylitis. Therefore there has been strong interest in identifying additional targets in the Th17/IL-17 pathway, and RORγt represents a highly attractive target. However, RORγt has proven to be difficult-to-drug, with many RORγt programs in the industry struggling to produce a viable clinical candidate. Key challenges included achieving selectivity for RORγt vs. closely related family members RORα and RORβ (the targeting of which could lead to undesirable side effects), as well as candidate compounds' general tendency to exhibit high hydrophobicity and low bioavailability.

Using the Contour platform, Vitae developed VTP-43742, which has a 1,000-fold selectivity margin for RORγt vs. RORα and RORβ. VTP-43742 is also well absorbed and has a long plasma half-life consistent with once-daily oral dosing. In preclinical studies, VTP-43742 inhibited the production of IL-17 and other pro-inflammatory cytokines produced by Th17 cells. In addition, VTP-43742 demonstrated activity in an animal model of multiple sclerosis, with reduced demyelination and inflammation in the spinal cord, and a reduction in clinical score similar to that observed with IL-17 monoclonal antibodies and in RORγt gene knock-out mice.

Vitae plans to file an IND with FDA for VTP-43742 in 1H15 and begin phase 1 trials thereafter. The first phase 1 study will be a single-ascending dose healthy volunteer study. The second study, expected to be initiated in 2H15, will be a multiple-ascending phase 1b study evaluating two weeks of treatment with VTP-43742 in patients with psoriasis. The phase 1b study will evaluate improvements in skin lesions and changes in IL-17 and other cytokines in skin biopsies. Proof-of-concept data from this phase 1b trial are expected by year-end 2015.

Exhibit 2: Vitae Pipeline and Clinical Development Milestones

PRODUCT CANDIDATE	TARGET	INDICATION	WORLDWIDE COMMERCIAL RIGHTS	STAGE OF CLINICAL DEVELOPMENT AND ANTICIPATED MILESTONES
VTP-34072	11β HSD1	Type 2 Diabetes and metabolic syndrome	BI	• Phase 2 clinical trial initiated in July 2014, with **data expected 1H15**
VTP-37948	BACE	Alzheimer's Disease	BI	• Phase 1 clinical trial initiated 1H14 • Phase 1 biomarker trial initiated 1H14 • **Data for both trials expected in 2H14**
VTP-43742	RORγt	Psoriasis, Multiple Sclerosis, other autoimmune diseases	Vitae	• Phase 1 clinical trial expected to begin in 1H15 • Phase 1 human proof-of-concept **data in psoriasis by year-end 2015**
VTP-38443	LXRβ	Acute Coronary Syndrome	Vitae	• Phase 1 clinical trial expected to begin in 1H16
VTP-38543	LXRβ	Atopic Dermatitis	Vitae	• Phase 1 clinical trial expected to begin in 2H15

Source: Vitae Pharmaceuticals.

VTP-38443, an orally active agonist for liver X receptor-beta (LXRβ), is being developed for the treatment of acute coronary syndrome (ACS). ACS patients have cholesterol plaque buildup in their coronary arteries and are at risk for an impending heart attack. LXRs, which include LXRα and LXRβ, promote reverse cholesterol transport (RCT), i.e. the transport of cholesterol from the periphery to the liver for excretion from the body. Therefore, agonists of LXR could potentially remove cholesterol from the plaques in vessel walls, thus reducing plaque burden. In addition, activated LXRs also suppress the production of pro-inflammatory proteins from immune cells in the plaque; therefore LXR agonists could also make the plaque less inflamed and more stable. An ideal LXR agonist product candidate should be selective for LXRβ vs. LXRα, because LXRα activation has been shown to increase liver and plasma triglyceride levels. In a mouse model of accelerated atherosclerosis, Vitae's LXRβ selective agonist VTP-38443 decreased plaque formation by more than 60% and reduced the inflammation state in the plaque, with minimal impact on triglyceride levels. Vitae expects to complete necessary preclinical studies and file an IND for VTP-38443 in 1H16, with phase 1 clinical trials commencing thereafter.

VTP-38543 is another LXRβ agonist and is being developed as a topical treatment for atopic dermatitis, also known as eczema. Atopic dermatitis is characterized by a loss of barrier function in the outmost layer of the skin and inflammation. Activation of LXRs leads to stimulation of keratinocyte differentiation, epidermal lipid synthesis and an anti-inflammatory response in skin cells. In preclinical studies, VTP-38543 promoted the expression of genes responsible for lipid synthesis and secretion, which are important in maintaining barrier function. In addition, VTP-38543 also reduced skin inflammation with efficacy comparable to that of high potency topical corticosteroids, the current standard of care. Vitae expects to complete necessary preclinical studies and make IND filing for VTP-38543 by 2H15, with phase 1 clinical trials commencing thereafter.

In addition to the existing product candidates, Vitae is currently utilizing Contour to discover and develop small molecule inhibitors in a new immune-oncology program. These inhibitors target enzymes responsible for generating metabolites in the tumor microenvironment that suppress T cell function. Vitae has identified a target with biology that has been validated in rodent cancer models via genetics, monoclonal antibodies and non-drug-like small molecules. Using the Contour platform, Vitae has discovered compounds that inhibit the target protein with single digit nM potency and no significant off-target activity. Vitae plans to conduct preclinical animal studies to confirm and optimize the activity of these compounds.

All of Vitae's current product candidates are covered by composition of matter and methods of treatment patents or patent applications in major markets worldwide. These patents and patent applications, if granted, are expected to provide intellectual property protection until 2030 and beyond.

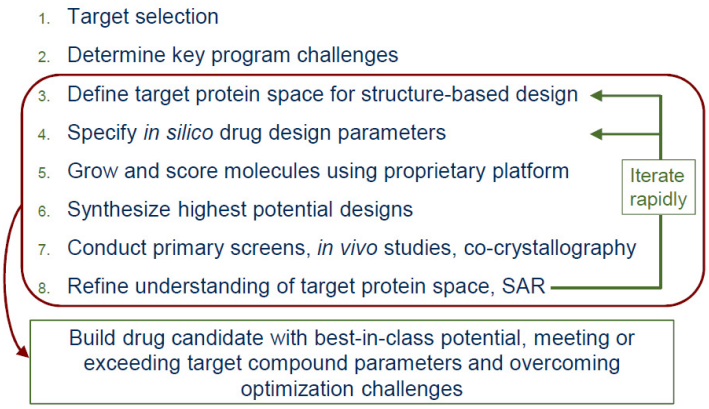
The Contour Drug Discovery Platform

Vitae's proprietary structure-based drug discovery platform, Contour, is a compelling *de novo* ("from scratch") drug discovery approach. It has enabled the company to rapidly discover novel compounds for difficult-to-drug targets, with an impressive timeline of achieving chemical solution in two to six months and animal proof-of-concept in 10-16 months.

Small-molecule drug discovery has traditionally involved screening of large chemical libraries, which contain thousands to millions of compounds, against certain biological assays. Potential "hits" are then inspected one at a time and modeled or "docked" by a scientist. There are several limitations to this approach: 1) the library may have been designed to address discovery needs not relevant for the target of interest; 2) the absence of high affinity molecules in the library; 3) the need to assess many different molecular conformations when docking a molecule, which can vastly increase the complexity of the assessment; 4) the lack of a high-quality scoring function, i.e. a computer program that predicts how tightly a molecule will bind to the active site of a protein.

By contrast, the computational software of the Contour platform uses artificial intelligence and advanced algorithms to assemble molecular "fragments", or chemical structures consisting of one to several atoms, into drug-like structures that precisely fit the three-dimensional binding site of the target. These assembled molecules are then evaluated by Contour's scoring function to identify the structures with the highest potential. Next, the novel structures are chemically synthesized, tested, and evaluated to provide feedback into the design process. This iterative cycle repeats until the compound meets or exceeds certain target compound parameters and demonstrates first- or best-in-class potential. The Contour discovery process is summarized in Exhibit 3.

Exhibit 3: Drug Discovery Process on the Contour Platform



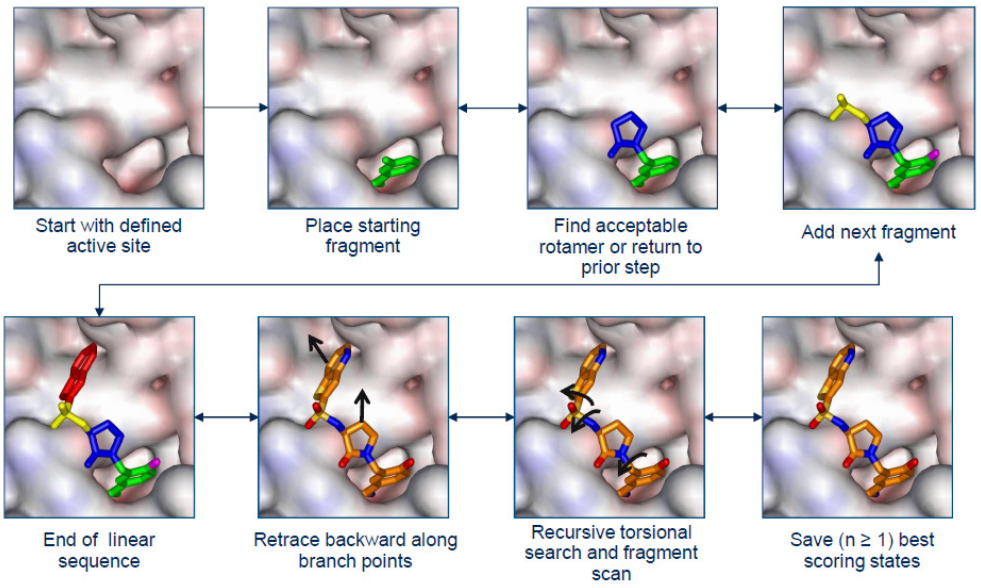
Source: Vitae Pharmaceuticals.

Vitae focuses on selecting targets with the following characteristics: 1) implication in diseases with large market opportunities and significant unmet needs; 2) validated biology; 3) proven to be difficult-to-drug, including those failed to be solved using conventional high-throughput library screening and optimization. These selection criteria allow Vitae to most effectively leverage its

unique Contour platform. In particular, selection of targets with validated biology, such as clinical data or compelling animal data, greatly increases the probability of success.

As described earlier, the Contour software package consists of two principle components: a growth algorithm and a scoring function. The growth algorithm assembles synthetically viable fragments in a protein's binding site using high-resolution x-ray crystal structures or homology models of the protein. As shown in Exhibit 4, Contour does this by "growing" drug-like molecules, one fragment at a time, in well-defined binding pockets. During the growing process, a novel component of Contour, Dynamic Fragment Selection (DFS), examines the physical characteristics of the binding site and selects a fragment with complementary characteristics from a fragment library. DFS avoids the limitations of the standard growth and scoring approach because it selects only a subset of the fragment library that best matches the shape and features of a given pocket in the target binding site. **Impressively, in greater than 90% of the cases, the theoretical 3-dimensional arrangement of the small molecule bound to the binding site as predicted by Contour is identical to the actual structural information obtained by x-ray crystallography.** This process yields multiple novel drug-like molecules, which are then scored using the proprietary empirical scoring function.

Exhibit 4: The Molecule Assembly Process by the Contour Growth Algorithm



Rotamer: the rotational position of a fragment attached by a single, rotatable bond to the rest of the compound.

Source: Vitae Pharmaceuticals.

Contour's scoring function provides a score that predicts the binding affinity of the grown molecules, thus identifying those with a high probability of activity. The scoring function is based on a directional contact model, which uses both distance and orientation to characterize interactions. This model captures the close, basic molecular interactions, including hydrogen bond, short-range electrostatic repulsion, non-polar interaction and desolvation effect. Mathematically, the final Contour score is approximately equivalent to the negative logarithm of the binding constant (i.e., pKi). Compared with other software packages, Contour's scoring function is among the most effective at accurately predicting the affinity of small-molecule-

protein bindings. The robust performance of Contour's scoring function has enabled Vitae scientists to rapidly and confidently identify and optimize drug molecules.

Once the *in silica* designed compounds with the highest predicted binding affinity have been identified, they are synthesized and assayed in biochemical and cell-based assays to determine binding affinity and activity against the molecular target. The pharmacokinetics (PK) of these compounds is studied in mice or rats. In parallel, structural studies are undertaken to co-crystallize the compounds with the target protein, yielding x-ray crystal structures of the compounds bound to the target protein. Vitae's scientists frequently obtain all the above data within two weeks of the initial synthesis of the compound. Based on these data, the scientists then decide on the specific objectives for the next iterative cycle of the drug discovery process (refer to Exhibit 3 above).

Compared with traditional pharmaceutical approaches, Contour improves the efficiency of drug discovery in two ways. First, Contour's algorithms increase the chance for the discovery of potent and selective compounds. Second, Contour accelerates optimization of the lead compound, because the modification of a compound is undertaken with knowledge of the relationship between the compound's structure and its desired biological effect, rather than through experimentation after randomly generated modifications to that compound.

The efficiency of the Contour platform is best reflected by the speed at which each of the company's product candidates reached key milestones. **As shown in Exhibit 5, despite the difficult-to-drug nature of some of the targets (as will be discussed later), Vitae was able to obtain novel chemical solutions in two to six months and achieve animal proof-of-concept with oral dosing in 10-16 months**.

Exhibit 5: Development Timelines for Product Candidates Developed on the Contour Platform

Selected Target	Novel Chemistry Solution	Animal Proof-of-Concept
11β HSD1	2 months	16 months
BACE	6 months	14 months
RORγt	2 months	10 months
LXRβ	6 months	12 months

Source: Vitae Pharmaceuticals.

VTP-34072 (11β HSD1 Inhibitor) for Type 2 Diabetes and Metabolic Syndrome

Vitae and partner Boehringer Ingelheim (BI) are developing VTP-34072, an orally active 11β HSD1 inhibitor, for type 2 diabetes. For FDA regulatory purposes, the indication for VTP-34072 is for the improvement of glycemic control in type 2 diabetes. However, Vitae believes VTP-34072 could have a broader impact on multiple cardiovascular and metabolic risk factors associated with metabolic syndrome, which afflicts 85% of type 2 diabetic patients. VTP-34072's potential impact on metabolic syndrome could differentiate it from other oral anti-diabetic agents.

Two phase 1 trials have been completed for VTP-34072, including a single-ascending dose study in 72 overweight/obese healthy volunteers and a multiple-ascending dose study evaluating 2 weeks of treatment in 70 overweight/obese type 2 diabetic patients. In both studies, VTP-34072 inhibited the activity of 11β HSD1 in adipose tissue by >90% in multiple dose groups. In addition, VTP-34072 was described as well tolerated and demonstrated a pharmacokinetic profile consistent with once-daily oral dosing.

A randomized, placebo-controlled, double-blind phase 2 trial of VTP-34072 in type 2 diabetic patients was initiated in July 2014. The study was designed to evaluate treatment with once-daily VTP34072 at one of three doses for 4 weeks in 126 overweight type 2 diabetic patients. The endpoints of the study include safety, tolerability and glucose lowering. Data from the phase 2 study are expected in 1H15.

Mechanism of Action

Metabolic syndrome is characterized by a linked combination of abnormalities which includes increased blood pressure, plasma glucose, plasma lipids, and body weight, and these abnormalities together significantly increase the risk for cardiovascular disease. Abnormalities in the metabolism of cortisol, a stress hormone, have been observed in individuals with metabolic syndrome.

Cortisol is the primary glucocorticoid hormone in humans. Glucocorticoid hormones are essential for regulating metabolic, immune, and cardiovascular responses to stress. Upon stress stimulation, the hypothalamus in the brain secretes corticotrophin-releasing hormone (CRH), which stimulates the anterior pituitary gland to release adrenocorticotropin (ACTH), which in turn stimulates the adrenal gland to secret glucocorticoids. This regulatory pathway is known as the hypothalamic-pituitary-adrenal (HPA) axis.

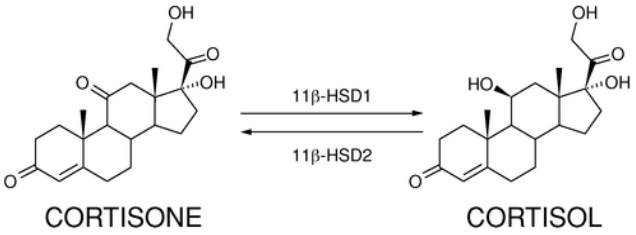
Cortisol's normal function is to increase catabolism, making substrates available for mitochondrial oxidation. However, excess of cortisol results in increased fat accumulation, hepatic triglyceride accumulation, insulin resistance, and hyperglycemia. It also leads to increased cardiovascular risk via hypertension and dyslipidemia.

Cortisol binds to the glucocorticoid receptor (GR) to exert its function. However, cortisol could also bind to the mineralocorticoid receptor and cause aberrant activation of the mineralocorticoid receptor. This is because cortisol shares structural similarity with aldosterone, a mineralocorticoid hormone. Cortisol and aldosterone bind to the mineralocorticoid receptor with similar affinities,

but the concentration of cortisol is much higher than that of aldosterone in circulation. Therefore, tissues that depend on mineralocorticoids for normal function, such as the kidney, sweat/salivary glands and colon, require a mechanism to protect their mineralocorticoid receptors from overstimulation by cortisol. This protective mechanism is achieved by the expression of 11β HSD2, an enzyme that converts cortisol to the inactive cortisone, in these mineralocorticoid target tissues.

11β HSD1 is closely related to 11β HSD2. 11β HSD1 is a bidirectional enzyme, capable of promoting the interconversion between cortisone and cortisol, although in intact cells, the main activity is to convert the inactive cortisone to cortisol. 11β HSD1 is expressed in metabolic tissues, such as liver, adipose tissue, and muscle. Some studies have suggested that the rates of peripheral regeneration of cortisol by 11β HSD1 in these tissues are similar to rates of adrenal secretion of cortisol at rest. Therefore, 11β HSD1 plays an important role in controlling local concentration of cortisol in metabolic tissues.

Exhibit 6: Interconversion Between Cortisone and Cortisol by 11β HSD Enzymes



Source: Vitae Pharmaceuticals.

Observations from two diseases, Cushing's syndrome and Addison's disease, suggest a potential role of cortisol in metabolic syndrome. Cushing's syndrome describes the signs and symptoms associated with prolonged exposure to high levels of cortisol as a result of a tumor in the pituitary gland that produces large amounts of ACTH. Patients with Cushing's syndrome have many of the same morbidities as metabolic syndrome, including visceral obesity, abdominal obesity, high triglycerides, low HDL-cholesterol, elevated blood pressure, and elevated glucose levels. In addition, patients with Cushing's syndrome are predisposed to developing overt diabetes. Addison's disease, on the other hand, is caused by a deficiency in cortisol. Patients with Addison's disease have decreased hepatic glucose production and hypoglycemia (low blood glucose).

Rodent models also provide support for the role of cortisol in metabolic syndrome. Rodents with elevated glucocorticoid levels have impaired glucose uptake in muscle and adipose tissue, and enhanced liver glucose production.

Inhibition of 11β HSD1 by small-molecule inhibitors suppresses the peripheral regeneration of cortisol, and therefore could presumably increase glucose uptake in muscle and adipose tissue, and decrease hepatic glucose production. In addition, 11β HSD1 inhibition affords the advantage of tissue-specific lowering of cortisol without affecting cortisol levels in the blood, which is important to prevent patients from developing symptoms of Addison's disease.

The beneficial effects of 11β HSD1 inhibition are supported in genetic studies in animals. For example, mice lacking 11β HSD1 were protected from becoming hyperglycemic and were insulin responsive, and mice with increased 11β HSD1 expression in adipose tissue were reported to gain

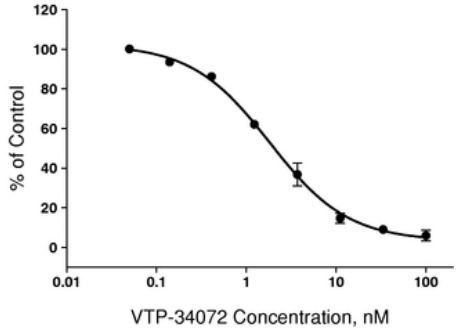
weight and have findings of metabolic syndrome. In addition, in a clinical trial in type 2 diabetics inadequately controlled by metformin, an 11β HSD1 inhibitor developed by Incyte Corporation demonstrated significant reductions in blood sugar and cholesterol. (See section entitled *"Other 11β HSD1 Programs in the Industry"* for details.)

Preclinical Data

Using Contour, Vitae and partner BI have discovered potent, selective 11β HSD1 inhibitors. After optimizing these compounds for enzyme inhibition, including in biopsies of human adipose tissue, Vitae selected VTP-34072 for further development.

In an *in vitro* enzyme assay, VTP-34072 demonstrated high potency, with low single-digit nanomolar (nM) inhibition of 11β HSD1 activity in human adipose tissue. In addition, VTP-34072's potency for 11β HSD1 was >1,000x its potency for 11β HSD2. Achieving high specificity for 11β HSD1 is important, because loss of 11β HSD2 activity, as reported in human genetic studies, could result in severely elevated blood pressure and low potassium (due to excess cortisol activity in the kidney).

Exhibit 7: Inhibition of 11β HSD1 Activity by VTP-34072 in Human Adipose Tissue



Source: Vitae Pharmaceuticals.

Clinical Development

Vitae's partner BI is leading the clinical development of VTP-34072. BI has completed two phase 1 clinical trials and initiated a phase 2 clinical trial in July 2014, with data expected in 1H15.

The first phase 1 clinical trial for VTP-34072 was a single-ascending dose trial in 72 healthy, overweight volunteers. VTP-34072 was described as well tolerated at all doses. No clinically relevant changes in vital signs, laboratory values or electrocardiograms were observed. The half-life for clearance from the plasma was 14-24 hours, consistent with once-daily dosing. The activity of 11β HSD1 was assessed in adipose tissue biopsies taken before dosing and at 24 hours after dosing. The activity of 11β HSD1 was inhibited by >90% at 24 hours in multiple dose groups. In addition, there was no evidence of inhibition of 11β HSD2, according to changes in plasma or urinary hormone levels.

The second phase 1 clinical trial was a multiple-ascending dose trial evaluating 2 weeks of treatment with once-daily VTP 34072 in 70 overweight type 2 diabetic patients. VTP-34072 was

described as well tolerated at all doses. No clinically relevant changes in vital signs, laboratory values, or electrocardiograms were observed. No dose-dependent adverse events (AEs) and no serious adverse events (SAEs) were reported. The activity of 11β HSD1 was assessed in adipose tissue biopsies taken before the first day of dosing and one day after the last dose. The activity of 11β HSD1 was inhibited by >90% in adipose tissue biopsies in multiple dose groups. In addition, there were no clinically significant changes in plasma levels of cortisol or ACTH. This suggested that VTP-34072 did not induce HPA-axis activation. In addition, there was no evidence of inhibition of 11β HSD2, according to changes in plasma or urinary hormone levels.

Development Plans

In July 2014, BI initiated a placebo-controlled, randomized, double-blinded phase 2 study of VTP-34072 in 126 overweight type 2 diabetic patients. Patients will receive once-daily VTP-34072 at one of three dose levels for 28 days. Anti-diabetic medications are discontinued, except for metformin. The endpoints of this trial include safety, tolerability and change from baseline in fasting plasma glucose after 28 days of treatment. Data from this clinical trial are expected in 1H15.

Market Opportunity

Approximately 17 million Americans had a diagnosis of type 2 diabetes and another 7 million were undiagnosed, according to the American Diabetes Association. The economic costs of type 2 diabetes in the U.S. were estimated to be $245 billion in 2012, including approximately $9.6 billion spent on prescription products. Vitae believes that the most appropriate target patient population for VTP-34072 are the 85% of type 2 diabetes patients who are classified as having metabolic syndrome.

There are many classes of oral drugs currently available for the treatment of type 2 diabetes, including sulfonylureas, biguanides, meglitinides, thiazolidinediones, alpha-glucosidase inhibitors, bile acid sequestrants, DPP-IV inhibitors, and SGLT2 Inhibitors. Nevertheless, there continues to be significant unmet medical need for diabetes treatment, as demonstrated by the rapid uptake of the relatively new class of DPP-IV inhibitors – first approved in the U.S. in 2006, DPP-IV inhibitors reached sales of $5.2 billion in 2013. Vitae believes that VTP-34072 has a differentiated profile compared with currently available type 2 diabetes treatments, because VTP-34072 may have a broader impact on the metabolic syndrome-associated cardiovascular risk profile by lowering glucose, lipids, blood pressure and body weight.

Collaboration

In October, 2007, 21 months after initiating the 11β HSD1 program, Vitae entered into a research collaboration and license agreement (the 11β Agreement) with BI. The companies agreed to combine their respective 11β HSD1 programs in an effort to develop compounds for patients with type 2 diabetes and certain related metabolic disease conditions, such as dyslipidemia.

Under the terms of the agreement, BI has the worldwide exclusive license to use certain Vitae patents and other intellectual property to develop and commercialize 11β HSD1 inhibitors in the

indications described above. Vitae is responsible for activities relating to the identification, synthesis, characterization and optimization of compounds pursuant to an agreed-upon research plan and received research funding from BI in connection with those activities. BI will control the preclinical and clinical development and commercialization of the product candidates and is responsible for the associated expenses. Vitae also has the right to use its patents and other intellectual property as licensed to BI as well as certain of BI's patents and intellectual property to develop and commercialize any particular 11β HSD1 inhibitor that BI has not selected as a development candidate, in accordance with the criteria agreed upon by the parties, for the treatment of indications other than those described above.

Vitae has entered into three amendments to the 11β Agreement: the first in October 2007, the second in February 2012, and the third in May 2014. The first and third amendments clarified the scope of the parties' rights with respect to certain intellectual property. The second amendment revised the development plan and the timing and amounts of payments from BI to Vitae associated with BI's achievement of certain development milestones.

As of June 30, 2014, Vitae has received $74.2 million from BI related to the 11β Agreement since 2007, including a $15 million equity investment, $22.2 million in upfront fees and research funding, and $37 million in development milestones. In addition, Vitae is eligible to receive up to $278.0 million in additional milestone payments, including up to $153 million in development and regulatory milestones and up to $125 million in commercialization milestones. Vitae is also eligible to receive tiered royalty payments from BI, ranging from upper single-digit to low double-digit percentages, based on the net sales of potential future products. Vitae has the option to participate in funding the phase 3 clinical trials in exchange for increased royalties. BI's obligation for royalty payment continues on a country-by-country and product-by-product basis for the later of 10 years following product launch or patent expiry. Vitae is also eligible to receive 50% of the aforementioned milestone payments for any subsequent products and for any additional indications. Vitae is eligible to receive a $6.0 million milestone payment upon dosing of the first patient phase 2 clinical trial that was initiated in July 2014.

Other 11β HSD1 Programs in the Industry

11b HSD1 as a target for the treatment of diabetes has been widely pursued in the industry, and a number of 11b HSD1 inhibitors have progressed into clinical studies. However, a large fraction of these programs have been discontinued or become inactive.

Amgen's AMG-221 was evaluated in a phase 1 trial in healthy obese subjects, and the compound demonstrated sustained target inhibition as measured by *ex vivo* adipose samples. Amgen stopped the development of AMG-221 in 2011, citing it did not meet criteria for advancement.

AstraZeneca's AZN-8329 and AZN-4017 were tested in phase 1 clinical trials for diabetes and obesity, but their development in this indication has since been discontinued.

Bristol-Myers Squibb's BMS-770767 has been evaluated in a phase 2 study in type 2 diabetes (n=76) and another phase 2 study in hypercholesterolemia (n=81). Both studies were competed in early 2011, but data from these trials were not made available. BMS-770767 is no longer present in BMS's pipeline. Another compound, BMS-816336, was evaluated in a phase 1 study in healthy

male subjects. The study was completed in 2010. There have been no further studies on BMS-816336.

Eli Lilly's LY-2523799 was evaluated in a phase 2 study in diabetes, but its development was terminated in 2013.

Merck's MK-0916 was evaluated in a 12-week phase 2a study in patients with type 2 diabetes and metabolic syndrome. MK-0916 did not demonstrate significant improvement in fasting plasma glucose, but did demonstrate modest decreases in blood pressure and body weight, as well as a small but statistically significant HbA1c reduction (0.3%). At the top dose of 6 mg/day, MK-0916 induced an elevation of LDL-C by 10.4%, and this could be related to the known CYP3A4 induction effect of this compound. In addition, treatment with MK-0916 resulted in HPA axis activation, with 20-30% elevations of circulating adrenal androgens (although still within normal physiological levels). MK-00916 is no longer in the company's pipeline.

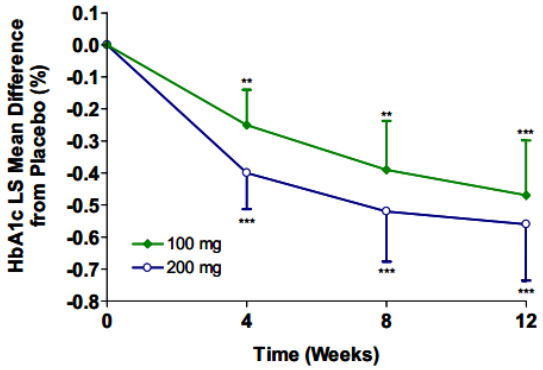
Pfizer's PF-915275 was reported to be a highly potent 11β HSD1 inhibitor, with Ki < 1 nM in a binding assay, IC_{50} of 5nM in a cell-based assay, and high selectivity against 11β HSD2. PF-915275 completed a phase 1 trial in 2006 and was advanced into phase 2 testing in 2007. The study was subsequently stopped due to tablet formulation issues.

Roche developed two 11β HSD1 inhibitors, RG-7234 and RG-4929. The two compounds were compared with each other in a head-to-head phase 2 study in patients with type 2 diabetes on a stable dose of metformin (n=110). The development of RG-7234 was terminated after the study in 2010. RG-4929 was subsequently studied in a 12-week phase 1 study in non-alcoholic fatty liver disease (NAFLD), and its development was later terminated in 2012.

Incyte Corporation's INCB13739 is a potent 11β HSD1 inhibitor, with 1.1 nM potency in cellular assays. INCB13739 is also over 1,000-fold more selective than 11β HSD2. Incyte conducted a phase 2b study of INCB13739 in type 2 diabetes patients who were failing metformin monotherapy. The study enrolled over 300 patients with type 2 diabetes who had inadequate glycemic control (HbA1c 7-11%) while on stable metformin monotherapy for ≥10 weeks at baseline. Patients were equally randomized to INCB13739 once-daily orally at various doses (5-200 mg) or placebo, in addition to their stable metformin regimen. The primary endpoint of the study was change in HbA1c from baseline to week 12. Secondary endpoints included the effect of INCB13739 on multiple cardiovascular risk factors in type 2 diabetes patients.

Results of the phase 2b study were presented at the American Diabetes Association (ADA) annual meeting in 2009. INCY13739 100 mg and 200 mg demonstrated a statistically significant placebo-adjusted reduction in HbA1c of 0.47% and 0.56%, respectively. Patients receiving 200 mg INCB13739 achieved statistically significant reduction in fasting plasma glucose, homeostasis model assessment estimated insulin resistance, and total cholesterol (~2.5-3% reduction in the 100 mg and 200 mg group vs. 2% increase in the placebo group). Given INCB13739's high potency (EC_{50} 1.1 nM), it was somewhat surprising that a rather high dose (200 mg) was required to demonstrate activity.

Exhibit 8: Placebo-Adjusted HbA1c Change From Baseline to Week 12



** p < 0.05; *** p < 0.01

Source: Incyte Corporation news release, June 2009.

INCB13739 was described as well tolerated at all dose levels. There were three SAEs, including cerebrovascular accident (5 mg), prolonged QRS complex (100 mg) and peripheral ischemia (200 mg); all were considered "unlikely" related to treatment. A reversible, dose-dependent elevation in ACTH was observed, indicating possible HPA axis activation, but basal cortisol homeostasis and testosterone levels in men were unchanged.

INCB13739 is no longer present in Incyte's pipeline.

VTP-37948 (BACE Inhibitor) for Alzheimer's Disease

Vitae and partner BI are developing VTP-37948, an orally active β-secretase (BACE) inhibitor, for the treatment of Alzheimer's disease (AD). A hallmark of AD is the accumulation of amyloid-beta (Aβ) peptide in forms of extracellular plaques in the brain. BACE is an enzyme responsible for the first of two cleavage events that lead to the generation of Aβ peptide from the amyloid precursor protein (APP). Human genetic studies have demonstrated that a mutation in the APP protein at the BACE cleavage site (A673T) that suppresses cleavage is associated with a 7.5-fold decrease in the incidence of AD. Therefore, targeting the activity of BACE could have therapeutic benefit for patients with AD.

In preclinical studies, VTP-37948 demonstrated highly potent and selective inhibition of BACE in the brain, with up to 95% lowering of brain Aβ levels. VTP-37948 is currently in two phase 1 clinical trials involving a total of 68 healthy volunteers. The first trial includes endpoints of safety, tolerability and pharmacokinetics, whereas the second trial will additionally assess the effects of VTP-37948 on Aβ concentration in the cerebrospinal fluid (CSF). Results from both trials are expected in 4Q14.

Mechanism of Action

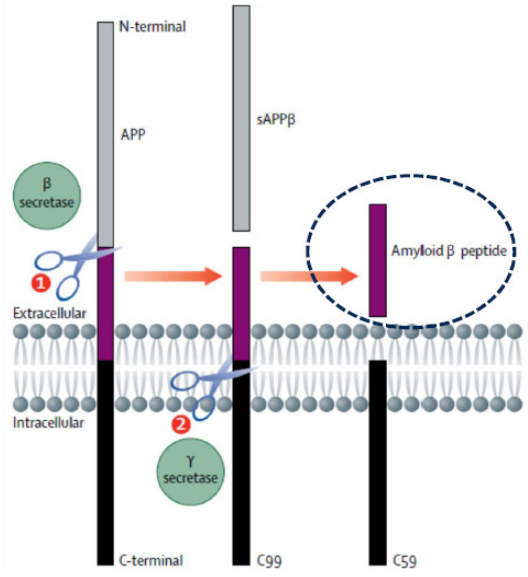
AD is a devastating disease that causes problems with memory, thinking, and behavior. Most commonly, AD starts with a gradually worsening ability to form new memories. This is because neurons responsible for short-term memory are the first to be affected in AD. Neurons in other parts of the brain are subsequently affected, leading to additional cognitive and functional decline,

including challenges in problem solving, confusion with time or place, problems with words in speaking or writing, poor judgment, and changes in mood and personality. AD impairs an individual's ability to carry out such basic functions as walking and swallowing and can ultimately be fatal.

Pathologically, AD is characterized by the accumulation of extracellular deposits (plaques) containing amyloid-beta (Aβ) and intracellular neurofibrillary tangles (NFT) containing misfolded tau protein. The leading hypothesis for the pathophysiology of AD, known as the amyloid cascade hypothesis, suggests that as early as a decade or more before the onset of clinical symptoms, an imbalance of Aβ production and clearance results in the build-up of Aβ aggregates, which in turn causes the formation of NFT, oxidative stress, synaptic injury, and inflammation that eventually lead to neuronal death and brain dysfunction.

Aβ is produced from the amyloid precursor protein (APP). APP is a ubiquitously expressed transmembrane protein, with high level expression found in the synapses of neurons. The physiological function of APP is not known. Aβ is generated from APP through sequential cleavage by two proteases. Initial cleavage by β-secretase (BACE) generates a secreted portion (sAPPβ) and a membrane bound portion, and the membrane bound portion is further cleaved by γ-secretase to release the Aβ fragment. Aβ mainly consists of two peptides that differ in lengths: $A\beta_{40}$ and $A\beta_{42}$. The 40-amino acid $A\beta_{40}$ accounts for the majority of amyloid produced, whereas the 42-amino acid $A\beta_{42}$ represents a minority fraction.

Exhibit 9: Conversion of APP to Aβ by BACE and γ-Secretase



Source: Vitae Pharmaceuticals.

Studies suggest that Aβ accumulation is critical to the pathogenesis of AD. A mutation in the APP protein at the BACE cleavage site (A673T) that suppresses production of Aβ peptides (by 40%) is associated with a 7.5-fold decrease in the incidence of AD and an improvement in cognitive function in non-Alzheimer's elderly individuals. Conversely, a different mutation at the same site (A673V) that increases Aβ production causes familial AD. Therefore, the inhibition of Aβ production in the brain could provide therapeutic benefit for patients with AD.

Small molecule inhibitors of γ-secretase have been pursued for the treatment of AD. Although inhibition of γ-secretase activity resulted in Aβ lowering, the treatment also resulted in serious adverse events, including colitis (inflammation of the colon) and skin cancer. This is because in addition to its role in Aβ production, the γ-secretase complex also plays a role in the cleavage of Notch, a signaling protein vital to the survival of many cell types. Genetic knock-out of presenilin, a component of the γ-secretase complex, leads to lethality around the time of birth due to development defects. Thus, inhibiting γ-secretase could have serious safety risks. In contrast, deletion of the BACE gene in mice has been demonstrated to have insignificant impact on mouse physiology. Therefore, compared with γ-secretase inhibitors, BACE inhibition has the potential advantage of being able to reduce Aβ production without serious off-target activities.

Another strategy for Aβ-lowering involves anti-Aβ monoclonal antibodies, with the hypothesis that these agents could promote the clearance of Aβ plaques. To date, clinical development in this area has been disappointing, with high-profile failures seen for bapineuzumab (developed by Pfizer and Johnson & Johnson) and solanezumab (Eli Lilly). Both agents failed to meet the primary endpoints of cognitive and functional performances in large phase 3 studies. In a pre-specified subgroup analysis, however, solanezumab demonstrated a statistically significant reduction (34%) in cognitive decline compared with placebo in patients with early AD. These data suggest that initiating Aβ lowering therapy early in the disease process may be important for achieving positive therapeutic effect. Compared with anti-Aβ antibodies, BACE inhibition offers the advantage of convenience of oral dosing and ability to efficiently penetrate the blood-brain barrier.

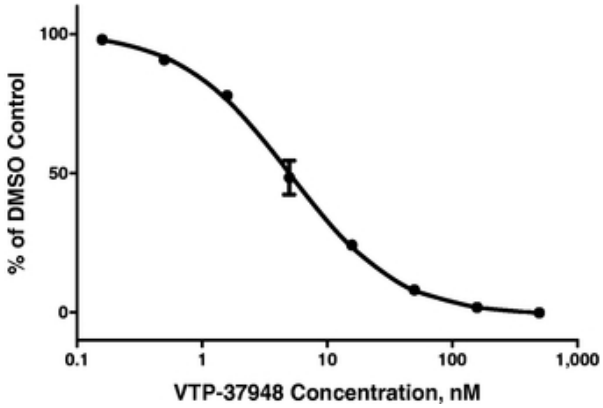
There are two classes of drugs currently approved to treat the symptoms of AD: cholinesterase inhibitors and NMDA inhibitors. Both classes of drugs treat symptoms of AD such as confusion and memory loss but they do not impact disease progression. Compared with these palliative treatments, VTP-37948 has the potential advantage of promoting neuronal survival, modifying disease progression, and maintaining cognitive function.

Preclinical Data

Using the Contour platform, Vitae discovered BACE inhibitors that were orally active for lowering brain Aβ levels in animal models. In collaboration with BI, Vitae further optimized these BACE inhibitors, and selected VTP-37948 to advance into clinical development.

In cell-free biochemical assays using purified recombinant human BACE, VTP-37498 demonstrated a potent inhibition of BACE activity at low nM concentrations.

Exhibit 10: Inhibition of Purified Human BACE by VTP-37948

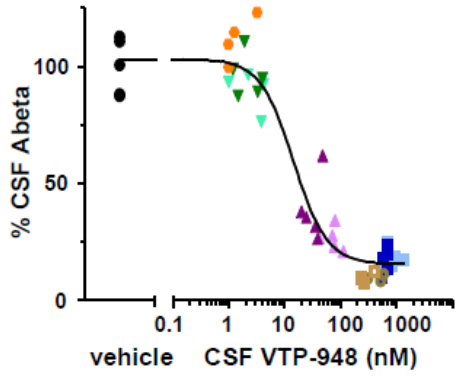


Source: Vitae Pharmaceuticals.

The selectivity of VTP-37948 was evaluated by testing its ability to inhibit other proteases that share certain structural homology, including renin, pepsin, and cathepsins D and E, in biochemical assays. VTP-37948 was greater than 1,000-fold more potent for BACE as compared with renin and cathepsin D, and demonstrated no activity against pepsin and cathepsin E.

In animal studies, VTP-37948 was highly effective at lowering brain and cerebral spinal fluid (CSF) Aβ in rats, achieving up to 95% brain Aβ lowering *in vivo* in a drug exposure-dependent manner (Exhibit 11).

Exhibit 11: CSF Aβ Levels in Rats Following Oral Administration of VTP-37948



Source: Vitae Pharmaceuticals.

In addition, preclinical studies in rats and dogs demonstrated that VTP-37948 was well absorbed in both species with high oral bioavailability, good brain penetration, and a relatively long plasma half-life, which Vitae believes is consistent with once-daily dosing in humans.

Development Plans

Two phase 1 clinical studies of VTP-37948 are ongoing in a total of 68 subjects. The first phase 1 clinical trial, initiated in January 2014, is a single ascending dose, randomized, double-blind, placebo-controlled study. This study will assess the safety and tolerability of VTP-37948 as well as the pharmacokinetics (PK).

The second phase 1 clinical trial is a single dose trial of VTP-37948 at various dose levels in healthy volunteers. In addition to safety, tolerability and PK, this study will also assess changes in the levels of CSF Aβ at various times after dosing of VTP-37948. The data on CSF Aβ lowering will provide early insights into the potential clinical efficacy of VTP-37948. Results from both phase 1 trials are expected in 4Q14.

Market Opportunity

Alzheimer's disease (AD) is the most common form of dementia, afflicting more than 5.2 million Americans and 30 million people worldwide. Nearly all AD patients in the U.S. are aged 65 years or older, and approximately 200,000 individuals under age 65 have early-onset AD. Due to the aging of the U.S. population, the number of Americans with AD is expected to continue to grow. On average, patients aged 65 years and older survive four to eight years after the diagnosis of AD.

The average annual cost of care for AD patients over the age of 70 in the U.S. was estimated to be between $157 billion and $210 billion in 2010. ARICEPT, a leading treatment for AD marketed by Pfizer and Eisai, achieved peak U.S. sales of approximately $2.1 billion before patent expiration and generic entry.

Collaboration

In June 2009, 18 months after initiating the BACE program, Vitae entered into a second research collaboration and license agreement with BI, referred to as the BACE Agreement. The companies agreed to work together to identify and develop BACE inhibitors for the treatment of AD. As of June 30, 2014, Vitae has received $78.2 million from BI related to the BACE Agreement, including a $15 million equity investment, $34.2 million in upfront fees and research funding, and $29 million in development milestones. In addition, Vitae is eligible for up to $326 million in additional milestone payments based on pre-specified events, including up to $176 million in development and regulatory milestones and up to $150 million in commercialization milestones. Vitae is also eligible to receive 50% of the above milestone payments for any subsequent products and for any additional indications of a product to meet those milestones.

Vitae is also eligible to receive tiered royalty payments from BI, ranging from upper single-digit to low-double-digit percentages, based on the net sales of potential future products, subject to certain reductions. Vitae also has the option to participate in funding the phase 3 clinical trials in exchange for increased royalties. BI's obligations to pay the royalties continues on a country-by-country and product-by-product basis for the later of 10 years after the first commercial sales and the expiration date of related-patents licensed to BI or any of the patents controlled by BI as of the effective date of the BACE Agreement.

Under the terms of the agreement, BI has the exclusive, worldwide license to use certain of Vitae's patents and other intellectual property to develop and commercialize BACE inhibitors. BI will control and is responsible for the expenses of preclinical and clinical development and commercialization of the product candidates resulting from the collaboration. Vitae is responsible for certain activities relating to the identification, synthesis, characterization, and optimization of compounds and received research funding from BI in connection with those activities. If a particular BACE inhibitor is not advanced to the development phase, subject to the approval of the joint steering committee established pursuant to the BACE Agreement, Vitae has the right to use its patents and other intellectual property licensed to BI as well as BI's certain patents and other intellectual property to develop and commercialize that BACE inhibitor for indications referred to above.

Vitae and BI have entered into three amendments to the BACE Agreement: the first in June 2011, the second in December 2012, and the third in December 2013. The June 2011 amendment modified one of the standards for selecting a potential lead product candidate. The December 2012 amendment expanded the core indication definition to include diabetes and metabolic disease. In accordance with that amendment, Vitae was obligated to provide 12 months of research contributions at no cost to, and at the option of, BI, with such contributions to be completed no later than June 30, 2014. The December 2013 amendment adjusted the timing and amount of certain of BI's development milestone payment obligations under the BACE Agreement.

Either Vitae or BI may terminate the BACE Agreement following an uncured material breach by the other party; however, Vitae may not terminate the BACE Agreement following the first sale of a product in certain major markets except in the event of certain commercial conflicts or breaches by BI of its payment obligations under the BACE Agreement. If BI terminates the BACE Agreement due to Vitae's material breach, then, except in certain circumstances, Vitae would continue to be eligible to receive royalty and milestone payments under the BACE Agreement. After the research phase is complete, BI also has the right to terminate the BACE Agreement in its entirety or on a product-by-product basis, in which case Vitae would obtain certain exclusive rights to develop and commercialize the terminated products for the treatment of AD, diabetes or metabolic disease.

BACE Inhibitor Competitive Landscape

Although long recognized as a promising target, BACE has proven to be a significant challenge for the pharmaceutical industry to develop potent, selective, small-molecule inhibitors that are capable of crossing the blood-brain barriers and have good oral availability.

CTS-21166

CTS-21166, developed by South San Francisco-based biotechnology company CoMentis, was the first BACE inhibitor to enter phase 1 clinical testing. In preclinical studies, CTS-21166 reduced brain $A\beta_{40}$ and $A\beta_{42}$ levels by 35%-38% and plaque load by 40% when injected into APP transgenic mice. Data from a single-ascending dose phase 1 study in 36 health volunteers were presented at the 2008 International Conference on Alzheimer's disease. CTS-21166 was administered via continuous intravenous infusion for up to three hours. At the highest dose of 225 mg, CTS-21166 reduced plasma $A\beta_{40}$ levels by 80%. CTS-21166 was described as well tolerated at all doses studied. Although this phase 1 study evaluated intravenous administration, CTS-21166 was reported to be orally available in mice, rats, dogs, and monkeys.

In 2008, Astellas Pharma and CoMentis announced a collaboration to develop and commercialize products from CoMentis's BACE inhibitor program, including CTS-21166. The current development status of CTS-21166 is unknown (listed as "confidential" on CoMentis's website).

MK-8931

Currently under phase 2/3 development, Merck's BACE inhibitor MK-8931 is in the lead among all BACE inhibitors under development.

Merck presented data from a single-ascending dose phase 1 study of its oral BACE inhibitor, MK-8931, in healthy volunteers at American Academy of Neurology (AAN) annual meeting in 2012. MK-8931 demonstrated a sustained and dose-dependent reduction in CSF Aβ levels. At 36 hours post-dose, CSF $A\beta_{40}$ levels were reduced by 21% in the 20 mg dose cohort, 75% in the 100 mg cohort, and 92% in the 550 mg cohort from baseline. Similar reductions were seen with CSF $A\beta_{42}$ levels.

Merck subsequently presented data from a phase 1b study of MK-8931 in patients with mild-to moderate Alzheimer's disease at the Alzheimer's Association International Conference (AAIC) in July 2013. A total of 32 patients were randomized to 12, 40, or 60 mg MK-8931 once-daily or placebo for 7 days. MK-8931 at doses of 12, 40 and 60 mg resulted in a dose-dependent and sustained reduction in CSF $A\beta_{40}$ levels of 57%, 79%, and 84%, respectively. Similar reductions were seen with CSF $A\beta_{42}$ levels. No SAEs or study discontinuation due to AEs were reported. There were also no statistically significant changes in laboratory assessments, including liver function tests. All AEs were mild to moderate in intensity and transient in duration.

Merck is conducting EPOCH, a 78-week phase 2/3 study of two doses of MK-8931 (12 and 40 mg once-daily) vs. placebo in patients with mild-to-moderate AD. The phase 2 portion also includes a 60 mg cohort to evaluate safety. The EPOCH study is expected to enroll up to 1,960 patients. The primary efficacy endpoints are the changes from baseline in Alzheimer's Disease

Assessment Scale Cognitive Subscale (ADAS-Cog) score and in Alzheimer's Disease Cooperative Study Activities of Daily Living (ADCS-ADL) score following 78 weeks of treatment.

In December 2013, Merck announced that the Data Monitoring Committee for the EPOCH study completed a planned interim safety analysis and recommended that the trial continue to recruit patients. The safety analysis involved 200 patients treated with MK-8931 for at least three months. The primary completion date of the EPOCH study is April 2017, according to clinicaltrial.gov.

Merck is also studying MK-8913 in patients with amnestic mild cognitive impairment (aMCI) due to AD, also known as prodromal AD. The phase 3 APECS study, initiated in November 2013, evaluates 24 months of treatment with MK-8931 (12 or 40 mg once-daily) vs. placebo in 1,500 patients with prodromal AD. The primary endpoint of the study is the change from baseline in the Clinical Dementia Rating Scale-Sum of Boxes (CDR-SB) score following 24 months of treatment. The primary completion of the APECS study is March 2018, according to clincialtrials.gov.

AZD3293

AstraZeneca's BACE inhibitor AZD3293 is the second most advanced in the industry, lagging Merck's MK-8931 by approximately a year.

In a multiple-ascending dose phase 1 study, 31 healthy volunteers were randomized to 5 cohorts and received AZD3293 as an oral solution. Daily dosing with 15 mg or 50 mg AZD3293 for 13 days resulted in a >75% reduction in plasma $A\beta_{40}$ and $A\beta_{42}$ during dosing, recovering to 60% at 72 hours post last dose. CSF $A\beta_{40}$ and $A\beta_{42}$ levels were reduced by a constant 50% and 75% in the 15 mg and 50 mg groups, respectively. Once-weekly dosing with 70 mg AZD3293 for two weeks (i.e. 3 doses) resulted in plasma $A\beta_{40}$ and $A\beta_{42}$ levels that were initially reduced by >75%, recovering to 35% between doses, and returning to placebo levels ~10 days after last dose. CSF $A\beta_{40}$ and $A\beta_{42}$ levels in the once-weekly 70 mg regimen were reduced by 50% at 72 hours after the last dose and returned to baseline by 12-14 days after last dose. In the multiple-ascending dose study, no safety concerns were identified and no clinically significant changes in ECG, vital signs, or laboratory results were observed.

The multiple-ascending dose study also includes a second part, in which up to 16 patients with mild-to-moderate AD patients are administered one to three dose levels of AZD3293. AstraZeneca expects data for AD patients to be presented at the 2014 Clinical Trials in Alzheimer's Disease Conference (CTAD) in November 2014.

In September 2014, AstraZeneca and Eli Lilly announced that the two companies were joining forces to rapidly progress AZD3293 into a phase 2/3 study in patients with early Alzheimer's disease. Eli Lilly will lead clinical development, while AstraZeneca will be responsible for manufacturing. Eli Lilly will pay AstraZeneca up to $500 million in development and regulatory milestones payments, and the two companies will take joint responsibility for commercialization of AZD3293.

The phase 2/3 AMARANTH trial evaluates 24 months of treatment with 20 mg or 50 mg once-daily AZD3293 vs. placebo in 1,550 patients with early AD, defined as the continuum of patients

with mild cognitive impairment (MCI) due to AD and patients diagnosed with mild dementia of the Alzheimer's type. The primary endpoint of the study is change from baseline in the Clinical Dementia Rating – Sum of Boxes (CDR-SB) score at 24 months. The study is currently being initiated, with a primary completion of June 2019 listed on clinicaltrials.gov.

LY2886721

In June 2013, Eli Lilly voluntarily terminated a phase 2 study of its BACE inhibitor LY2886721 due to abnormal liver biochemical tests observed during routine monitoring. In an earlier phase 1 study, daily dosing of LY2886721 for 2 weeks reduced CSF $A\beta_{42}$ by 72%.

E2609

Eisai's BACE inhibitor, E2609, is currently undergoing preparations to enter phase 2 clinical trials.

In July 2012, Eisai presented data from single- and multiple-ascending dose phase 1 studies of E2609 at the Alzheimer's Association International Conference (AAIC). In the single-ascending dose healthy volunteer study, E2609 demonstrated a maximum reduction of plasma Aβ of 52% at 5 mg and 92% at 800 mg. In the multiple-ascending dose study, a total of 50 healthy volunteers received between 25 mg and 400 mg E2609 once-daily for 14 days. E2609 demonstrated CSF Aβ reductions of 46%, 62%, 74%, and 80% after 14 days of dosing at 25mg, 50mg, 100 mg, and 200 mg doses. No clinically significant safety concerns were observed in doses up to 200 mg.

Eisai has also completed a randomized phase 1 study of E2609 in patients with mild cognitive impairment or mild dementia due to AD. A total of 65 patients were randomized to 5, 25, 50, 100, 200, or 400 mg E2609 or placebo. Data from this study has not been reported.

In March 2014, Eisai and Biogen Idec announced that they have entered into a collaboration to jointly develop and commercialize two of Eisai's clinical candidates for AD, E2609 and BAN2401 (an anti-Aβ mAb). Eisai will lead the co-development of these candidates and will pursue marketing authorizations worldwide. In major markets, such as the U.S. and EU, Eisai and Biogen will co-promote the products following marketing approval. The companies will share overall costs, including R&D costs, and split profits from sales. Eisai received an upfront payment from Biogen and will be eligible for additional development, approval and commercial milestone payments.

VTP-43742 (RORγt Inhibitor) for Autoimmune Disorders

Vitae is developing wholly owned compound VTP-43742, an orally active small molecule inhibitor of RAR-Related Orphan Receptor gamma-t (RORγt), for the treatment of a variety of autoimmune disorders.

RORγt is a nuclear hormone receptor essential for the formation and function of a class of T cells known as Th17 cells. Th17 cells play a crucial role in the pathophysiology of many human autoimmune disorders, and there has been strong interest in targeting RORγt for the treatment of these diseases. However, RORγt has proven to be difficult-to-drug, with many RORγt programs in the industry struggling to produce a viable clinical candidate.

Using the Contour platform, Vitae developed VTP-43742 as a RORγt selective inhibitor. In preclinical studies, VTP-43742 inhibited the production of IL-17 and other pro-inflammatory cytokines produced by Th17 cells. In addition, VTP-43742 demonstrated activity in an animal model of multiple sclerosis, with reduced demyelination and inflammation in the spinal cord, and a reduction in clinical score similar to that seen with IL-17 monoclonal antibodies and in RORγt gene knock-out mice.

Vitae plans to file an IND with FDA for VTP-43742 in 1H15 and begin phase 1 trials thereafter. The first phase 1 study will be a single-ascending dose healthy volunteer study. The second study, expected to be initiated in 2H15, will be a multiple-ascending phase 1b study evaluating 2 weeks of treatment with VTP-43742 in patients with psoriasis. The phase 1b study will evaluate improvements in skin lesions and changes in IL-17 and other cytokines in skin biopsies. Proof-of-concept data from this phase 1b trial are expected by year-end 2015.

Mechanism of Action

Autoimmune disorders comprise a large number of diseases in which the body's immune system mounts an inappropriate attack on normal tissues. Common autoimmune disorders include psoriasis, MS, RA, and steroid-resistant asthma, and rarer autoimmune disorders include Behcet's disease and autoimmune uveitis.

First discovered in the 1990's, IL-17 (also known as IL-17A) has been recognized as a pro-inflammatory cytokine that plays a significant role in several autoimmune disorders including psoriasis, MS and RA. In 2000, the major immune cells responsible for production of IL-17 was determined to be a unique subset of T lymphocytes, and these cells were thus named Th17 cells.

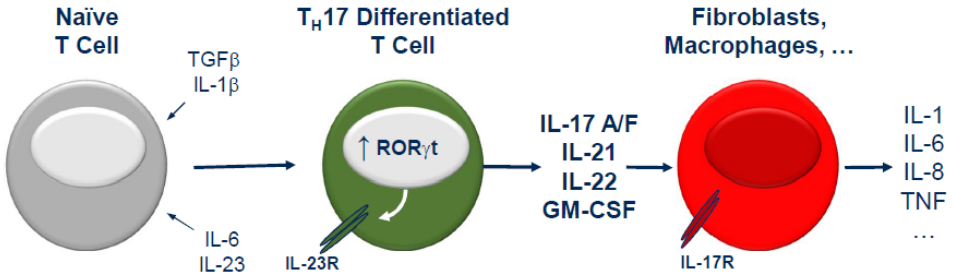
Th17 cells are normally involved in host defense against certain extracellular pathogens at epithelial and mucosal barriers (e.g. skin, colon, and lung). Once released by the Th17 cells, IL-17 activates other cells to secrete proinflammatory cytokines (e.g. TNF, IL-1β, IL-6, and IL-8), chemokines and anti-pathogenic peptides. These proinflammatory molecules in turn trigger the recruitment of innate immune cells, such as neutrophils and macrophages, to the site of infection and the elimination of the pathogen.

Although IL-17 is crucial in protecting the host from many types of pathogens, aberrant IL-17 production can result in excessive proinflammatory cytokine production and chronic inflammation, which could in turn lead to tissue damage and autoimmunity.

Th17 cells represent one of three major T helper (Th) cell lineages: Th1, Th2, and Th17. Each lineage produces a distinct set of cytokines and plays a distinct role in immunity. Th17 cells produce IL-17, IL-17F (a cytokine closely related to IL-17), IL-22 and IL-21. All Th lineages are derived from naïve T cells, and differentiation into a specific lineage is governed by the cytokine milieu shaped by professional antigen-presenting cells such as dendritic cells. The cytokine milieu induces the expression of lineage-specific transcription factors, which in turn drive differentiation by expressing lineage-specific genes.

Differentiation into the Th17 lineage requires the presence of TGF-β, IL-6 and IL-1β, and maintenance of the Th17 phenotype requires IL-21 and IL-23. The master transcriptional factor for Th17 differentiation is retinoic acid-related orphan receptor (ROR)γt, which is a member of the hormone nuclear receptor family. RORγt contains a ligand binding domain (LBD) and a DNA binding domain (DBD). When a ligand binds to a ligand-binding pocket in the LBD, it induces a conformational change in the DBD. This conformational change leads to the binding of RORγt to specific DNA sequences, called ROR Response Elements (ROREs), to regulate the expression of Th17 lineage-specific genes, including IL-17. In addition, RORγt also upregulates the IL-23 receptor, providing a positive feedback loop for IL-23 signaling and further driving the activity of Th17 cells.

Exhibit 12: RORγt Drives Th17 Cell Differentiation and Expression of Inflammatory Cytokines



Source: Vitae Pharmaceuticals.

Monoclonal antibodies that block IL-17 activity have been extensively studied and have demonstrated promising activity in several autoimmune disorders, including psoriasis, MS, RA and ankylosing spondylitis. These agents studied include Eli Lilly's ixekizumab (anti-IL-17), Novartis' secukinumab (anti-IL-17), and Amgen's brodalumab (anti-IL-17 receptor). In addition, drugs and drug candidates targeting IL-23 and IL-21 have also demonstrated efficacy in autoimmune disorders; these agents include Johnson & Johnson's STELARA (ustekinumab, anti-IL12/IL23) and guselkumab (anti-IL-23), and Merck's tildrakizumab (anti-IL-23).

Positive results from the above studies have created interest in identifying additional targets in the Th17/IL-17 pathway. RORγt represents an attractive target, because inhibition of RORγt could result in blockade of the synthesis of IL-23R, IL-17, IL-17F, and IL-22. The binding pocket of the LBD of RORγt is well characterized and suitable to be targeted by small molecule inhibitors. Indeed, several RORγt inhibitors have been reported in the literature, and these compounds appeared to be effective in animal models of autoimmune diseases, demonstrating anti-inflammatory effects similar to those seen with anti-IL-17 antibodies. These small molecule RORγt inhibitors may offer advantages over IL-17 antibody therapies, including convenient oral

dosing and broader effects on several inflammatory mediators. In addition, small molecule RORγt inhibitors could also potentially complement IL-17 antibody therapies.

However, advancing RORγt inhibitors into the clinic has proven to be challenging, for two reasons. First, candidate compounds are generally too hydrophobic ("greasy"), leading to low bioavailability and poor metabolic stability. Second, compounds do not have high enough selectivity against other isotypes (α and β) of the ROR protein family.

The ROR protein family consists of three isotypes: RORα, RORβ, and RORγ. RORα and RORγ are broadly expressed in many tissues, including brain, liver, thymus, and skeletal muscle. RORβ has a limited expression pattern and is found mainly in the retina of the eye and the pineal gland (a small gland in the brain). RORγt is an isoform of RORγ, and both are encoded by a single gene. Because of difference in transcription start sites, RORγt lacks 21 amino acids that are present in the N-terminus of RORγ; nevertheless, both isoforms have the same DBD and LBD. Unlike RORγ, which has broad tissue expression, RORγt is expressed only in the thymus and in differentiated Th17 cells.

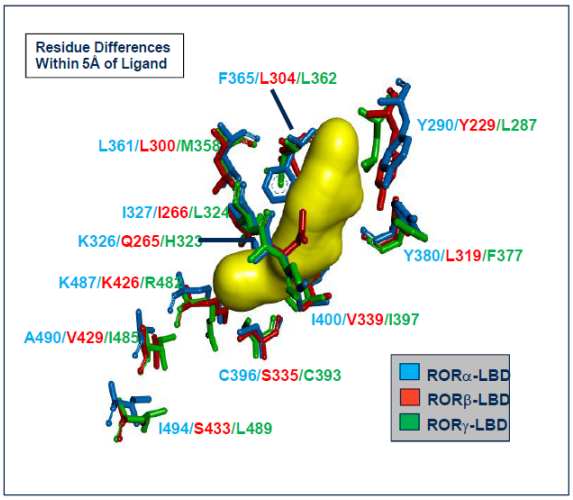
Mice deficient in RORα (RORα-/- mice) demonstrate a movement disorder due to deficiency and degeneration of specific brain cells. Deficiency in RORβ in mice results in blindness due to abnormal retinal development. In contrast, mice deficient in RORγt demonstrate impaired Th17 cell differentiation, but are otherwise healthy. These findings suggest that inhibition of RORα or RORβ could be associated with significant safety concerns, and therefore any viable RORγt inhibitor should have high selectivity for RORγt.

As a result of the challenge in achieving RORγt selectivity, as well as the candidate compounds' tendency of having high hydrophobicity and low bioavailability, many RORγt programs in the industry have struggled to produce a viable clinical candidate.

Preclinical Data

Vitae has evaluated the structures of the three ROR receptors (α, β, and γ) and noted subtle variations in the ligand-binding pockets (Exhibit 13, left panel). **Vitae exploited these minute variations using Contour, and successfully developed VTP-43742, a RORγt inhibitor with a 1000-fold selectivity margin for RORγt.** In biochemical binding assays, the Ki value of VTP-43742 to RORγt, a measure of how tightly the compound binds to its target, is 3.7 nM, suggesting a potent binding affinity (Exhibit 13, right panel). In contrast, the binding affinities of VTP-43742 to RORα and RORβ are much weaker, as evidenced by the much higher Ki values.

Exhibit 13: Solving for and Achieving ROR Isotype Selectivity With Contour

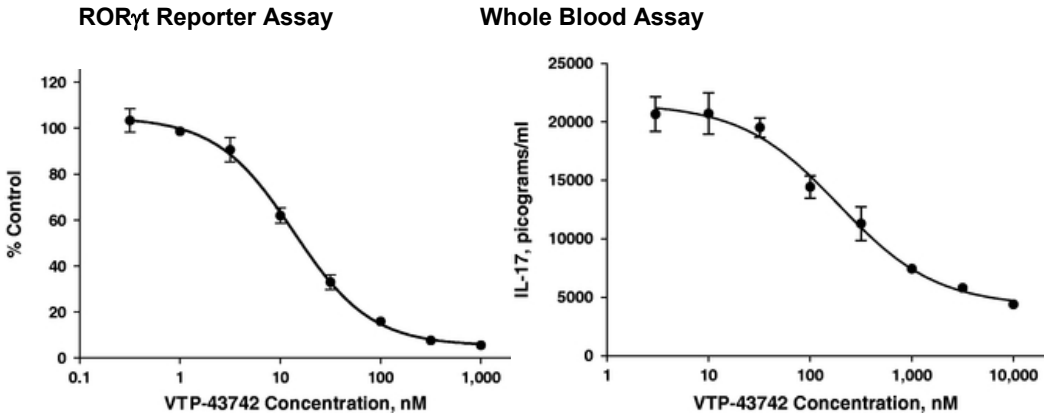


Assay	VTP-43742
hRORγt Ki (nM)	3.7 nM
hRORα Ki (nM)	4,712 nM
hRORβ Ki (nM)	3,914 nM

Source: Vitae Pharmaceuticals.

VTP-43742 also demonstrated potent RORγt inhibition in cell-based assays. In a RORγt-dependent reporter assay in a human T cell line (Jurkat cells), VTP-4372 demonstrated an IC_{50} (the concentration of drug necessary to inhibit the assay by 50%) of 17nM. In a human whole blood assay, VTP-43742 blocked endogenous RORγt-dependent IL-17 production in lymphocytes with an IC_{50} of 221 nM. The whole blood assay is more representative of the treatment of humans, and takes into account the effects of protein binding and cell penetration on the compound's activity.

Exhibit 14: Potency of VTP-43742 in Cell-Based Assays

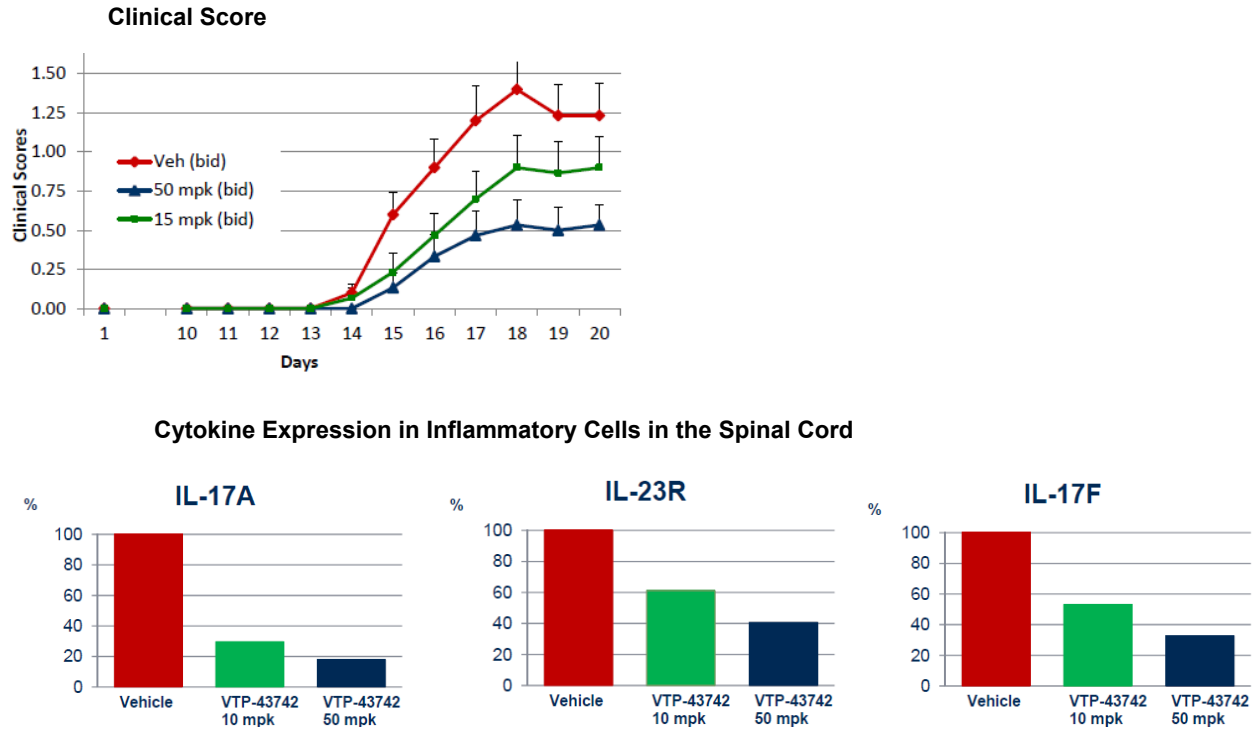


Source: Vitae Pharmaceuticals.

VTP-43742 was also tested in an animal model of multiple sclerosis (MS). MS is caused by autoimmune destruction of the myelin sheath, which is an insulating layer wrapped around the axons of neurons in the brain and spinal cord. Myelin sheath serves to increase the speed of the propagation of impulses along nerve fibers. Damage to the myelin sheath (known as demyelination) therefore impairs the conduction of neuronal signals, manifested as deficiency in sensation, movement, and cognition. The mouse model of experimental autoimmune encephalomyelitis (EAE) shares similarities with human MS as both are associated with inflammation and demyelination, along with a Th17-dependent disease process.

VTP-43742 was tested in the EAE model to evaluate its effects on disease progression. VTP-43742 was orally administered twice daily from the time of disease induction. As shown in Exhibit 15, VTP-43742 treated animals demonstrated significant and dose-dependent reductions in the clinical score, a measure of disease severity, compared with animals treated with vehicle control. **VTP-43472 treatment resulted in a maximal reduction in clinical score of approximately 50%, similar to that seen with IL-17 monoclonal antibodies and in RORγt gene knock-out mice.** Spinal cords were harvested and analyzed for IL-17 expression (by infiltrating T cells), and VTP-43742 treated animals demonstrated a significant and dose-dependent reduction in the expression of IL-17 (Exhibit 15, middle panel).

Exhibit 15: Activity of VTP-43742 in Animal Model of MS



mpk=mg/kg

Source: Vitae Pharmaceuticals.

The effect of VTP-43742 on the loss of myelin sheaths in the spinal cord was also evaluated in EAE animals. Spinal cords from animals treated with VTP-43742 or vehicle control were stained with hematoxylin and eosin (H&E), which are stains routinely used in microscopic tissue analysis. In vehicle-treated animals, loss of axonal myelin sheaths resulted in the formation of vacuoles, or small bubbles, on the cross section of spinal cords (Exhibit 15, bottom panel). In contrast, these vacuoles were substantially decreased or absent in VTP-43742-treated animals (Exhibit 15, bottom right panel). In addition, VTP-43742 also significantly reduced inflammation, lymphocyte and neutrophil infiltration, and necrotic cell debris compared with vehicle control.

Collectively, these data demonstrate that VTP-43742 is effective in reducing disease activity in a clinically relevant animal model of human MS.

To assess pharmacokinetics, VTP-43742 was administered via oral and intravenous routes in rats and dogs. VTP-43742 demonstrated good oral bioavailability (66%) and long plasma half-life (15 hours) in dogs. Based on these data and other preclinical data, Vitae expects VTP-43742 to be well absorbed in humans, with a predicted plasma half-life of approximately 24 hours.

Development Plans

Vitae plans to file an investigational new drug (IND) application with FDA for VTP-43742 in 1H15, and expects to begin phase 1 clinical trials thereafter. The initial phase 1 trial is expected to be a single ascending dose trial in healthy volunteers. The clinical trial will be designed to demonstrate that VTP-43742 is well tolerated and does not cause clinically significant changes in clinical laboratory tests or vital signs. This trial will also evaluate VTP-43742's PK characteristics.

Vitae also plans to initiate a two-week, multiple ascending dose phase 1b trial of VTP-43742 in 2H15. This study will be conducted in patients with psoriasis, and will analyze the safety, tolerability and PK characteristics of two weeks of once-daily dosing of VTP-43742. The study will also evaluate improvements in skin lesions (a treatment period of two weeks is generally sufficient for this evaluation in psoriasis patients), and skin biopsies will be performed to evaluate inflammation as well as changes in IL-17 and other cytokines. Proof-of-concept data from this phase 1b study are expected by year-end 2015.

Current Therapies for Psoriasis

A number of topical and systemic therapies are available for the treatment of psoriasis. Choice of therapy depends on disease severity, location of disease, comorbidities (e.g. psoriatic arthritis), and evaluation of individual patient response.

For treatment-planning purposes, psoriasis can be categorized as mild-to-moderate or moderate-to-severe. Moderate-to-severe disease is defined as involvement of >5-10% of the body surface area or involvement of the face, palm or sole, or disease that is otherwise disabling. Mild-to-moderate psoriasis can be managed with topical agents, whereas moderate-to-severe diseases may need systemic therapy. Disease that involves hand, foot, or face, can be debilitating functionally or socially and may warrant more aggressive treatments. Patients are typically started on safer therapies and, if the response is inadequate, progress to more aggressive therapies.

Mild-to-moderate psoriasis is most often treated with topical corticosteroids and emollients. Alternative therapies include tar, topical retinoids, and vitamin D analogs such as calcipotriene and calcitriol. Localized UVB phototherapy is an option for recalcitrant disease.

Moderate-to-severe disease requires UVB phototherapy or systemic therapies, including retinoids, methotrexate, cyclosporine, OTEZLA, and biologic agents, such as anti-TNF mAbs (HUMIRA, ENBREL, REMICADE) and the anti-IL12/23 mAb STELARA. Improvement is usually seen within weeks.

Anti-TNF agents have revolutionized the treatment of psoriasis (and the common comorbidity psoriatic arthritis) with impressive response rates. These agents have been evaluated in phase 3 studies in patients with moderate-to-severe plaque psoriasis (≥10% of the body surface area involved, a minimum Psoriasis Area and Severity Index [PASI] score of 12, and candidates for phototherapy or systemic therapy).

The primary efficacy outcomes in these phase 3 studies generally included the PSAI-75 response rate, defined as ≥75% reduction in the PASI score, and the proportion of patents who achieved treatment success, defined as a score of "clear" or "minimal" on the 6-point Physician Global Assessment (PGA) scale.

The PASI is a composite score that takes into account both the fraction of body surface area affected and the nature and severity of psoriatic changes (induration, erythema and scaling) within the affected regions. The PGA is a six-category scale ranging from "0=none" to "5=severe" indicating physician's overall assessment of the psoriasis severity focusing on induration, erythema and scaling. Treatment success of "clear" or "minimal" consists of none or minimal elevation in plaque, up to faint red coloration in erythema, and none or minimal fine scale over <5% of the plaque.

REMICADE demonstrated a PASI-75 response rate of 75-88% and a treatment success rate of 75-90% at week 10 (5 mg/kg IV infusion at weeks 0, 2, and 6). HUMIRA demonstrated a PASI response rate of 71-78% and a treatment success rate of 62-71% at week 16 (40 mg subcutaneously q2weekly). ENBREL demonstrated a PASI-75 response rate of 46% and a treatment success rate of 47-54% at week 12 (50 mg subcutaneously twice/week).

The prescription labels of anti-TNF agents carry black-box warnings for risk of serious infections (tuberculosis, sepsis, and invasive fungal infections), and risk of lymphoma and other malignancies in children and adolescent patients. The most common AEs observed in phase 3 studies included infections, and injection site reactions or infusion-related reactions.

The anti-IL12/23 mAb STELARA demonstrated similar efficacy to anti-TNF, with a PASI-75 response rate of 67-76% and a treatment success rate of 59%-73% at week 12 (45 or 90 mg subcutaneously at weeks 0 and 4).

STELARA was described as well-tolerated in clinical trial experience and its AE profile appeared to be favorable compared with that of anti-TNF agents. One case of reversible posterior leukoencephalopathy syndrome (RPLS) was reported in STELARA's clinical trials.

Recently, Celgene's OTEZLA was approved as a new oral treatment for moderate-to-severe psoriasis. OTEZLA is an inhibitor of phosphodiesterase type 4 (PDE4), and it has been reported that OTEZLA decreases the production of pro-inflammatory cytokines (such as IL-12, IL-23 and TNF) and induces anti-inflammatory cytokines such as IL-10. In phase 3 studies, OTEZLA demonstrated a PASI-75 response rate of 29-33% and a treatment success rate of 20-22% at week 16 (30 mg orally BID).

The most common AEs (≥5%) in OTEZLA's phase 3 studies included diarrhea, nausea, upper respiratory tract infection, and headache. The proportion of study participants who discontinued treatment due to any AEs was 6.1% in the OTEZLA group vs. 4.1% in the placebo group.

Psoriasis Drug Development Landscape

IL-17 Antagonists – Secukinumab, Ixekizumab, and Brodalumab

The pathophysiology of psoriasis is predominantly mediated by IL-17-producing T helper cells (Th17 cells). Three IL-17 antagonists have demonstrated impressive efficacy clinical trials.

COSENTYX (Secukinumab)

Novartis' anti-IL-17 mAb COSENTYX (secukinumab) has been evaluated in two phase 3 studies, ERASURE and FIXTURE, in moderate-to-severe psoriasis. Secukinumab met all primary and key secondary endpoints in both pivotal trials, and is currently under FDA review. In a briefing document published on October 16, 2014, ahead of the Dermatologic and Ophthalmic Drugs Advisory Committee Meeting, FDA stated that the available data for secukinumab demonstrate a favorable benefit-risk assessment, and that no major safety issues have been identified to date. The FDA action date for secukinumab is in early 2015.

The ERASURE study (n=738) evaluated secukinumab 150 or 300 mg (subcutaneously once weekly for 5 weeks then every 4 weeks) vs. placebo, whereas the FIXTIRE study (n=1306) evaluated the same secukinumab regimens vs. an ENBREL biosimilar (etanercept). The co-primary endpoints were PASI-75 response rate and the proportion of patients who had a score of 0 (clear) or 1 (almost clear) on a 5-point modified investigator's global assessment scale (IGA mod 2011 0/1).

In the ERASURE study, after 12 weeks of treatment, secukinumab demonstrated PASI-75 response rates of 81.6% (300 mg) and 71.6% (150 mg) vs. 4.5% placebo, and IGA mod 2011 0/1 response rates of 65.3% (300 mg) and 51.2% (150 mg) vs. 2.4% placebo. As a key secondary endpoint, secukinumab demonstrated PASI-90 response rates of 59.2% (300 mg) and 39.1% (150 mg) vs. 1.2% placebo.

In the FIXTURE study, after 12 weeks of treatment, secukinumab demonstrated PASI-75 response rates of 77.1% (300 mg) and 67.0% (150 mg) vs. 44.0% for etanercept, and IGA mod 2011 0/1 response rates of 62.5% (300 mg) and 51.1% (150 mg) vs. 27.2% for etanercept. As a key secondary endpoint, secukinumab demonstrated PASI-90 response rates of 54.2% (300 mg) and 41.9% (150 mg) vs. 20.7% for etanercept.

The rates of AEs in the FIXTURE study were similar between the secukinumab and etanercept groups. The most common AEs in the secukinumab group were nasopharyngitis, headache, and diarrhea.

Ixekizumab

Eli Lilly's anti-IL-17 mAb ixekizumab has been evaluated in three phase 3 studies (UNCOVER-1, 2, 3) in moderate-to-severe psoriasis, including two head-to-head studies against ENBREL. In August 2014, Eli Lilly announced that ixekizumab met all primary and key secondary objectives across three UNCOVER studies in 3,866 patients, and that ixekizumab was superior to ENBREL on all measures of skin clearance. Specifically, after 12 weeks of treatment, ixekizumab q2weekly or q4weekly demonstrated PASI-75 response rates of 78-90%, and PASI-100 (or clear skin) response rates of 31-41%. In comparison, only 5-7% of ENBREL-treated patients achieved a

PASI-100 response in UNCOVER-2. Further details from these studies are expected to be presented at a scientific meeting in 2015.

The overall rates and severities of AEs were comparable between ixekizumab-treated patients and ENBREL-treated patients in the two active comparator trials. The most frequently reported AEs (≥5%) included nasopharyngitis and injection site reaction.

Eli Lilly expects to submit regulatory submission for ixekizumab in 1H15.

Brodalumab

Amgen and partner AstraZeneca's brodalumab is a mAb against IL-17 receptor. Brodalumab is currently being evaluated in three phase 3 studies (AMAGINE-1, 2, 3) in moderate-to-severe psoriasis.

The AMAGINE-1 study evaluated brodalumab 140 or 210 mg (subcutaneously q2weekly) vs. placebo in 661 patients. Brodalumab met all primary and secondary endpoints, demonstrating PASI-75 response rates of 83.3% (210 mg) and 60.3% (140 mg) vs. 2.7% placebo, PASI-90 response rates of 70.3% (210 mg) and 42.5% (140 mg) vs. 0.9% placebo, and PASI-100 response rates of 41.9% (210 mg) and 23.3% (140 mg) vs. 0.5% placebo.

The most common AEs (≥5%) in the brodalumab group were nasopharyngitis, upper respiratory tract infection and headache. SAEs occurred in 1.8% of patients in the 210 mg group and 2.7% of patients in the 140 mg group, vs. 1.4% placebo.

AMAGINE-2 and AMAGINE-3 studies are active-comparator studies evaluating 140 mg and 210 mg brodalumab vs. STALARA vs. placebo. Each study enrolls approximately 1,850 patients. The co-primary endpoints are PASI-75 response rate and PGA 0/1 response rate at week 12. The estimated primary completion date is September 2014 for both studies, as listed on clinicaltrials.gov.

Oral Jak3 Inhibitor – XELJANZ

Pfizer's XELJANZ (tofacitinib) is a twice-daily oral Janus kinase (JAK) inhibitor that has been approved for the treatment of rheumatoid arthritis (RA). XELJANZ is being evaluated in patients with moderate-to-severe psoriasis in several phase 3 studies.

The JAK family proteins, including JAK1, JAK2, JAK3, and TYK2, function downstream of various cytokine receptors to mediate cytokine signaling. XELJANZ is a JAK1 and JAK3 inhibitor. In animal studies, XELJANZ inhibited the expression of IL-23 receptor in T cells following stimulation with IL-6 and IL-23, which in turn led to in suppression of Th17 cell differentiation.

The OPT Compare phase 3 trial evaluated XELJANZ (5 mg or 10 mg BID) vs. high-dose ENBREL (50 mg BIW) vs. placebo in 1,106 patients with moderate-to-severe chronic plaque psoriasis who had an inadequate response to, intolerance to, or contraindication to conventional systemic therapy (excluding patients who failed an anti-TNF therapy). In this study, XELJANZ 10 mg demonstrated non-inferiority to ENBREL, whereas XELJANZ 5 mg did not meet the non-inferiority criteria compared with ENBREL. Specifically, the proportion of patients that achieved a PASI-75 response at week 12 was 63.6% for XELJANZ 10 mg, 58.8% ENBREL, 39.5%

XELJANZ 5 mg, and 5.6% placebo. The proportion of patients that achieved "clear" or "almost clear" in PGA at week 12 was 68.2% XELJANZ 10 mg, 66.3% ENBREL, 47.1% XELJANZ 5 mg, and 15.0% placebo.

Rates of selected safety events of special interest, including serious infections, herpes zoster, non-melanoma skin cancer and cardiovascular events, were below 1% and similar between the XELJANZ and ENBREL groups. The most frequent AEs were infections (most commonly nasopharyngitis and upper respiratory tract infections). Increases in cholesterol and creatine phosphokinase were more common in the XELJANZ groups than in the ENBREL group.

The OPT Pivotal #1 and OPT Pivotal #2 studies evaluated XELJANZ (5 mg or 10 mg BID) vs. placebo in patients with moderate-to-severe chronic plaque psoriasis who were candidates for systemic or phototherapy (n>900 for each study). In both studies, XELJANZ met the primary endpoints of PASI-75 response and PGA 0/1 response at week 16. Detailed data from the Pivotal #1 and #2 studies have not been reported.

Pfizer expects to submit regulatory filing to FDA for XELJANZ in psoriasis by early 2015.

Other RORγt Programs in the Industry

Orphagen Pharmaceuticals (based in San Diego, California) entered a collaboration and license agreement with Japan Tobacco (JT) to develop small molecule antagonists for RORγ in 2008. In August 2013, Orphagen announced that JT has entered phase 1 clinical trials with an oral small-molecule RORγt inhibitor for the treatment of autoimmune and allergic diseases.

Exelixis entered into a joint discovery program with Bristol Myers Squibb to optimize and characterize RORγ antagonists in October 2010. The collaborative research period ended in July 2013; according to Exelixis, BMS now has sole responsibility for further research, development, and commercialization of products developed under the collaboration.

Karo Bio, a Swedish biotechnology company with expertise in nuclear hormone receptors, launched a RORγt program in 2010. In December 2011, Karo Bio entered into a licensing and research collaboration agreement with Pfizer to discover and develop novel small-molecule RORγt modulators for the treatment of autoimmune diseases. In June 2013, the research collaboration was extended to the end of 2014. Pfizer has been responsible for research costs related to the project, and Karo Bio is eligible to receive over $200 million in milestone payments in addition to any royalty fees.

Lycera Corporation (based in Ann Arbor, Michigan) entered into an exclusive research collaboration with Merck in March 2011 to discover, develop and commercialize small molecules that target RORγt for the treatment of autoimmune diseases. According to the agreement, Lycera and Merck work collaboratively in the discovery and preclinical development stages, and Merck is responsible for subsequent clinical development and will have worldwide marketing and commercialization rights to any resulting products, subject to a profit share option in the U.S. retained by Lycera. Lycera received $12 million in upfront cash payment as well as significant committed research funding. Lycera is eligible to receive up to $295 million in research, development and regulatory milestone payments, as well as tiered royalty payments (up to low double-digit) and sales milestones.

In December 2012, Phenex Pharmaceuticals, a biotechnology company based in Germany, entered into an agreement with Janssen Biotech, a subsidiary of Johnson & Johnson, to jointly discover compounds that target the nuclear hormone receptor RORγt for the treatment of autoimmune diseases. Under the terms of the agreement, Phenex will receive an upfront payment and milestone payments upon the achievement of specific development and regulatory events that could total as much as $135 million. Phenex will also be eligible to receive tiered royalties and sales milestones. Phenex and Janssen will work collaboratively on identifying compounds that are active against RORγt and optimized for preclinical development. Thereafter, Janssen will have sole responsibility for the continued development and commercialization of any compounds that arise from the collaboration.

Market Opportunity

There are a large number of autoimmune disorders, including both common diseases such as psoriasis, MS and RA, and rarer disorders such as Behcet's disease and autoimmune uveitis. Based on the IL-17-related mechanism of action of VTP-43742, Vitae believes the compound could be most effective in psoriasis, MS, Behcet's disease and autoimmune uveitis.

Multiple sclerosis is estimated to afflict 400,000 Americans. Behcet's disease is a rare disorder caused by inflammation of the blood vessels (vasculitis). The prevalence of Behcet's disease in the U.S. is estimated to be 16,500. Autoimmune uveitis is an inflammatory condition of the uvea, or the middle layer of the eye that can lead to permanent vision loss. The prevalence of autoimmune uveitis in the U.S. is estimated to be 5,400.

Psoriasis, a chronic autoimmune disorder of the skin, is estimated to affect 7.4 million Americans. Despite the numerous treatment options available, there remains a need for additional safe and effective therapies for psoriasis. Recent surveys suggest that approximately 50% of psoriasis patients are dissatisfied with their treatment. There also appears to be a problem of under-treatment: although treatment guidelines generally recommend systemic therapy for moderate-to-severe patients, 20-30% of patients with moderate-to-severe disease received only topical therapies.

VTP-38443 (LXRβ Inhibitor) for Acute Coronary Syndrome (ACS)

Vitae is developing VTP-38443, an orally active agonist for liver X receptor-beta (LXRβ), for the treatment of acute coronary syndrome (ACS). ACS patients have cholesterol plaque buildup in their coronary arteries and are at risk for an impending heart attack. LXRs, which include LXRα and LXRβ, promote reverse cholesterol transport (RCT), i.e. the transport of cholesterol from the periphery to the liver for excretion from the body. Therefore, agonists of LXR could potentially remove cholesterol from the plaques in vessel walls, thus reducing plaque burden. In addition, activated LXRs also suppress the production of pro-inflammatory proteins from immune cells in the plaque; therefore LXR agonists could also make the plaque less inflamed and more stable. An ideal LXR agonist product candidate should be selective for LXRβ vs. LXRα, because LXRα activation has been shown to increase liver and plasma triglyceride levels.

In a mouse model of accelerated atherosclerosis, Vitae's LXRβ selective agonist VTP-38443 decreased plaque formation by more than 60% and reduced the inflammation state in the plaque, with minimal impact on triglyceride levels. Vitae expects to complete necessary preclinical studies and file an IND for VTP-38443 in 1H16, with phase 1 clinical trials commencing thereafter.

Mechanism of Action

Acute coronary syndromes (ACS) is an umbrella term referring to any condition resulted from insufficient blood flow to the myocardium (heart muscle). ACS encompasses a spectrum of conditions, including unstable angina (UA) and myocardial infarction (heart attack). ACS is most often a complication of a buildup of fatty substances, known as atherosclerotic plaques, in the walls of coronary arteries. These plaques consist of a thin fibrous cap, formed by smooth muscle cells, and a lipid-rich core, formed by cholesterol, cholesterol ester, lipid-laden foam cells (macrophages), calcium, and cellular debris. Plaques gradually grow in size, causing the narrowing of artery opening. This in turn increases the pressure from the blood flow on the thin fibrous cap. The cap could rupture, resulting in blood clots that could completely block the artery, leading to a heart attack. Patients who experience an ACS event have a 10-20% chance of having a significant cardiovascular event within the next six months. The treatment goal for ACS after the acute event is to preserve patency of the coronary artery. Patients are usually treated with an anti-blood clotting agent and a cholesterol lowering agent, such as statin.

Reverse cholesterol transport (RCT) is a process by which extrahepatic (peripheral) cholesterol is transported to the liver for excretion in the bile, and ultimately eliminated through the feces. This return of "peripheral" cholesterol to the liver is necessary, because nonhepatic cells acquire cholesterol through uptake of lipoproteins and *de novo* synthesis, but they are largely unable to catabolize it.

The first step of RCT involves cholesterol efflux, mediated by two transmembrane transporters, ABCA1 and ABCG1, which belong to the ATP binding cassette (ABC) superfamily. ABCA1 is responsible for transporting cholesterol out of cells and onto lipid-poor apolipoprotein A-I (ApoA-I), which then form nascent high-density lipoproteins (HDL). Nascent HDL particles

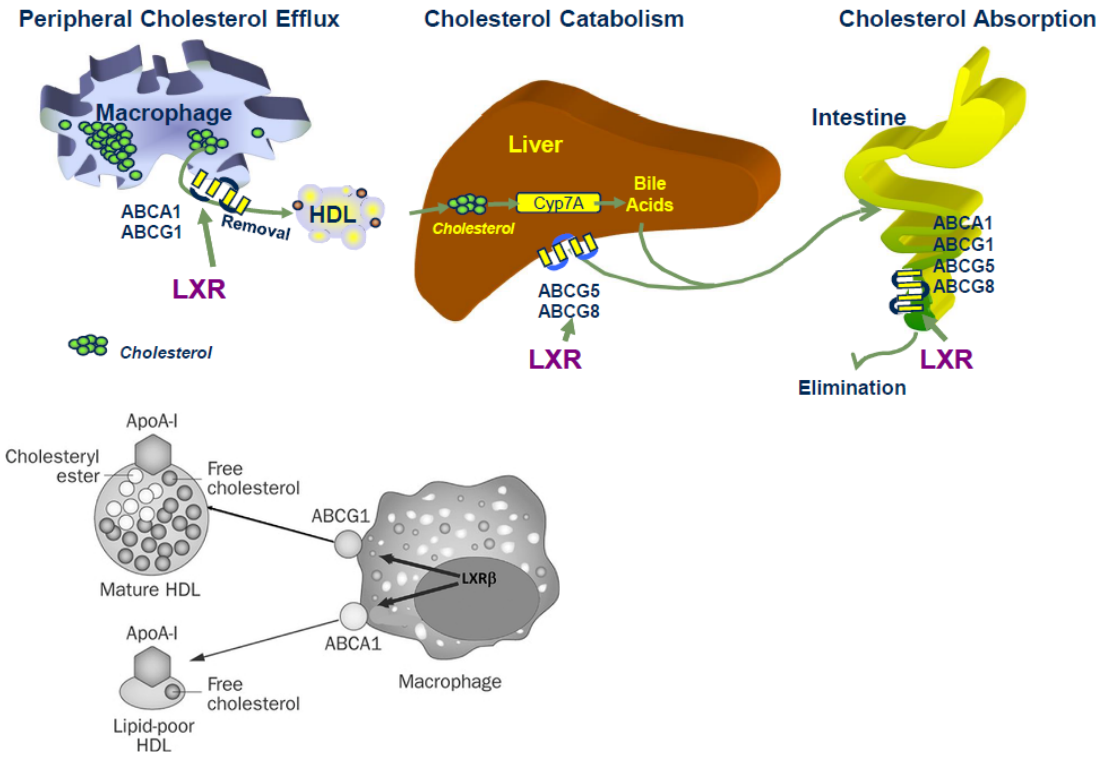
obtain additional cholesterol and become mature HDL. The ABCG1 transporter mediates the efflux of cellular cholesterol onto mature HDL. Genetic mutations in ABCA1 are associated with Tangier disease, characterized by cholesterol buildup in peripheral tissues.

The toxic buildup of cholesterol in arterial foam cells, which are macrophages laden with cholesterol, plays a key role in the initiation and progression of atherosclerotic plaque development. Therefore macrophage RCT is of particular interest even though it represents only a small fraction of total cholesterol efflux. ABCA1 and ABCG1 facilitate macrophage RCT, and mice deficient in both transporters demonstrate dramatic increases in foam cell accumulation and atherosclerosis.

Liver X receptors (LXRs), including LXRα and LXRβ, are major regulators of ABCA1 and ABCG1 expression, as well as the expression of genes involved in bile acid biosynthesis and transport. Therefore, LXRs plays a critical role in normal cholesterol efflux from peripheral cells and cholesterol excretion by the liver (Exhibit 16). LXRs are thought to be activated *in vivo* by oxysterols, oxygenated derivatives of cholesterol. LXRα is mainly expressed in liver, kidney and intestine, whereas LXRβ is expressed more ubiquitously.

Studies of mouse models have demonstrated that treatment with LXR agonists promotes RCT and decreases atherosclerosis. Therefore LXR agonists could represent a novel treatment for ACS, and its mechanism of reducing plaque burden could be complementary to the cholesterol-lowering mechanism of statin.

Exhibit 16: The Role of LXR in Cholesterol Transport and Metabolism



Source: Vitae Pharmaceuticals.

In addition to augmenting RCT, LXR agonists also have anti-inflammatory properties, which could be beneficial for the treatment of atherosclerosis. The active inflammation process in atherosclerotic plaques has several deleterious effects. Immune cells (including macrophages) infiltrating the atherosclerotic plaque secrete pro-inflammatory mediators and alter the endothelial surface (a thin layer of cells that line the interior surface of blood vessels) of the plaque, making it prone to the formation of blood clots. In addition, activated macrophages in the plaque secrete proteases, which break down the extracellular proteins and weaken the cap of the plaque, predisposing the plaque to rupture. Thus, inflammation in atherosclerotic plaques exacerbates the disease process in ACS.

Activation of LXR receptors has been reported to inhibit the synthesis of inflammatory mediators. In a mouse model of atherosclerosis, treatment with LXR agonists altered the expression of pro-inflammatory proteins, including IL-6, ICAM1 and E-selectin, within the atherosclerotic lesions.

Therefore, LXR agonists could have a dual impact on the pathology of atherosclerosis, by directly activating genes to promote RCT, which decreases the amount of cholesterol in the plaques, and by inhibiting the expression of pro-inflammatory genes, which reduces inflammation in the plaques.

The development of LXR agonists, however, has been hampered by the lipogenic effects of these compounds. This is because in liver cells, activated LXRs upregulate SREBP-1c, the master regulator of hepatic lipogenesis. As a result, treatment with LXR agonists increases triglyceride (i.e. fat) synthesis in the liver and promotes the secretion of very-low-density lipoprotein (VLDL). These side effects present a major obstacle for the development of LXR agonists as drugs for cardiovascular diseases.

Because LXRα is the predominant subtype expressed in the liver, it is hypothesized that selective targeting of LXRβ could help avoid the undesirable effects on liver and plasma triglycerides. **However, LXRα and LXRβ are closely related, and their ligand binding domains have very similar amino acid sequences. Thus it has been challenging to identify small molecules that are selective for LXRβ.**

Preclinical Data

Vitae's VTP-38443 is an orally active LXR agonist. In biochemical binding assays, VTP-38443 demonstrated a high affinity for LXRβ (Ki=12 nM), and a 22-fold lower affinity for LXRα (Ki=262 nM). VTP-38443 also demonstrated potent activity in cells, with an EC_{50} of 19 nM for LXRβ and a 17-fold lower potency for LXRα in a cell-based reporter assay (Exhibit 17).

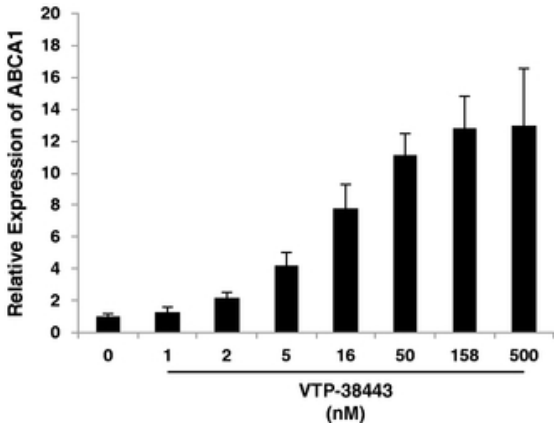
Exhibit 17: Affinity and Potency of VTP-38443

ASSAY	RECEPTOR	VTP-38443
Binding Ki (nM)	LXRα	262
	LXRβ	12
	LXRβ Selectivity Ratio	**22x**
Cell based reporter assay EC_{50} nM	LXRα	320
	LXRβ	19
	LXRβ Selectivity Ratio	**17x**

Source: Vitae Pharmaceuticals.

VTP-38443 was also studied in a functional assay to evaluate its ability to induce LXR target genes and to promote cholesterol efflux in a human fibroblast cell line. As shown in Exhibit 18, VTP-38443 is a potent agonist for increasing the expression of ABCA1. In addition, Vitae has demonstrated that the increase in ABCA1 expression is associated with an increased efflux of cholesterol in an HDL-dependent manner.

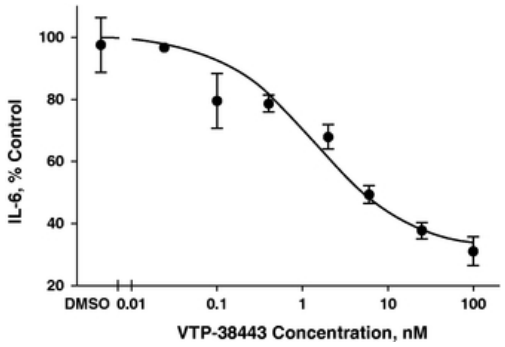
Exhibit 18: VTP-38443 Induces ABCA1 mRNA Expression in Human Fibroblast Cell Line



Source: Vitae Pharmaceuticals.

VTP-38443's ability to suppress inflammatory protein production in macrophages was also studied. As shown in Exhibit 19, VTP-38443 reduced the secretion of the proinflammatory cytokine IL-6 from the activated human macrophage cell line, THP-1, in a concentration dependent manner.

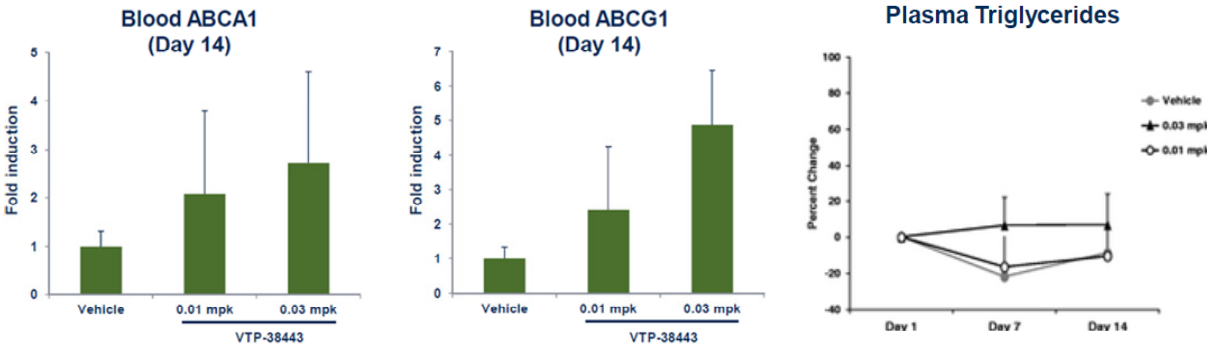
Exhibit 19: VTP-38443 Suppresses IL-6 Secretion in Activated Macrophage Cell Line



Source: Vitae Pharmaceuticals.

To evaluate the selectivity of VTP-38443 for LXRβ vs. LXRα, Vitae assessed VTP-38443's ability to induce ABCA1 expression vs. its ability to induce plasma and liver triglyceride elevation (a LXRα-driven process). Cynomolgus monkeys were dosed with VTP-38443 orally at 0.01 and 0.03 mg/kg per day for 14 days. As shown in Exhibit 20, VTP-38443 increased the expression of ABCA1 and ABCG1 at both doses, and did not significantly raise plasma triglyceride at either dose. **Using these data and data from other experiments, Vitae determined that there was an approximately 30-fold difference between the dose level that increases the expression of ABCA1 and ABCG1 and the dose level that causes the plasma and liver triglyceride elevation.**

Exhibit 20: Levels of ABCA1, ABCG1, and Plasma Triglycerides in Cynomolgus Monkeys Dosed with Once-Daily VTP-38443 for 14 Days



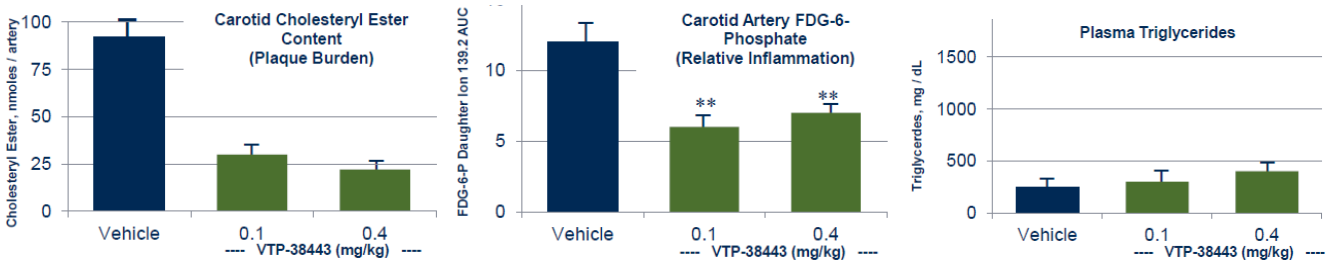
Source: Vitae Pharmaceuticals.

Vitae studied the ability of VTP-38443 to promote RCT. Mice were administered VTP-38443 and injected with macrophages loaded with labeled cholesterol. The amount of labeled cholesterol in feces was determined, and VTP-38443 treatment significantly increased the excretion of labeled cholesterol at both doses, indicating an increase in RCT in treated mice.

Vitae also studied the ability of VTP-38443 to reduce atherosclerosis in a mouse model of accelerated atherosclerosis. The model involved feeding high fat diet to ApoE -/- mice for two weeks, followed by ligation of the left common carotid artery (an artery in the neck that supplies blood to the brain), followed by another two weeks of high fat diet. Under these conditions, atherosclerotic lesions develop within the ligated carotid artery, characterized by an increase in cholesteryl esters as well as an increase in vascular inflammation, both indicative of an unstable

atherosclerotic plaque. VTP-38443 was administered to these mice orally, starting at the time of ligation surgery. **As shown in Exhibit 21, VTP-38443 produced a significant, dose-dependent decrease in cholesteryl ester content (plaque burden) by more than 60%, with minimal change in triglycerides at the low dose and a small increase at the high dose.** In addition, VTP-38443 also decreased vascular inflammation as evidenced by a decrease in FDG-6-phosphate, an indirect marker of vascular inflammation. These results demonstrated that VTP-38443 had significant anti-atherosclerotic effect in this experimental model of an unstable atherosclerotic plaque.

Exhibit 21: VTP-38443 Decreases Cholesteryl Ester Content and Vascular Inflammation in a Mouse Model of Experimental Atherosclerosis



** statistically significant at p<0.01.

Source: Vitae Pharmaceuticals.

In PK studies in rats and cynomolgus monkeys, VTP-38443 administered orally or intravenously was well absorbed, with approximately 50% bioavailability and a half-life consistent with once-daily dosing in humans.

Development Plans

VTP-38443 is currently in preclinical development, and Vitae has completed dose ranging toxicology studies. Upon completing necessary preclinical studies, Vitae expects to make an IND filing in 1Q16 and initiate single and multiple ascending dose phase 1 studies thereafter. These phase 1 studies will be conducted in healthy volunteers and will assess safety, tolerability and PK of VTP-38443, as well as markers of RCT and inflammation.

Market Opportunity

Each year in the U.S., approximately 1.36 million hospitalizations list ACS as either the primary or secondary discharge diagnosis. Approximately 0.55 million of these hospitalizations are for UA and 0.81 million are for MI. The economic impact of ACS is estimated to be greater than $150 billion annually and the direct medical cost for ACS is estimated at $75 billion, with drug therapy accounting for a significant portion of the medical cost.

VTP-38543 (LXRβ Inhibitor) for Atopic Dermatitis

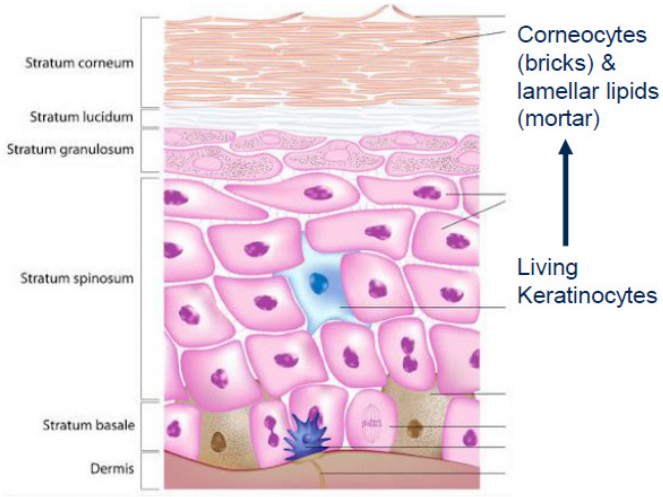
Vitae is developing another LXRβ agonist, VTP-38543, as a topical treatment for atopic dermatitis, also known as eczema. Atopic dermatitis is characterized by a loss of barrier function in the outmost layer of the skin and inflammation. Activation of LXRs leads to stimulation of keratinocyte differentiation, epidermal lipid synthesis and an anti-inflammatory response in skin cells. In preclinical studies, VTP-38543 promoted the expression of genes responsible for lipid synthesis and secretion, which are important in maintaining barrier function. In addition, VTP-38543 also reduced skin inflammation with efficacy comparable to that of high potency topical corticosteroids, the current standard of care. Vitae expects to complete necessary preclinical studies and make IND filing for VTP-38543 by 2H15, with phase 1 clinical trials commencing thereafter.

Mechanism of Action

Atopic dermatitis, also known as atopic eczema or eczema, is a chronic inflammatory skin condition characterized by erythema, pruritus, and scaling. Two major pathological features of atopic dermatitis are barrier dysfunction and inflammation, and they drive each other in a vicious cycle.

Evidence from human genetic studies suggests that defects in the epidermal structure, particularly in the stratum corneum, play a pivotal role in driving the pathogenesis of atopic dermatitis. The stratum corneum is the outmost layer of the epidermis, and is composed of flattened, terminally differentiated keratinocytes (known as corneocytes) surrounded by lipid matrix (known as lamellar lipids). The stratum corneum forms an impermeable barrier that controls the movement of water and electrolytes in and out of the body, and blocks the entry of microorganisms. Research suggests that up to 55% of atopic dermatitis patients in Europe have mutations in the gene encoding filaggrin, a structural protein in the stratum corneum. Other mutations have also been identified that decrease the formation of the lamellar lipids. These epidermal impairments result in a reduced ability of the skin to self-repair, leading to extended signaling of repair and chronic activation of immune cells, which eventually presents as atopic dermatitis and related conditions.

Exhibit 22: The Architecture of the Epidermis



Source: Vitae Pharmaceuticals.

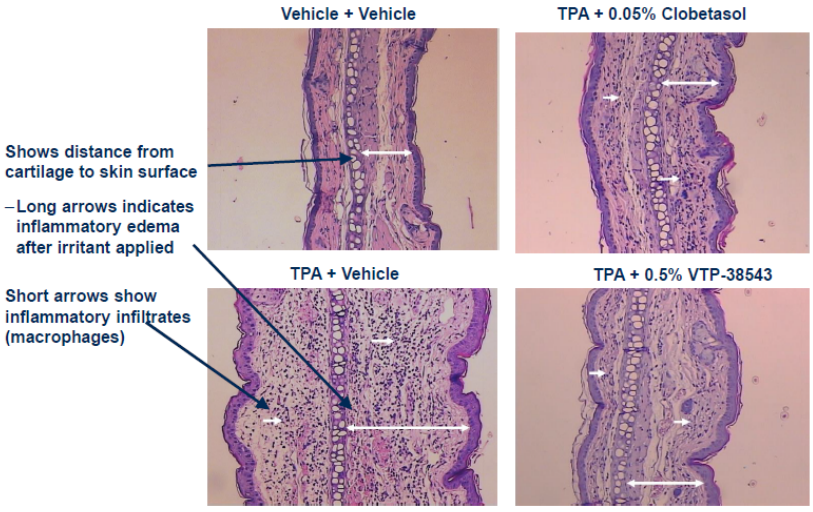
LXRs are important regulators of epidermal biology. Activation of LXR stimulates the differentiation of keratinocytes into corneocytes by inducing the expression of genes involved in stratum corneum formation, such as filaggrin. LXR also promotes epidermal lipid synthesis and the secretion of lamellar lipids, which "glue" the corneocytes into becoming an impermeable barrier. In addition, LXR also has anti-inflammatory functions. Like other nuclear receptors (e.g. the glucocorticoid receptor), LXR has the ability to mediate transrepression of the expression of inflammatory genes, including iNOS, IL-6, and COX2. Therefore, LXR agonists could represent a novel therapeutic approach for atopic dermatitis because it enhances the integrity of the epidermal barrier and at the same time suppresses skin inflammation.

Preclinical Data

VTP-38543 is a partial agonist of LXRβ, and has demonstrated an affinity of 26 nM in binding assays and an EC_{50} of 16 nM in inducing LXR-mediated activity in cell-based assays.

Vitae studied the ability of VTP-38543 to reduce inflammation in a mouse ear model of inflammation. When applied topically to the ear, the chemical tetradecanoylphorbol acetate (TPA) induces a strong inflammatory response, as evidenced by the infiltration of neutrophils (small arrows) and increased ear swelling (Exhibit 23, lower left panel). At 45 minutes and 4 hours after TPA-application, mice were treated topically with either VTP-38543 or clobetasol (a potent corticosteroid). **Topical treatment with VTP-38543 significantly reduced both neutrophil infiltration and swelling (Exhibit 23, upper right panel), with treatment effects comparable to those of clobetasol (Exhibit 23, lower right panel)**.

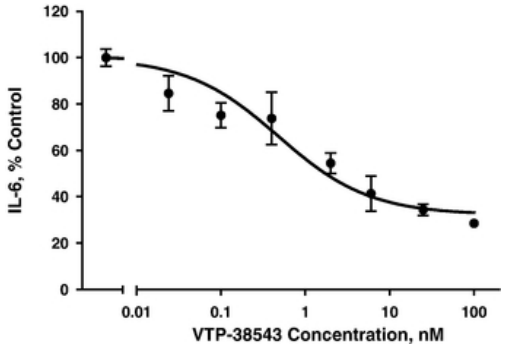
Exhibit 23: VTP-38543 Demonstrates Similar Efficacy to Corticosteroid in Acute Ear Dermatitis Model



Source: Vitae Pharmaceuticals.

Consistent with its anti-inflammatory effect in the mouse dermatitis model, VTP-38543 also reduced IL-6 expression in human THP-1 macrophages in a concentration-dependent manner.

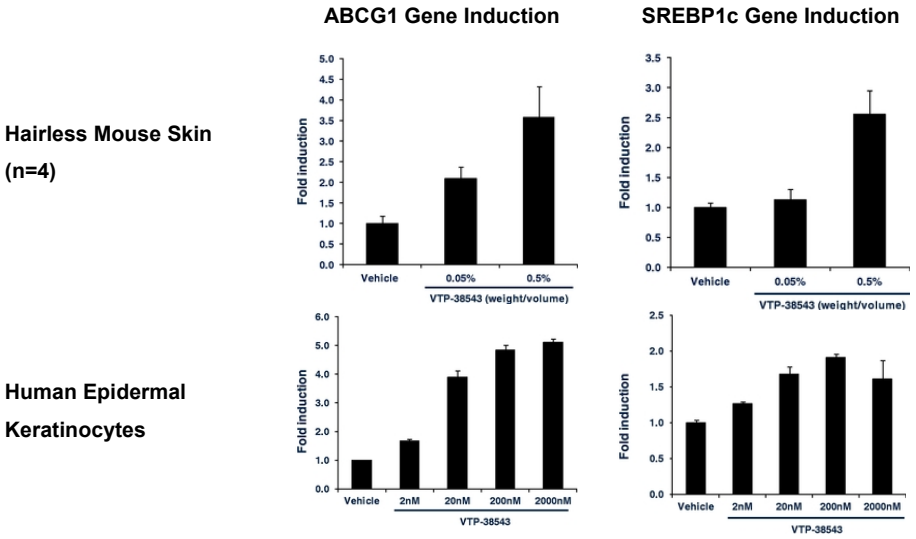
Exhibit 24: VTP-38543 Suppresses Expression of IL-6 in Activated THP-1 Macrophages



Source: Vitae Pharmaceuticals.

ABCG1 and SREBP1c are key LXR target genes and are involved in lipid transport and lipid synthesis, respectively. Mice deficient in ABCG1 or SREBP1c exhibit abnormal barrier formation. Topical application of VTP-38543 to the skin of hairless mice increased expression of both genes (Exhibit 25, upper row). In addition, VTP-38543 also induced expression of ABCG1 and SREBP1c in primary cultures of human epidermal keratinocytes (Exhibit 25, lower row).

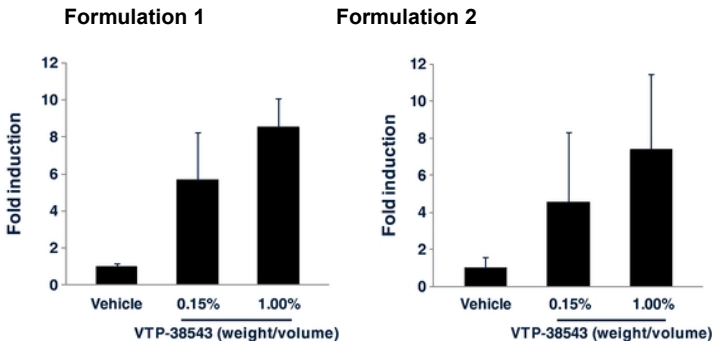
Exhibit 25: VTP-38543 Induces Expression of ABCG1 and SREBP1c in the Skin and in Keratinocytes



Source: Vitae Pharmaceuticals.

To further advance VTP-38543 as a clinical candidate, Vitae identified two topical formulations of VTP-38543 with appropriate drug stability, release, permeation, and aesthetic characteristics. When applied to the skin of hairless mice, both topical formulations produced strong, dose-dependent induction of the LXR-dependent marker of barrier function, ABCG1, in mouse skin (Exhibit 26).

Exhibit 26: Two Newly Selected Formulations of VTP-38543 Induce Expression of ABCG1 in Mouse Skin



Source: Vitae Pharmaceuticals.

Development Plans

VTP-38543 is currently in preclinical development, with an IND filing expected in 2H15. Vitae expects the first phase 1 clinical trial to be a single topical dose study in healthy volunteers. The endpoints for the clinical trial will include safety, tolerability, PK (if there are detectable drug levels in plasma), and biomarkers for lipid synthesis (e.g., SREBP1c) and lipid transport (e.g., ABCG1) in skin biopsies. The second phase 1 clinical trial is expected to be a two-week, topical multiple dose trial conducted in young adults with atopic dermatitis. The endpoints for the second clinical trial will include safety, tolerability, PK, and improvement in the clinical signs and symptoms of atopic dermatitis.

Market Opportunity

It is estimated that at least 17.8 million people in the U.S. have symptoms of atopic dermatitis. Worldwide, the prevalence of atopic dermatitis in infants and children is estimated to be 7-17%, and approximately 60% of these individuals experience recurrence of the disease as adults.

The most commonly used topical therapies for atopic dermatitis include glucocorticoids and calcineurin inhibitors. Though effective, both classes of therapies are associated with serious side effects in some patients. The side effects of glucocorticoids include thinning of the skin, loss of barrier function, adrenal suppression caused by drug absorption through the skin, and contraindications for use on the face and other sensitive areas. The side effects of calcineurin inhibitors include a burning sensation upon application and a black box warning for the risk of development of cancer. Two topical calcineurin inhibitors, PROTOPIC and ELIDEL, were approved in 2000 and 2001; by 2004, their combined annual sales exceeded $450 million. In 2005, a black-box warning for cancer risk was added to the prescription labels of these two drugs, and their sales decreased as a result. In 2013, the combined annual sales of these two drugs were approximately $240 million. VTP-38543 has the potential of a first-in-class LXR therapy that controls inflammation and improves the skin barrier function while avoiding the side effects associated with existing therapies.

Immuno-Oncology Program

Vitae has initiated a discovery program focused on developing small-molecule modulator as immunotherapy for cancer. Cancer immunotherapy harnesses the immune system and directs it against the cancer. Cancer cells or their micro-environment frequently produce immune suppressive factors to blunt immune response and allow tumors to escape immune-mediated clearance. Therefore the key to cancer immunotherapy is to overcome tumor-induced immune suppressive mechanisms.

In recent years, an emerging class immunotherapy, termed immune checkpoint blockers, has demonstrated impressive activity in many tumor types. These agents are mainly monoclonal antibodies targeting inhibitory receptors expressed on T cells or their ligands. These proteins, such as CTLA-4, PD-1, PD-L1, Tim-3 and LAG3, function to switch off the anti-tumor activity of T cells.

The list of potential immuno-modulators has continued to expand, and now includes certain low molecular-weight metabolites generated by cells in the tumor microenvironment. These metabolites suppress T cell function or activate immune suppressive mechanisms. Therefore an emerging strategy in cancer immunotherapy is to use small molecule drugs to inhibit the enzymes responsible for the generation of these metabolites. Recent development in cancer immunotherapy has suggested that regimens that target multiple pathways appear to have additive or synergistic effects and could improve patient outcomes dramatically. Therefore the dominant route for development of agents in this area is likely to be combination regimens, including combination with other novel agents, as well as with conventional therapies.

Vitae has identified a target with biology that has been validated in rodent cancer models via genetics, monoclonal antibodies, and non-drug-like small molecules. Using the Contour platform, Vitae has discovered compounds that inhibit the target protein with single-digit nM potency and no significant off-target activity. Vitae plans to conduct preclinical animal studies to confirm and optimize their activity.

Intellectual Property

As of June 30, 2014, Vitae owned, either solely or jointly, 20 issued patents and 21 pending applications in the U.S., 68 issued patents and 180 pending applications in foreign jurisdictions, and six pending international applications filed under the Patent Cooperation Treaty (PCT).

The VTP-34072 portfolio, jointly owned by Vitae and BI, includes one issued patent in the U.S., one pending patent application in the U.S., two issued patents in foreign jurisdictions, and 37 pending patent applications in foreign jurisdictions including Europe, Japan, Taiwan, Canada, Australia, Brazil, China, and India. These properties include claims directed to VTP-34072 and related compounds, and methods of using these compounds to treat type 2 diabetes. The granted patents and any patents that may grant from the pending applications will expire in November 2030, not including possible extensions. The U.S. patent received additional patent term for patent office delay, and will expire in September 2031, not including possible patent term extensions due to regulatory delay.

The VTP-37948 portfolio, jointly owned by Vitae and BI, includes one pending patent application in the U.S., one pending international application filed under the PCT, and six pending patent applications in foreign jurisdictions. These applications include claims directed to VTP-37948 and related compounds, and methods of using these compounds to treat Alzheimer's disease. Patents that may issue from these applications will expire in August 2033, not including possible extensions due to patent office or regulatory delays.

VTP-43742 is claimed in a U.S. provisional application filed in February 2014, which includes claims to VTP-43742 and related compounds, and methods of using these compounds to treat various indications. The U.S. provisional application will serve as the basis for filing of patent applications and the pursuit of patents globally. Patents that may issue from these applications may expire as late as February 2035, not including possible extensions due to patent office or regulatory delays.

VTP-38443 is claimed in a published PCT application, which includes claims to VTP-38443 and related compounds, and methods of using these compounds to treat various indications. The PCT application will allow for the pursuit of patents globally, including in the U.S., Europe, Japan, Canada, Australia, Brazil, China, and India. Patents that may issue from these applications will expire in March 2033, not including possible extensions due to patent office or regulatory delays.

VTP-38543 is claimed in a published PCT application, which includes claims to VTP-38543 and related compounds, and methods of using these compounds to treat various indications, including atopic dermatitis. The PCT application will allow for the pursuit of patents globally, including in the U.S., Europe, Japan, Canada, Australia, Brazil, China, and India. Patents that may grant from these applications will expire in March 2033, not including possible extensions.

Vitae's maintains its intellectual property on Contour, its proprietary structure-based drug discovery platform, as trade secrets and know-how.

Management

Jeffrey S. Hatfield has served as president, chief executive officer and a member of the board of directors since March 2004. From 1985 to 2004, Mr. Hatfield worked at Bristol-Myers Squibb (BMS), where he held various executive positions, including senior vice president of the Virology and Immunology Divisions from 2000 to 2004, president and general manager, Canada from 1997 to 2000, and vice president, U.S. Managed Health Care from 1996 to 1997. In 2014, Mr. Hatfield became a director of Ambit Biosciences. Mr. Hatfield received an MBA degree from the Wharton School, University of Pennsylvania, and a bachelor's degree in pharmacy from Purdue University.

Richard Gregg, M.D. has served as chief scientific officer since 2008. From 1988 to 2007, Dr. Gregg worked at BMS in a variety of positions, including vice president of clinical discovery from 2001 to 2007 and vice president of metabolic and cardiovascular drug discovery from 1999 to 2001. Prior to his career in the biopharmaceutical industry, Dr. Gregg spent 10 years studying disorders of lipid and lipoprotein metabolism at the National Heart, Lung and Blood Institute. Dr. Gregg holds an M.D. degree from Stanford School of Medicine and received a master of science and a bachelor’s degree in biochemistry from Iowa State University.

Richard Morris has served as chief financial officer since May 2014. Prior to Vitae, Mr. Morris worked at ViroPharma in a variety of positions since 2001, including vice president, financial planning and strategic analysis from 2012 to 2014, vice president, chief accounting officer from 2011 to 2012, controller and chief accounting officer from 2008 to 2011 and controller from 2005 to 2008. Prior to ViroPharma, Mr. Morris worked for KPMG in its health care assurance practice. Mr. Morris received a bachelor’s degree in accounting from Saint Joseph's University and has been a CPA since 1999.

Arthur Fratamico, R.Ph. has served as chief business officer since May 2014. From June 2012 through 2014, Mr. Fratamico served as chief business officer of ion Therapeutics. Previously, Mr. Fratamico led the business development efforts, including overseeing numerous licensing transactions and acquisitions, at various private biotechnology companies including Trevena from 2011 to 2012, Gemin X Pharmaceuticals from 2008 to 2011 and MGI Pharma from 1999 to 2008. Mr. Fratamico holds a bachelor’s degree in pharmacy from the Philadelphia College of Pharmacy and an MBA degree from Drexel University.

Other companies mentioned (priced as of the close on October 17, 2014):

Amgen (AMGN, $133.69, Market Perform)
AstraZeneca (AZN, $67.81, Not Rated)
Bristol-Myers Squibb (BMY, $50.42, Outperform, rated by Alex Arfaei)
Celgene (CELG, $88.12, Outperform)
Eli Lilly (LLY, $62.58, Market Perform, rated by Alex Arfaei)
Exelixis (EXEL, $1.58, Not Rated)
Incyte (INCY, $50.08, Not Rated)
Johnson & Johnson (JNJ, $98.70, Outperform, rated by Joanne Wuensch)
Merck (MRK, $54.02, Market Perform, rated by Alex Arfaei)
Novartis (NVS, $86.63, Not Rated)
Pfizer (PFE, $27.83, Market Perform, rated by Alex Arfaei)

VTAE Income Statement 2014E-2020E

INCOME STATEMENT ($M)	2014E	2015E	2016E	2017E	2018E	2019E	2020E
REVENUES							
Product Revenue	$ -	$ -	$ -	$ -	$ -	$ -	$ 37.7
Collaboration Revenue	2.3	-	-	-	-	-	-
Sponsored Research and Other Revenue	-	-	-	-	-	-	-
TOTAL REVENUES	**$ 2.3**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 37.7**
EXPENSES (GAAP)							
Cost of Goods Sold (COGS)	$ -	$ -	$ -	$ -	$ -	$ -	$ 3.6
R&D Expense	18.8	20.0	21.0	21.5	24.0	26.0	28.0
SG&A Expense	5.2	6.0	6.0	6.0	8.0	10.0	12.0
Other	-	-	-	-	-	-	-
TOTAL EXPENSES	24.1	26.0	27.0	27.5	32.0	36.0	43.6
Operating Income	**(21.7)**	**(26.0)**	**(27.0)**	**(27.5)**	**(32.0)**	**(36.0)**	**(5.9)**
Depreciation and amortization	-	-	-	-	-	-	-
EBIT	(21.7)	(26.0)	(27.0)	(27.5)	(32.0)	(36.0)	(5.9)
Interest and other income	0.0	-	-	-	-	-	-
Interest and other expense	(0.5)	-	-	-	-	-	-
Other Income (Expense)	0.2	(12.9)	(12.1)	(7.2)	12.0	(7.5)	-
Interest and Other Income (Expense)	(0.3)	(12.9)	(12.1)	(7.2)	12.0	(7.5)	-
Pre-Tax Income	(22.0)	(38.9)	(39.1)	(34.7)	(20.0)	(43.5)	(5.9)
Income Taxes	-	-	-	-	-	-	-
Net Income (GAAP)	**$ (22.0)**	**$ (38.9)**	**$ (39.1)**	**$ (34.7)**	**$ (20.0)**	**$ (43.5)**	**$ (5.9)**
EPS (GAAP) (basic)	$ (1.42)	$ (1.72)	$ (1.46)	$ (1.19)	$ (0.68)	$ (1.16)	$ (0.14)
EPS (GAAP) (diluted)	**$ (1.42)**	**$ (1.72)**	**$ (1.46)**	**$ (1.19)**	**$ (0.68)**	**$ (1.16)**	**$ (0.14)**
Total of Reconciliation Items	112.1	-	-	-	-	-	-
Net Income (Non-GAAP)	$ 90.0	$ (38.9)	$ (39.1)	$ (34.7)	$ (20.0)	$ (43.5)	$ (5.9)
Impact of Adjustments to EPS	8.14	-	-	-	-	-	-
EPS (Non-GAAP) (basic)	$ 6.72	$ (1.72)	$ (1.46)	$ (1.19)	$ (0.68)	$ (1.16)	$ (0.14)
EPS (Non-GAAP) (diluted)	$ 6.72	$ (1.72)	$ (1.46)	$ (1.19)	$ (0.68)	$ (1.16)	$ (0.14)
Weighted average shares outstanding (basic)	15.6	22.5	27.0	29.1	29.5	37.9	41.8
Weighted average shares outstanding (diluted)	15.6	22.5	27.0	29.1	29.5	37.8	41.7

Source: Company reports and BMO Capital Markets.

VTAE Balance Sheet 2014E-2020E

BALANCE SHEET (M)	2014E	2015E	2016E	2017E	2018E	2019E	2020E
Current Assets							
Cash and cash equivalents	$ 46.2	$ 57.3	$ 93.2	$ 58.4	$ 38.4	$ 69.9	$ 64.0
Short-term investments	9.4	9.4	9.4	9.4	9.4	9.4	9.4
Total cash, cash equivalents, and short-term investments	$ 55.6	$ 66.7	$ 102.6	$ 67.8	$ 47.8	$ 79.3	$ 73.4
Accounts Receivables	-	-	-	-	-	-	-
Restricted Cash	-	-	-	-	-	-	-
Inventories	-	-	-	-	-	-	-
Prepaid and other current assets	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Current Assets	$ 56.4	$ 67.5	$ 103.4	$ 68.6	$ 48.6	$ 80.1	$ 74.2
Leasehold improvements	-	-	-	-	-	-	-
Property and equipment, net	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Patents and licensed technology	-	-	-	-	-	-	-
Restricted Cash	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Marketable securities	-	-	-	-	-	-	-
Intangibles, net	-	-	-	-	-	-	-
Other assets	1.0	1.0	1.0	1.0	1.0	1.0	1.0
TOTAL ASSETS	**$ 58.5**	**$ 69.6**	**$ 105.5**	**$ 70.7**	**$ 50.7**	**$ 82.2**	**$ 76.3**
Current Liabilities							
Accounts payable	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Accrued payroll	-	-	-	-	-	-	-
Accrued expenses	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Interest payable	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Payables to related parties	-	-	-	-	-	-	-
Income taxes payable	-	-	-	-	-	-	-
Notes payable - current portion	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Current portion of deferred rent	-	-	-	-	-	-	-
Current portion of deferred revenue	-	-	-	-	-	-	-
Other current liabilities	-	-	-	-	-	-	-
Total Current Liabilities	$ 8.9	$ 8.9	$ 8.9	$ 8.9	$ 8.9	$ 8.9	$ 8.9
Notes payable	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Accrued interest on convertible notes payable	-	-	-	-	-	-	-
Other long-term obligations, less current portion	-	-	-	-	-	-	-
Deferred revenue, less current portion	-	-	-	-	-	-	-
Interest payable	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Deferred rent	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Other liabilities	0.3	0.3	0.3	0.3	0.3	0.3	0.3
TOTAL LIABILITIES	$ 11.3	$ 11.3	$ 11.3	$ 11.3	$ 11.3	$ 11.3	$ 11.3
Shareholder's Equity							
Series A-1 convertible preferred stock	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Series A-2 convertible preferred stock	16.4	16.4	16.4	16.4	16.4	16.4	16.4
Series B convertible preferred stock	64.0	64.0	64.0	64.0	64.0	64.0	64.0
Series C convertible preferred stock	14.9	14.9	14.9	14.9	14.9	14.9	14.9
Series D convertible preferred stock	29.9	29.9	29.9	29.9	29.9	29.9	29.9
Common stock, at par	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Additional paid-in capital	54.1	104.1	179.1	179.1	179.1	254.1	254.1
Treasury stock	-	-	-	-	-	-	-
Accumulated other comprehensive income	-	-	-	-	-	-	-
Accumulated deficit	(132.9)	(171.8)	(210.9)	(245.6)	(265.6)	(309.1)	(315.0)
TOTAL SHAREHOLDER'S EQUITY (DEFICIT)	$ 47.1	$ 58.2	$ 94.1	$ 59.4	$ 39.4	$ 70.9	$ 65.0
TOTAL LIABILITIES AND SHAREHOLDER'S EQUITY	**$ 58.5**	**$ 69.6**	**$ 105.5**	**$ 70.7**	**$ 50.7**	**$ 82.2**	**$ 76.3**

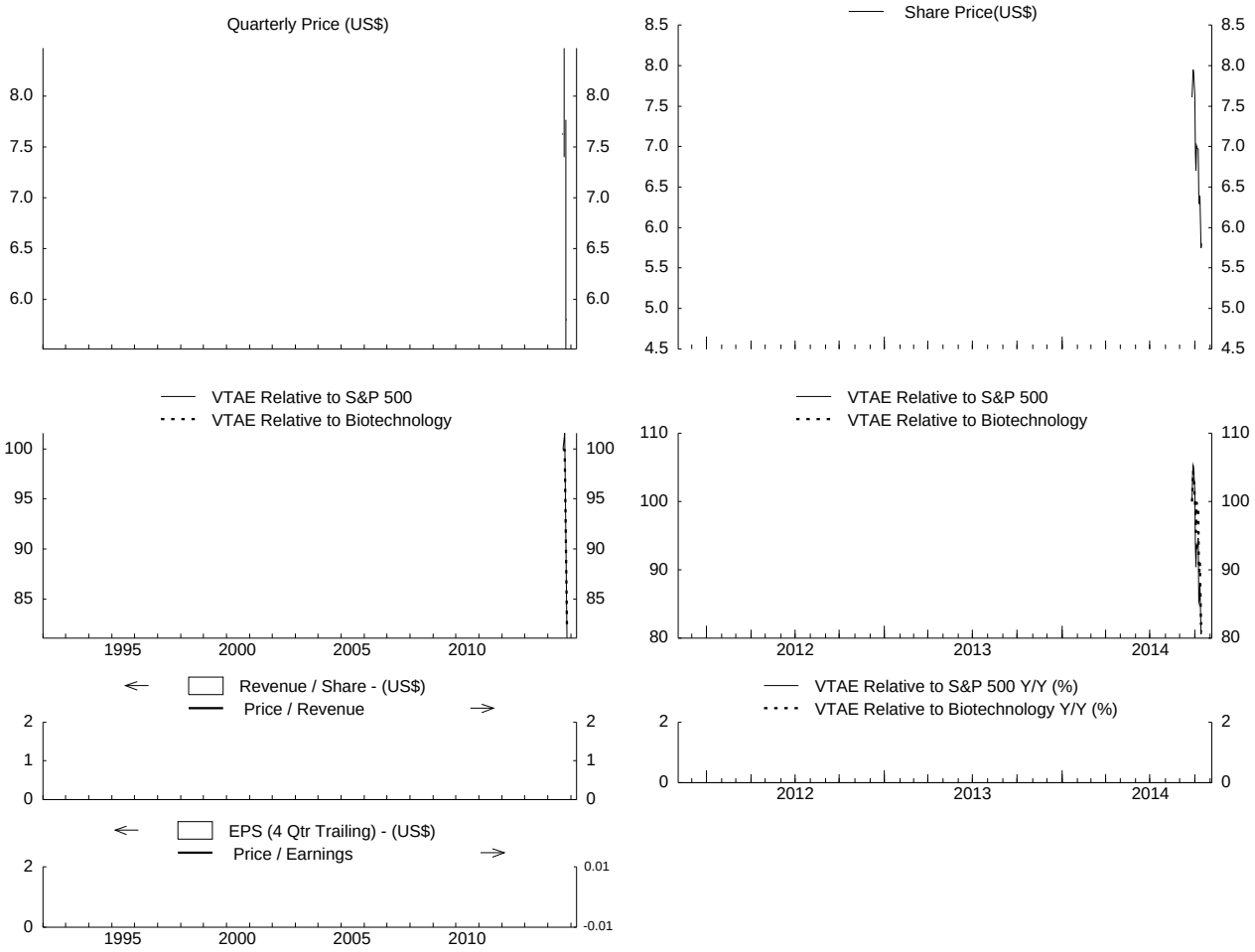
Source: Company reports and BMO Capital Markets.

VTAE Cash Flow Statement 2014E-2020E

CASH FLOW STATEMENT (M)	2014E	2015E	2016E	2017E	2018E	2019E	2020E
Cash Flow From Operating Activities							
Net Income	$ (6.0)	$ (10.5)	$ (9.8)	$ (8.8)	$ (5.0)	$ (10.5)	$ (0.8)
Adjustments to reconcile net income to cash from operations							
Depreciation & amortization	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
Amortization of premium on investments, net	-	-	-	-	-	-	-
Gain on disposal of property and equipment	-	-	-	-	-	-	-
Stock-based compensation	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
Deferred rent and lease incentives	-	-	-	-	-	-	-
Other	-	0.1	0.1	0.1	0.1	0.1	0.1
Working Capital Adjustments							
Prepaids and other assets	-	-	-	-	-	-	-
Accounts payable	-	-	-	-	-	-	-
Accrued payroll	-	-	-	-	-	-	-
Accrued expenses	-	-	-	-	-	-	-
Accrued interest	-	-	-	-	-	-	-
Accounts receivable							
Payable to related parties	-	-	-	-	-	-	-
Income taxes payable	-	-	-	-	-	-	-
Deferred revenue	-	-	-	-	-	-	-
Deferred rent	-	-	-	-	-	-	-
Other assets and liabilities, net	-	-	-	-	-	-	-
Total Working Capital Increase (Decrease)	$ -	$ -	$ -	$ -	$ -	$ -	$ -
TOTAL CASH FROM OPERATIONS	**$ (6.2)**	**$ (10.6)**	**$ (9.9)**	**$ (8.9)**	**$ (5.1)**	**$ (10.6)**	**$ (0.9)**
Cash From Investing Activities							
Purchases of short-term investments	-	-	-	-	-	-	-
Maturities and sales of short-term investments	-	-	-	-	-	-	-
Purchases of property and equipment	-	-	-	-	-	-	-
Acquisitions of patents	-	-	-	-	-	-	-
Acquisitions of licenses	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Increase in patents, deposits and other assets	-	-	-	-	-	-	-
TOTAL CASH FROM INVESTING	$ 0.1	$ 0.1	$ 0.1	$ 0.1	$ 0.1	$ 0.1	$ 0.1
Cash From Financing Activities							
Proceeds from long-term debt borrowings	-	-	-	-	-	-	-
Repayment of borrowings	-	-	-	-	-	-	-
Payments of financing costs for an initial public offering	-	-	-	-	-	-	-
Proceeds from exercise of preferred and common stock options	-	-	-	-	-	-	-
Restricted cash	-	-	-	-	-	-	-
Common stock issuance	-	-	-	-	-	-	-
TOTAL CASH FROM FINANCING	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Increase (decrease) in cash and cash equivalents	(6.1)	(10.5)	(9.8)	(8.8)	(5.0)	(10.5)	(0.8)
Cash and cash equivalents at beginning of year	52.3	67.8	103.0	67.3	43.4	80.4	64.8
Cash and cash equivalents at end of year	$ 46.2	$ 57.3	$ 93.2	$ 58.4	$ 38.4	$ 69.9	$ 64.0

Source: Company reports and BMO Capital Markets.

VITAE THERAPEUTICS (VTAE)



FYE (Dec.)	EPS US$	P/E Hi - Lo	DPS US$	Yield% Hi - Lo	Payout %	BV US$	P/B Hi - Lo	ROE %
Range*:		na na		NC			>15 >15	
Current*	ND	na	0.00	0.0	na	NA	NA	na

VTAE - Rating as of 1-Oct-14 = NR

* Current EPS is the 4 Quarter Trailing to Q2/2014.
* Valuation metrics are based on high and low for the fiscal year.
* Range indicates the valuation range for the period presented above.

Last Price (October 14, 2014): $5.80
Sources: IHS Global Insight, Thomson Reuters, BMO Capital Markets.

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Hold	Market Perform	52.5%	9.7%	38.5%	51.6%	42.1%	39.1%
Sell	Underperform	3.2%	5.3%	1.3%	4.5%	1.4%	4.9%

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