Vital Therapies, Inc. (VTL)

Rating	(from Neutral) **OUTPERFORM* [V]**
Price (10 Dec 14, US$)	20.80
Target price (US$)	25.00[1]
52-week price range	33.31 - 11.21
Market cap. (US$ m)	495.98
Enterprise value (US$ m)	397.48

**Stock ratings are relative to the coverage universe in each analyst's or each team's respective sector.*
[1]Target price is for 12 months.
[V] = Stock considered volatile (see Disclosure Appendix).

Research Analysts

Bruce Nudell
212 325 9122
bruce.nudell@credit-suisse.com

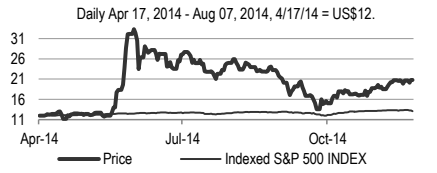
Matthew Keeler
212 325 9008
matthew.keeler@credit-suisse.com

UPGRADE RATING

Corrected: Proprietary Statistical Analysis Adds to Our Confidence in VTI-208 Success

- **Upgrade to Outperform; Statistical Analysis Supports Our Confidence in VTI-208 Success:** We employed statistical analysis to assess the likelihood of VTI-208 trial success. This analysis adds to our confidence that our original assumption that a 70% likelihood of VTI-208 primary endpoint success is reasonable. As a result, given where VTL currently trades we are revising our rating to Outperform & leaving our price target unchanged (2014 EPS changes below due to change in basis of EPS to be consistent with VTL's reporting, not due to underlying changes).
- **Analysis Supports our View that VTI-208 More Likely than Not to be Successful:** Our analysis relies on data from the VTI-206 Phase 2b alcohol induced liver decompensation (AILD) trial (in a sub-group similar to that enrolling in the ongoing pivotal VTI-208) to assess the plausibility of the 15% absolute survival benefit assumed in the VTI-208 trial & the likelihood of primary endpoint (log-rank difference in 90 day survival at the P < 0.05 level) success of the VTI-208 trial (which we see as the most important driver of VTL valuation). The output of our work suggests that a 10-15% mortality benefit for VTL's extracorporeal liver assist device (ELAD) is plausible (as discussed in detail in this report) which, if achieved, to us implies (based on further statistical analysis), that VTI-208 is more likely than not to hit its primary endpoint. We acknowledge risk remains based on the limited data presented to date, however, this exercise increases our comfort with this risk.
- **Thoughts on the Stock:** Given the large AILD opportunity (60K US/EU patients & ~$150K ASP implies $9B opportunity) we see meaningful upside potential on favorable VTI-208 data, however, the risk associated with trial success is likely to weigh on the shares until preliminary results are announced.

Share price performance



On 08/07/14 the S&P 500 INDEX closed at 2028.04

Quarterly EPS	Q1	Q2	Q3	Q4
2013A	—	—	—	—
2014E	-24.49	-0.91	-0.59	-0.53
2015E	-0.53	-0.53	-0.55	-0.55

Financial and valuation metrics

Year	12/13A	12/14E	12/15E	12/16E
EPS (CS adj.) (US$)	-3.91	-3.48	-2.17	-1.29
Prev. EPS (US$)	—	-2.99	-2.18	-1.19
P/E (x)	-5.3	-6.0	-9.6	-16.2
P/E rel. (%)	-28.2	-34.1	-59.9	-113.1
Revenue (US$ m)	—	—	—	—
EBITDA (US$ m)	-30.6	-47.9	-52.4	-31.4
OCFPS (US$)	-2.86	-2.77	-2.23	-1.32
P/OCF (x)	—	-7.5	-9.3	-15.7
EV/EBITDA (current)	-13.6	-8.7	-8.0	-13.3
Net debt (US$ m)	-38	-98	-43	-11
ROIC (%)	-971.60	8,297.92	-2,137.81	-929.53

Number of shares (m)	23.85	IC (current, US$ m)	3.23
BV/share (Next Qtr., US$)	—	EV/IC (x)	-673.6
Net debt (Next Qtr., US$ m)	-98.5	Dividend (current, US$)	—
Net debt/tot eq (Next Qtr., %)	-100.6	Dividend yield (%)	—

Source: Company data, Credit Suisse estimates.

Statistical Analysis Supports Our View that VTI-208 Likely to Hit Primary Endpoint (this note corrects & replaces previous version to include corrected Exhibit 3, no changes to any other text or exhibits)

Background on VTL's Extracorporeal Liver Assist Device (ELAD) Therapy

A Phase 2b study (VTI-206), as well as pre-clinical work suggests that ELAD may be used as a bridging therapy (5 days) for patients suffering from acute alcohol induced liver de-compensation (AILD). ELAD harnesses extra-corporeal activated liver cells to 1) help reestablish overall physiological hemostasis and 2) off-load the "shocked" liver while providing a more favorable environment for liver regeneration. Key in patient selection is the requirement that the liver is sufficiently viable to regenerate. The ELAD hypothesis is formally being tested in a US pivotal trial – VTI-208 – which is enrolling 200 AILD patients (randomized 1:1 versus standard of care) with MELD liver risk scores of 18-35, with the mid-point score of 26.5 connoting just around 50% 90 day mortality risk.

The 4 ELAD bio-canisters contain the equivalent mass of around 30% of a normal liver, with each cell performing around 80% of the functions of a native liver cell. Pre-clinical work has demonstrated that the ELAD cells likely contribute to plasma detoxification (cytochrome P-450 enzyme systems), osmotic balance / protein clearance (albumin, alpha fetoprotein, transferrin), coagulation factors (FV, FVII, fibrinogen, etc.), immunological balance (alpha-1-antitrypsin, alpha-1antichymotrypsin, antithrombin III, complement C3, gelsolin), and liver regeneration (hepatocyte growth factor, gelsolin, alpha-fetoprotein).

Proprietary Statistical Analysis Supports Greater than 50/50 Likelihood of VTI-208 Success

In this note, we use data from the VTI-206 Phase 2b AILD trial (in a sub-group similar to that enrolling in the ongoing pivotal VTI-208) to estimate the likely impact of ELAD on survivorship in severely compromised AILD patients. Specifically, we feed the changes in key biochemical markers (creatinine and bilirubin) that were observed in ELAD treated patients in VTI-206 - which are the key elements of the MELD risk score (Model for End-Stage Liver Disease, a scoring system for assessing the severity of chronic liver disease) - to predict the anticipated impact on 90 day mortality. This exercise suggested that a 90 day survivorship benefit of 10-15% is indeed feasible (the trial assumed a 15% absolute benefit as the expected case).

We then analyzed whether survival benefits of this magnitude would yield a statistical significant difference (log-rank difference at the $P < 0.05$ level) between exponentially declining survivorship curves (across control survival rates of 40% to 60% at 90 days) and for the circumstance in which ELAD survivorship flattens after 30 days with controls continuing to decline in an exponential manner. For the more stringent case of exponential decline in both arms, probability of trial success was about 50% for a 10% absolute benefit (with control mortality at the expected 50% at 90 days) but rose to around 85% with a 15% absolute benefit, with a mean probability of trial success of around 70% across this range of benefit. When invoking an early flattening in ELAD survivorship (actually observed in the small VTI-206, but perhaps favorably biased), a survival benefit of even 5% at 90 days would very likely result in a statistically significant trial outcome. **Given the small size (and sub-selection) of the VTI-206 pilot data (n=29), which provided the grist for this analysis, and uncertainties with regards to the exact mechanism of action of ELAD, we continue to see risk to approval, however, our statistical analysis adds to our confidence that our original assumption that the assumption of a 70% likelihood of VTI-208 primary endpoint success remains reasonable.**

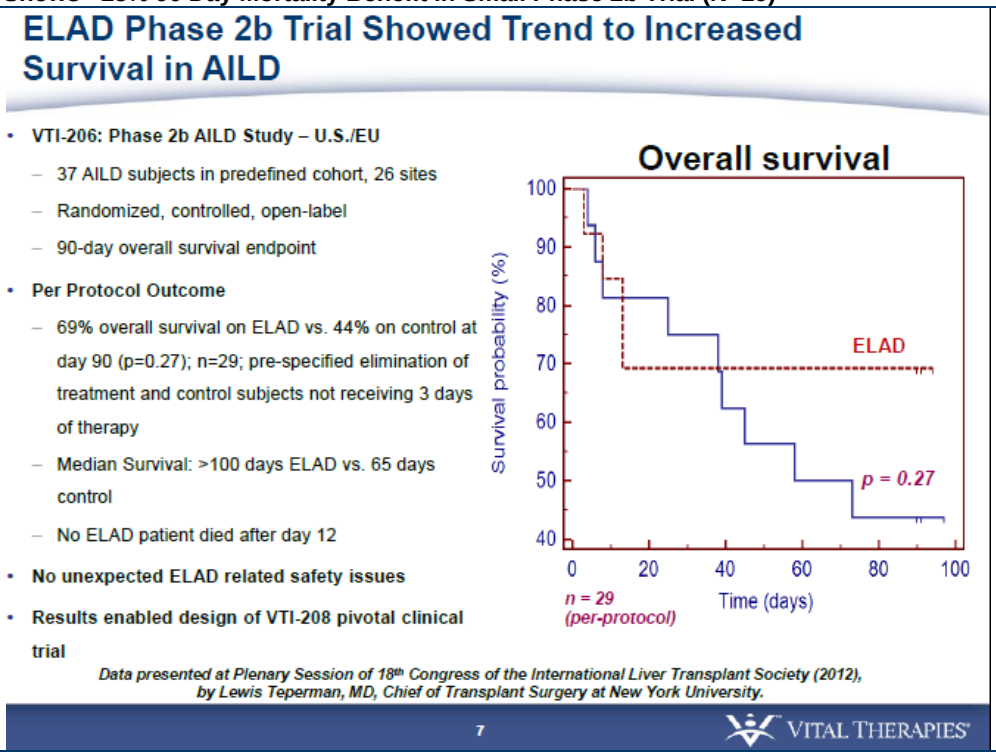
Upgrade to Outperform

(Market uncertainty as to the pace of adoption even with a successful outcome remains a factor as well.) As we previously articulated, a 70% chance of success supports a price target of $25 (EV/Sales of ~3X 2020 sales estimate of $300M discounted back at ~11%). Given where the stock trades currently, we are therefore revising our rating to Outperform and leaving our price target unchanged.

VTI-206 Suggests a Big Survivorship Benefit is Possible

Exhibit 1 shows the Kaplan-Meier survival curves for the very small (n=29) per-protocol Phase 2b test of ELAD in a group of severely ill AILD patients who had a MELD score (in both arms) of 29. A MELD score of 29 implies around 58% 90 day mortality and the observed death rate in the control arm was in fact around 55%, whereas the treatment arm showed a 30% death rate (with survival curve flattening beyond 10 days).

Exhibit 1: ELAD Shows ~25% 90 Day Mortality Benefit in Small Phase 2b Trial (N=29)



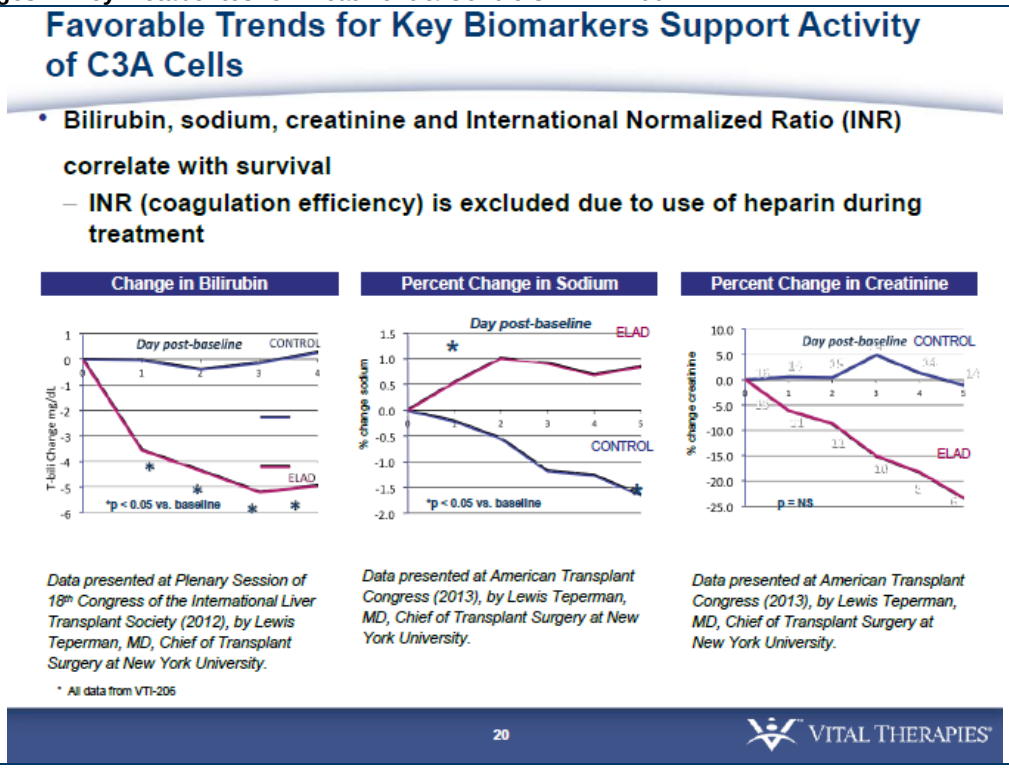
Source: Company presentation

The MELD algorithm provides a validated risk score for mortality at 90 days for AILD patients and uses bilirubin, creatine, and INR levels as prognostic indicators of global liver function and disruptions in overall physiological hemostasis driven by liver dysfunction. Given the broad range of biochemical support seemingly bestowed by ELAD cells (outlined in the introductory paragraphs), we felt that we could use calculated changes in MELD scores seen in ELAD patients in VTI-206 to guage the likely impact upon mortality at 90 days.

Exhibit 2 shows the changes in key metabolites for treatment and controls in VTI-206. Treatment arm patients enjoyed about a 23-25% decline in creatinine and bilirubin, and an increase in plasma sodium (which is deemed an important prognostic indicator, but which isn't included in the standard MELD score). Control patients, showed constant or worsening levels of these analytes. As ELAD patients are anti-coagulated while hooked up to the extra-corporeal ELAD circuit, we discounted the about 0.5 increases in INR that were seen during the five days of therapy. We reasoned that the small increase in INR was not reflective of underlying liver function / hemostasis (ELAD in fact results in an increase in circulating coagulation factors), and we also reasoned that a brief period (5

days) of elevated INR in a carefully monitored patient was unlikely to significantly influence the 90 day death rate.

Exhibit 2: Changes in Key Metabolites for Treatment & Controls in VTI-206



Source: Company presentation

Exhibit 3 shows a calculation of the expected impact on 90 day survivorship for ELAD patients in VTI-206 based on observed changes in creatinine and bilirubin. The MELD changes following ELAD therapy suggest a reduction in 90 day mortality from 58% to 43%, a 15% absolute difference, or a 26% reduction in the 90 day event rate. In fact, observed mortality in the ELAD arm was 30% (a 28% absolute survival benefit relative to that predicted by MELD), but because the per protocol VTI-206 was so small and involved sub-selection of patients meeting the selection criteria employed in the follow-on VTI-208, we've elected to explore the statistical consequences of a smaller treatment effect. A 26% treatment effect for patients with a background risk of death of 40% at 90 days, would amount to a 10% absolute benefit, it would be about 13% for patients with a 50% risk of death, and 15.6% for patients with a risk of death of 60%. We've therefore elected to explore a range of 10-15% absolute benefit across control death rates of 40% to 60% at 90 days (all conceivable given the enrollment criteria of the trial).

Exhibit 3: MELD Score Changes in Treatment Arm of VTI-206

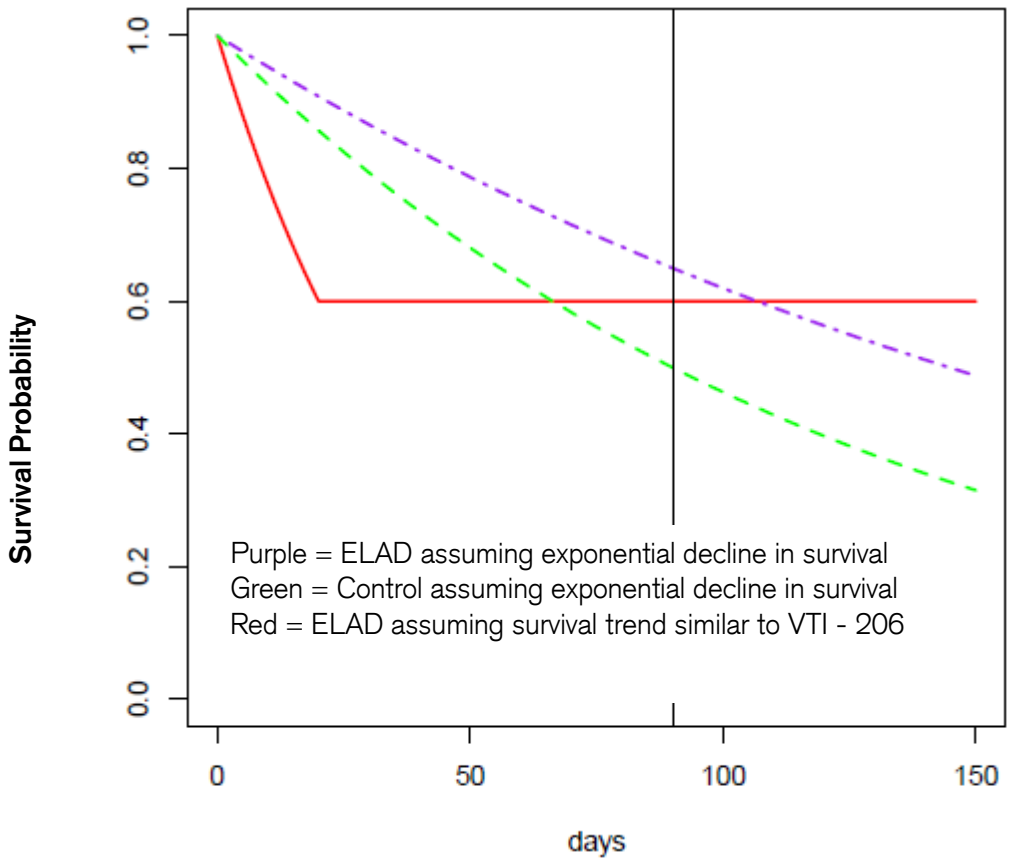
	Pre-ELAD	Post-ELAD	Delta
Creatinine	1.95	1.50	-0.45 (-23%)
Bilirubin	20.4	15.4	-5.0 (-24.5%)
INR	1.5	1.5	0 (0%)
MELD	29	25	-4 (-14%)
Predicted 90 day Mortality	58%	43%	-15% (-26%)
Observed Mortality		30%	

Source: Credit Suisse estimates

Assessing Likelihood of VTI-208 Success

VTI-208 trial success has been defined as a statistically significant survivorship advantage using a log rank test (with P<0.05) across the period of observation, with a minimum patient follow-up of 90 days. We used publicly available information on the pace of enrollment to define the period of observation. In Exhibit 4, we show the shapes of the survival curves that we exercised. The purple and green lines reflect an exponential decline in survivorship for both treatment (purple) and control (green) arms, with an absolute difference of 15% at 90 days. The red line depicts a hypothetical survivorship curve for ELAD patients with a steep initial decline, followed by a flattening at around 20 days. Yhis pattern more closely resembles that seen in VTI-206 (Exhibit 1) and results in a higher likelihood of trial success (given the play of chance) at any given absolute survivorship benefit at 90 days. As noted above, given the uncertainties in ELAD mechanism of action, and the small size of the predicate VTI-206 trial, we've elected to base our assumption of success on the more conservative exponential surviorship curve analysis.

Exhibit 4: Potential VTI-208 Kaplan Meier Curves Assuming Exponential Survival Declines & VTI-206-Like ELAD Survival Trend



Source: Credit Suisse estimates

Exhibit 5 shows the probability for statistical success for various absolute survival benefits at 90 days, across control survivorship of 40% to 60% (with 50% being the expected case given the mid-point of the MELD enrollment range), while assuming exponentially shaped survival curves for both treatment and control. The relative risk reduction (RRR) columns reflect the calculated diminution in daily risk (assuming exponential curves) for treatment relative to control. Focusing on the expected case for 50% survival in the control arm, this

analysis suggests an around 50% chance of trial success if the survival benefit is really 10%, which rises to an 85% chance of success if the survival benefit is really 15% (yellowed region). The reason success is defined as a probability is because of the play of chance in clinical trials in which observed survival can deviate from true survival if assessed with an infintely large sample size. Focusing on the yellowed region in Exhibit 5 which spans the likely range of absolute benefit consistent with the MELD analysis, the probability of success seems centered around 70%, consistent with our prior valuation assumption. Of note, for any given absolute benefit, the probability of trial success increases with relative risk reduction; e.g., a 10% risk reduction represents a bigger treatment effect and bestows a higher likelihood of trial success against a 40% background death rate versus the impact seen when the background death rate is 60% in the control arm.

Exhibit 5: Probability of VTI 208 Success on Primary Endpoint Given Varying Levels of ELAD Absolute Benefit in Survival Assuming Exponentially Shaped Survival Curves for ELAD & Control

Absolute Survival Versus Probability of Success Exponential Survival Curves						
	40% Control Survival		50% Control Survival		60% Control Survival	
Absolute ELAD Survival Benefit	RRR	Probability of Trial Success	RRR	Probability of Trial Success	RRR	Probability of Trial Success
5.0%	13.0%	14.9%	13.8%	15.9%	15.6%	18.1%
6.0%	15.4%	19.6%	16.1%	20.4%	19.0%	24.5%
7.0%	17.9%	25.5%	19.1%	25.9%	21.5%	32.0%
8.0%	20.1%	31.9%	21.5%	33.8%	24.5%	40.2%
9.0%	22.4%	38.9%	23.8%	41.8%	27.3%	49.3%
10.0%	24.5%	44.6%	26.4%	50.5%	30.3%	59.5%
11.0%	26.6%	51.9%	28.8%	58.3%	33.1%	68.0%
12.0%	28.9%	60.7%	31.0%	66.2%	35.7%	76.9%
13.0%	30.9%	67.3%	33.6%	73.1%	38.4%	82.9%
14.0%	32.7%	74.5%	35.7%	80.0%	41.1%	88.7%
15.0%	34.8%	80.1%	38.2%	84.9%	43.7%	92.6%

Source: Company data, Credit Suisse estimates

Exhibit 6 shows a similar probability of success analysis under the circumstance in which the survival curve for the ELAD arm flattens after about 20 days whereas the control arm remains on a constant exponential trajectory. As Exhibit 6 indicates, much smaller absolute survival benefits will result in a high probability of statistical success; e.g., with a control death rate of 50% at 90 days; e.g., a 5% absolute ELAD benefit will be associated with a 98% chance of trial success. As noted above, a flattening in ELAD survival was in fact noted in VTI-206, but the trial was very small, the sub-analysis retrospective, ELAD's mechanism of action remains incompletely defined and the pace of market adoption is hard to predict. Hence, at the risk of being overly conservative, we are retaining our $25 price target which we believe is roughly consistent with a 70% chance of success in ELAD approval and which implies an EV/Sales ratio of 3X $300M in 2020 sales discounted back to today at a WACC of 11%.

Exhibit 6: Probability of VTI 208 Success on Primary Endpoint Given Varying Levels of ELAD Absolute Benefit in Survival Assuming VTI-206-Like Survival Curve for ELAD

Absolute Survival Versus Probability of Success				
Flattened Treatment Arm Survivorship				
	40% Control Survival		50% Control Survival	
Absolute ELAD Survival Benefit	RRR	Probability of Trial Success	RRR	Probability of Trial Success
5.0%	39.1%	79.0%	53.2%	97.7%
6.0%	41.3%	84.3%	54.9%	98.5%
7.0%	43.4%	87.7%	56.7%	99.2%
8.0%	45.5%	91.3%	58.4%	99.4%
9.0%	47.6%	93.6%	60.0%	99.7%
10.0%	49.5%	95.9%	61.8%	99.8%
11.0%	51.3%	97.4%	63.4%	99.9%
12.0%	53.4%	98.3%	64.9%	99.9%
13.0%	54.9%	98.9%	66.5%	99.9%
14.0%	57.0%	99.5%	68.1%	99.9%
15.0%	58.6%	99.6%	69.6%	99.9%

Source: Credit Suisse estimates

Companies Mentioned *(Price as of 10-Dec-2014)*

Vital Therapies, Inc. (VTL.OQ, $20.8, OUTPERFORM[V], TP $25.0)

Disclosure Appendix

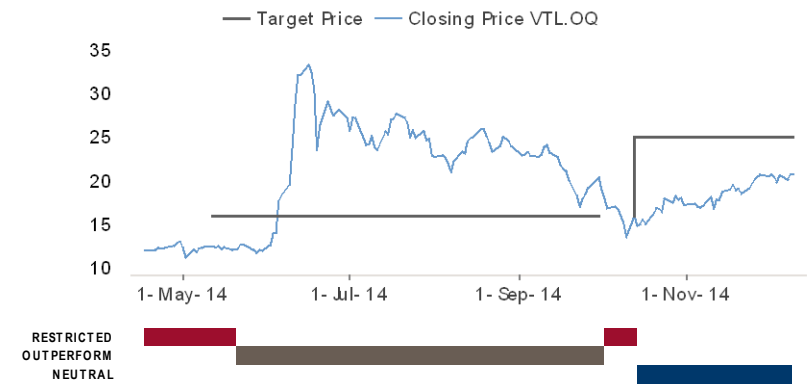
Important Global Disclosures

I, Bruce Nudell, certify that (1) the views expressed in this report accurately reflect my personal views about all of the subject companies and securities and (2) no part of my compensation was, is or will be directly or indirectly related to the specific recommendations or views expressed in this report.

3-Year Price and Rating History for Vital Therapies, Inc. (VTL.OQ)

VTL.OQ Date	Closing Price (US$)	Target Price (US$)	Rating
07-Apr-14			R
12-May-14	12.49	16.00	O *
30-Sep-14	20.41		R
13-Oct-14	16.00	25.00	N

** Asterisk signifies initiation or assumption of coverage.*



The analyst(s) responsible for preparing this research report received Compensation that is based upon various factors including Credit Suisse's total revenues, a portion of which are generated by Credit Suisse's investment banking activities

As of December 10, 2012 Analysts' stock rating are defined as follows:

Outperform (O) : The stock's total return is expected to outperform the relevant benchmark*over the next 12 months.

Neutral (N) : The stock's total return is expected to be in line with the relevant benchmark* over the next 12 months.

Underperform (U) : The stock's total return is expected to underperform the relevant benchmark* over the next 12 months.

**Relevant benchmark by region: As of 10th December 2012, Japanese ratings are based on a stock's total return relative to the analyst's coverage universe which consists of all companies covered by the analyst within the relevant sector, with Outperforms representing the most attractive, Neutrals the less attractive, and Underperforms the least attractive investment opportunities. As of 2nd October 2012, U.S. and Canadian as well as European ratings are based on a stock's total return relative to the analyst's coverage universe which consists of all companies covered by the analyst within the relevant sector, with Outperforms representing the most attractive, Neutrals the less attractive, and Underperforms the least attractive investment opportunities. For Latin American and non-Japan Asia stocks, ratings are based on a stock's total return relative to the average total return of the relevant country or regional benchmark; prior to 2nd October 2012 U.S. and Canadian ratings were based on (1) a stock's absolute total return potential to its current share price and (2) the relative attractiveness of a stock's total return potential within an analyst's coverage universe. For Australian and New Zealand stocks, 12-month rolling yield is incorporated in the absolute total return calculation and a 15% and a 7.5% threshold replace the 10-15% level in the Outperform and Underperform stock rating definitions, respectively. The 15% and 7.5% thresholds replace the +10-15% and -10-15% levels in the Neutral stock rating definition, respectively. Prior to 10th December 2012, Japanese ratings were based on a stock's total return relative to the average total return of the relevant country or regional benchmark.*

Restricted (R) : In certain circumstances, Credit Suisse policy and/or applicable law and regulations preclude certain types of communications, including an investment recommendation, during the course of Credit Suisse's engagement in an investment banking transaction and in certain other circumstances.

Volatility Indicator [V] : A stock is defined as volatile if the stock price has moved up or down by 20% or more in a month in at least 8 of the past 24 months or the analyst expects significant volatility going forward.

Analysts' sector weightings are distinct from analysts' stock ratings and are based on the analyst's expectations for the fundamentals and/or valuation of the sector* relative to the group's historic fundamentals and/or valuation:

Overweight : The analyst's expectation for the sector's fundamentals and/or valuation is favorable over the next 12 months.

Market Weight : The analyst's expectation for the sector's fundamentals and/or valuation is neutral over the next 12 months.

Underweight : The analyst's expectation for the sector's fundamentals and/or valuation is cautious over the next 12 months.

**An analyst's coverage sector consists of all companies covered by the analyst within the relevant sector. An analyst may cover multiple sectors.*

Credit Suisse's distribution of stock ratings (and banking clients) is:

Global Ratings Distribution

Rating	Versus universe (%)	Of which banking clients (%)
Outperform/Buy*	46%	(53% banking clients)
Neutral/Hold*	38%	(50% banking clients)
Underperform/Sell*	14%	(44% banking clients)
Restricted	2%	

**For purposes of the NYSE and NASD ratings distribution disclosure requirements, our stock ratings of Outperform, Neutral, and Underperform most closely correspond to Buy, Hold, and Sell, respectively; however, the meanings are not the same, as our stock ratings are determined on a relative basis. (Please refer to definitions above.) An investor's decision to buy or sell a security should be based on investment objectives, current holdings, and other individual factors.*

Credit Suisse's policy is to update research reports as it deems appropriate, based on developments with the subject company, the sector or the market that may have a material impact on the research views or opinions stated herein.

Credit Suisse's policy is only to publish investment research that is impartial, independent, clear, fair and not misleading. For more detail please refer to Credit Suisse's Policies for Managing Conflicts of Interest in connection with Investment Research: http://www.csfb.com/research-and-analytics/disclaimer/managing_conflicts_disclaimer.html

Credit Suisse does not provide any tax advice. Any statement herein regarding any US federal tax is not intended or written to be used, and cannot be used, by any taxpayer for the purposes of avoiding any penalties.

Price Target: (12 months) for Vital Therapies, Inc. (VTL.OQ)

Method: Our $25 DCF-derived price target is based on an ~11% WACC and a 2% terminal growth rate.

Risk: Risks to our $25 price target are: (1) a large, clean dataset does not yet exist, and while early data are encouraging, the ultimate clinical benefit of the ELAD system is yet to be proven; (2) ultimate pricing of the system is likely dependent on the mortality benefit demonstrated in VTL's ongoing phase 3 trial; (3) VTL will likely need additional financing prior to commercialization; (4) approval process in China is opaque; and (5) VTL's IP could ultimately afford exclusivity for a shorter period of time than we anticipate.

Please refer to the firm's disclosure website at https://rave.credit-suisse.com/disclosures for the definitions of abbreviations typically used in the target price method and risk sections.

See the Companies Mentioned section for full company names

The subject company (VTL.OQ) currently is, or was during the 12-month period preceding the date of distribution of this report, a client of Credit Suisse.

Credit Suisse provided investment banking services to the subject company (VTL.OQ) within the past 12 months.

Credit Suisse has managed or co-managed a public offering of securities for the subject company (VTL.OQ) within the past 12 months.

Credit Suisse has received investment banking related compensation from the subject company (VTL.OQ) within the past 12 months

Credit Suisse expects to receive or intends to seek investment banking related compensation from the subject company (VTL.OQ) within the next 3 months.

As of the date of this report, Credit Suisse makes a market in the following subject companies (VTL.OQ).

Important Regional Disclosures

Singapore recipients should contact Credit Suisse AG, Singapore Branch for any matters arising from this research report.

The analyst(s) involved in the preparation of this report have not visited the material operations of the subject company (VTL.OQ) within the past 12 months

Restrictions on certain Canadian securities are indicated by the following abbreviations: NVS--Non-Voting shares; RVS--Restricted Voting Shares; SVS--Subordinate Voting Shares.

Individuals receiving this report from a Canadian investment dealer that is not affiliated with Credit Suisse should be advised that this report may not contain regulatory disclosures the non-affiliated Canadian investment dealer would be required to make if this were its own report.

For Credit Suisse Securities (Canada), Inc.'s policies and procedures regarding the dissemination of equity research, please visit http://www.csfb.com/legal_terms/canada_research_policy.shtml.

Credit Suisse has acted as lead manager or syndicate member in a public offering of securities for the subject company (VTL.OQ) within the past 3 years.

As of the date of this report, Credit Suisse acts as a market maker or liquidity provider in the equities securities that are the subject of this report.

Principal is not guaranteed in the case of equities because equity prices are variable.

Commission is the commission rate or the amount agreed with a customer when setting up an account or at any time after that.

For Credit Suisse disclosure information on other companies mentioned in this report, please visit the website at https://rave.credit-suisse.com/disclosures or call +1 (877) 291-2683.

CREDIT SUISSE

References in this report to Credit Suisse include all of the subsidiaries and affiliates of Credit Suisse operating under its investment banking division. For more information on our structure, please use the following link: https://www.credit-suisse.com/who_we_are/en/This report may contain material that is not directed to, or intended for distribution to or use by, any person or entity who is a citizen or resident of or located in any locality, state, country or other jurisdiction where such distribution, publication, availability or use would be contrary to law or regulation or which would subject Credit Suisse AG or its affiliates ("CS") to any registration or licensing requirement within such jurisdiction. All material presented in this report, unless specifically indicated otherwise, is under copyright to CS. None of the material, nor its content, nor any copy of it, may be altered in any way, transmitted to, copied or distributed to any other party, without the prior express written permission of CS. All trademarks, service marks and logos used in this report are trademarks or service marks or registered trademarks or service marks of CS or its affiliates. The information, tools and material presented in this report are provided to you for information purposes only and are not to be used or considered as an offer or the solicitation of an offer to sell or to buy or subscribe for securities or other financial instruments. CS may not have taken any steps to ensure that the securities referred to in this report are suitable for any particular investor. CS will not treat recipients of this report as its customers by virtue of their receiving this report. The investments and services contained or referred to in this report may not be suitable for you and it is recommended that you consult an independent investment advisor if you are in doubt about such investments or investment services. Nothing in this report constitutes investment, legal, accounting or tax advice, or a representation that any investment or strategy is suitable or appropriate to your individual circumstances, or otherwise constitutes a personal recommendation to you. CS does not advise on the tax consequences of investments and you are advised to contact an independent tax adviser. Please note in particular that the bases and levels of taxation may change. Information and opinions presented in this report have been obtained or derived from sources believed by CS to be reliable, but CS makes no representation as to their accuracy or completeness. CS accepts no liability for loss arising from the use of the material presented in this report, except that this exclusion of liability does not apply to the extent that such liability arises under specific statutes or regulations applicable to CS. This report is not to be relied upon in substitution for the exercise of independent judgment. CS may have issued, and may in the future issue, other communications that are inconsistent with, and reach different conclusions from, the information presented in this report. Those communications reflect the different assumptions, views and analytical methods of the analysts who prepared them and CS is under no obligation to ensure that such other communications are brought to the attention of any recipient of this report. Some investments referred to in this report will be offered solely by a single entity and in the case of some investments solely by CS, or an associate of CS or CS may be the only market maker in such investments. Past performance should not be taken as an indication or guarantee of future performance, and no representation or warranty, express or implied, is made regarding future performance. Information, opinions and estimates contained in this report reflect a judgment at its original date of publication by CS and are subject to change without notice. The price, value of and income from any of the securities or financial instruments mentioned in this report can fall as well as rise. The value of securities and financial instruments is subject to exchange rate fluctuation that may have a positive or adverse effect on the price or income of such securities or financial instruments. Investors in securities such as ADR's, the values of which are influenced by currency volatility, effectively assume this risk. Structured securities are complex instruments, typically involve a high degree of risk and are intended for sale only to sophisticated investors who are capable of understanding and assuming the risks involved. The market value of any structured security may be affected by changes in economic, financial and political factors (including, but not limited to, spot and forward interest and exchange rates), time to maturity, market conditions and volatility, and the credit quality of any issuer or reference issuer. Any investor interested in purchasing a structured product should conduct their own investigation and analysis of the product and consult with their own professional advisers as to the risks involved in making such a purchase. Some investments discussed in this report may have a high level of volatility. High volatility investments may experience sudden and large falls in their value causing losses when that investment is realised. Those losses may equal your original investment. Indeed, in the case of some investments the potential losses may exceed the amount of initial investment and, in such circumstances, you may be required to pay more money to support those losses. Income yields from investments may fluctuate and, in consequence, initial capital paid to make the investment may be used as part of that income yield. Some investments may not be readily realisable and it may be difficult to sell or realise those investments, similarly it may prove difficult for you to obtain reliable information about the value, or risks, to which such an investment is exposed. This report may provide the addresses of, or contain hyperlinks to, websites. Except to the extent to which the report refers to website material of CS, CS has not reviewed any such site and takes no responsibility for the content contained therein. Such address or hyperlink (including addresses or hyperlinks to CS's own website material) is provided solely for your convenience and information and the content of any such website does not in any way form part of this document. Accessing such website or following such link through this report or CS's website shall be at your own risk. This report is issued and distributed in Europe (except Switzerland) by Credit Suisse Securities (Europe) Limited, One Cabot Square, London E14 4QJ, England, which is authorised by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and the Prudential Regulation Authority. This report is being distributed in Germany by Credit Suisse Securities (Europe) Limited Niederlassung Frankfurt am Main regulated by the Bundesanstalt fuer Finanzdienstleistungsaufsicht ("BaFin"). This report is being distributed in the United States and Canada by Credit Suisse Securities (USA) LLC; in Switzerland by Credit Suisse AG; in Brazil by Banco de Investimentos Credit Suisse (Brasil) S.A or its affiliates; in Mexico by Banco Credit Suisse (México), S.A. (transactions related to the securities mentioned in this report will only be effected in compliance with applicable regulation); in Japan by Credit Suisse Securities (Japan) Limited, Financial Instruments Firm, Director-General of Kanto Local Finance Bureau (*Kinsho*) No. 66, a member of Japan Securities Dealers Association, The Financial Futures Association of Japan, Japan Investment Advisers Association, Type II Financial Instruments Firms Association; elsewhere in Asia/ Pacific by whichever of the following is the appropriately authorised entity in the relevant jurisdiction: Credit Suisse (Hong Kong) Limited, Credit Suisse Equities (Australia) Limited, Credit Suisse Securities (Thailand) Limited, regulated by the Office of the Securities and Exchange Commission, Thailand, having registered address at 990 Abdulrahim Place, 27th Floor, Unit 2701, Rama IV Road, Silom, Bangrak, Bangkok 10500, Thailand, Tel. +66 2614 6000, Credit Suisse Securities (Malaysia) Sdn Bhd, Credit Suisse AG, Singapore Branch, Credit Suisse Securities (India) Private Limited (CIN no. U67120MH1996PTC104392) regulated by the Securities and Exchange Board of India (registration Nos. INB230970637; INF230970637; INB010970631; INF010970631), having registered address at 9th Floor, Ceejay House, Dr.A.B. Road, Worli, Mumbai - 18, India, T- +91-22 6777 3777, Credit Suisse Securities (Europe) Limited, Seoul Branch, Credit Suisse AG, Taipei Securities Branch, PT Credit Suisse Securities Indonesia, Credit Suisse Securities (Philippines) Inc., and elsewhere in the world by the relevant authorised affiliate of the above. Research on Taiwanese securities produced by Credit Suisse AG, Taipei Securities Branch has been prepared by a registered Senior Business Person. Research provided to residents of Malaysia is authorised by the Head of Research for Credit Suisse Securities (Malaysia) Sdn Bhd, to whom they should direct any queries on +603 2723 2020. This report has been prepared and issued for distribution in Singapore to institutional investors, accredited investors and expert investors (each as defined under the Financial Advisers Regulations) only, and is also distributed by Credit Suisse AG, Singapore branch to overseas investors (as defined under the Financial Advisers Regulations). By virtue of your status as an institutional investor, accredited investor, expert investor or overseas investor, Credit Suisse AG, Singapore branch is exempted from complying with certain compliance requirements under the Financial Advisers Act, Chapter 110 of Singapore (the "FAA"), the Financial Advisers Regulations and the relevant Notices and Guidelines issued thereunder, in respect of any financial advisory service which Credit Suisse AG, Singapore branch may provide to you. This information is being distributed by Credit Suisse AG, Dubai Branch, duly licensed and regulated by the Dubai Financial Services Authority (DFSA), and is directed at Professional Clients or Market Counterparties only, as defined by the DFSA. The financial products or financial services to which the information relates will only be made available to a client who meets the regulatory criteria to be a Professional Client or Market Counterparty only, as defined by the DFSA, and is not intended for any other person. This research may not conform to Canadian disclosure requirements. In jurisdictions where CS is not already registered or licensed to trade in securities, transactions will only be effected in accordance with applicable securities legislation, which will vary from jurisdiction to jurisdiction and may require that the trade be made in accordance with applicable exemptions from registration or licensing requirements. Non-U.S. customers wishing to effect a transaction should contact a CS entity in their local jurisdiction unless governing law permits otherwise. U.S. customers wishing to effect a transaction should do so only by contacting a representative at Credit Suisse Securities (USA) LLC in the U.S. Please note that this research was originally prepared and issued by CS for distribution to their market professional and institutional investor customers. Recipients who are not market professional or institutional investor customers of CS should seek the advice of their independent financial advisor prior to taking any investment decision based on this report or for any necessary explanation of its contents. This research may relate to investments or services of a person outside of the UK or to other matters which are not authorised by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and the Prudential Regulation Authority or in respect of which the protections of the Prudential Regulation Authority and Financial Conduct Authority for private customers and/or the UK compensation scheme may not be available, and further details as to where this may be the case are available upon request in respect of this report. CS may provide various services to US municipal entities or obligated persons ("municipalities"), including suggesting individual transactions or trades and entering into such transactions. Any services CS provides to municipalities are not viewed as "advice" within the meaning of Section 975 of the Dodd-Frank Wall Street Reform and Consumer Protection Act. CS is providing any such services and related information solely on an arm's length basis and not as an advisor or fiduciary to the municipality. In connection with the provision of the any such services, there is no agreement, direct or indirect, between any municipality (including the officials, management, employees or agents thereof) and CS for CS to provide advice to the municipality. Municipalities should consult with their financial, accounting and legal advisors regarding any such services provided by CS. In addition, CS is not acting for direct or indirect compensation to solicit the municipality on behalf of an unaffiliated broker, dealer, municipal securities dealer, municipal advisor, or investment adviser for the purpose of obtaining or retaining an engagement by the municipality for or in connection with Municipal Financial Products, the issuance of municipal securities, or of an investment adviser to provide investment advisory services to or on behalf of the municipality. If this report is being distributed by a financial institution other than Credit Suisse AG, or its affiliates, that financial institution is solely responsible for distribution. Clients of that institution should contact that institution to effect a transaction in the securities mentioned in this report or require further information. This report does not constitute investment advice by Credit Suisse to the clients of the distributing financial institution, and neither Credit Suisse AG, its affiliates, and their respective officers, directors and employees accept any liability whatsoever for any direct or consequential loss arising from their use of this report or its content. Principal is not guaranteed. Commission is the commission rate or the amount agreed with a customer when setting up an account or at any time after that.

Investment principal on bonds can be eroded depending on sale price or market price. In addition, there are bonds on which investment principal can be eroded due to changes in redemption amounts. Care is required when investing in such instruments.

When you purchase non-listed Japanese fixed income securities (Japanese government bonds, Japanese municipal bonds, Japanese government guaranteed bonds, Japanese corporate bonds) from CS as a seller, you will be requested to pay the purchase price only.