

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

FORM 11-K

FOR ANNUAL REPORTS OF
EMPLOYEE STOCK PURCHASE, SAVINGS AND SIMILAR PLANS
PURSUANT TO SECTION 15(d) OF THE
SECURITIES EXCHANGE ACT OF 1934

(MARK ONE)

ANNUAL REPORT PURSUANT TO SECTION 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
FOR THE FISCAL YEAR ENDED DECEMBER 31, 2011

OR

TRANSITION REPORT PURSUANT TO SECTION 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

FOR THE TRANSITION PERIOD FROM _____ TO _____

COMMISSION FILE NUMBER 001-09974

Enzo Biochem, Inc.

Salary Reduction Profit Sharing Plan

(Full title of the plan and the address of the plan,
if different from that of the issuer named below:)

Enzo Biochem, Inc. 527 Madison Ave. New York, NY 10022

(Name of issuer of the securities held pursuant to the plan and
the address of its principal executive office)

ENZO BIOCHEM, INC.
SALARY REDUCTION PROFIT SHARING PLAN

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R E P O R T O F I N D E P E N D E N T R E G I S T E R E D P U B L I C A C C O U N T I N G F I R M

To the Trustees and Participants of
Enzo Biochem, Inc. Salary Reduction Profit Sharing Plan

We have audited the accompanying statements of net assets available for benefits of Enzo Biochem, Inc. Salary Reduction Profit Sharing Plan (the "Plan") as of December 31, 2011 and 2010, and the related statement of changes in net assets available for benefits for the year ended December 31, 2011. The financial statements are the responsibility of the Plan's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. The Plan is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. Our audit included consideration of internal control over financial reporting as a basis for designing audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Plan's internal control over financial reporting. Accordingly, we express no such opinion. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above, present fairly, in all material respects, the net assets available for benefits of the Plan as of December 31, 2011 and 2010, and the changes in net assets available for benefits for the year ended December 31, 2011 in conformity with accounting principles generally accepted in the United States of America.

Our audits were performed for the purpose of forming an opinion on the basic financial statements taken as a whole. The supplemental schedule of assets (held at end of year) as of December 31, 2011 is presented for the purpose of additional analysis and is not a required part of the basic financial statements but is supplementary information required by the Department of Labor's Rules and Regulations for Reporting and Disclosure under the Employee Retirement Income Security Act of 1974. The supplemental schedule is the responsibility of the Plan's management. The supplemental schedule has been subjected to the auditing procedures applied in the audit of the basic financial statements and, in our opinion, is fairly stated in all material respects in relation to the basic financial statements taken as a whole.

/s/ EisnerAmper LLP

New York, New York
June 25, 2012

ENZO BIOCHEM, INC.
SALARY REDUCTION PROFIT SHARING PLAN

Statements of Net Assets Available for Benefits

December 31,

	<u>2011</u>	<u>2010</u>
ASSETS		
Investments, at fair value:		
Mutual funds	\$ 13,608,896	\$ 13,632,248
Common stock	1,109,214	1,952,326
	<u>14,718,110</u>	<u>15,584,574</u>
Receivables:		
Employer's contributions	655,249	698,759
Participants' contributions	58	11,996
Notes receivable – participants	400,949	330,621
	<u>1,056,256</u>	<u>1,041,376</u>
TOTAL ASSETS	<u>15,774,366</u>	<u>16,625,950</u>
NET ASSETS AVAILABLE FOR BENEFITS	<u>\$ 15,774,366</u>	<u>\$ 16,625,950</u>

See notes to financial statements.

ENZO BIOCHEM, INC.
SALARY REDUCTION PROFIT SHARING PLAN

S statement of Changes in Net Assets Available for Benefits

For the Year Ended December 31, 2011

Additions to net assets attributed to:	
Investment income:	
Interest and dividends	\$ 424,986
Net depreciation in fair value of investments and net gain on sale of investments	(2,025,397)
Interest on notes receivable-participants	19,557
Contributions:	
Participants' contributions	1,983,310
Employer's contributions	653,507
	<hr/>
Total additions	1,055,963
	<hr/>
Deductions from net assets attributed to:	
Benefits paid to participants	1,891,312
Administrative expenses	16,235
	<hr/>
Total deductions	1,907,547
	<hr/>
Net decrease in net assets available for benefits	(851,584)
Net assets available for plan benefits, beginning of year	16,625,950
	<hr/>
Net assets available for plan benefits, end of year	\$ 15,774,366
	<hr/>

See notes to financial statements.

ENZO BIOCHEM, INC.
SALARY REDUCTION PROFIT SHARING PLAN
Notes to Financial Statements

NOTE 1: PLAN DESCRIPTION

The following description of the Enzo Biochem, Inc. Salary Reduction Profit Sharing Plan (“the Plan”) provides only general information. Participants should refer to the Plan Agreement, as amended, for a more complete description of the Plan’s provisions.

General

The Plan is a defined contribution plan covering all eligible United States based full-time employees who have completed one month of service and have attained age twenty-one of Enzo Biochem Inc., (the “Plan Sponsor”), and its wholly owned subsidiaries, Enzo Clinical Labs, Inc., Enzo Therapeutics, Inc., and Enzo Life Sciences, Inc., (collectively, the “Company”). The Plan is subject to the provisions of the Employee Retirement Income Security Act of 1974 (“ERISA”).

Contributions

Eligible employee participants can elect to defer up to the maximum amount permitted by the Internal Revenue Code (the “Code”) for each year (\$16,500 in 2011 and 2010). Catch-up contributions are also permitted for participants who have attained age 50 by December 31st, in accordance with Section 414(v) of the Code, in an amount up to a maximum of \$5,500 in 2011 and 2010, bringing those participants’ statutory maximum limitation to \$22,000 in 2011 and 2010. In 2011, participant contributions totaled \$1,983,310 which includes \$147,553 in rollover contributions.

The Company may contribute to the Plan annually, a discretionary matching contribution. For 2011 the contribution was equal to 50% of the participant’s 401(k) contribution, not to exceed 50% of 10% of the participant’s annual compensation. Participants who have completed a year of service during the plan year and are actively employed as of the last day of the plan year shall be deemed eligible to share in the matching contribution for the year. In 2011, the total matching contributions were \$653,507 in the form of Enzo Biochem Inc. common stock.

The Plan provides that unless the participant affirmatively elects otherwise, the participant’s compensation will automatically be reduced by 3%, which will be considered to be the Participant’s salary reduction election.

Participant Accounts

Participants direct their contributions into various investment options offered by the Plan which include a choice of mutual funds and the common stock of Enzo Biochem, Inc. Contribution selections are designated by the participants. Each participant’s account is credited with the participant’s contribution and allocations of (a) the Company’s matching contribution, (b) Plan earnings and c) charged with an allocation of administrative expenses. Allocations are based on participant compensation or account balances, as defined. The benefit to which a participant is entitled is the benefit that can be provided from the participant’s vested account.

ENZO BIOCHEM, INC.
SALARY REDUCTION PROFIT SHARING PLAN
Notes to Financial Statements

NOTE 1: PLAN DESCRIPTION (continued)

The Plan allows a participant to elect to classify all or part of his or her elective deferrals as a Roth 401(k) deferral.

Vesting

Participants' contributed funds arising from salary reductions and the earnings thereon, are fully vested at all times. Vesting in the Company's matching contribution and earnings thereon, are ratable over four years of service.

Forfeitures

Forfeited non-vested amounts are applied to reduce the Company's future contributions to the Plan and pay Plan expenses. During the year ended December 31, 2011, forfeitures of \$6,806 were used to reduce employer contributions and pay Plan expenses. Forfeited non-vested accounts available at December 31, 2011 and 2010, were \$21,733 and \$16,148, respectively.

Notes Receivable from Participants

Notes receivable from participants are measured at their unpaid principal balance plus any accrued but unpaid interest. Participants may borrow from their accounts a minimum of \$1,000 up to a maximum of 50% of their vested account balance or \$50,000. Participants are entitled to borrow from their account for a maximum loan term of five years unless the proceeds are used to acquire a principal residence in which case it may exceed five years. The loans, classified as Notes Receivable from Participants, are secured by the participant's vested account balance and bear a reasonable rate of interest, ranging from 5.00% to 9.25%. Principal and interest is paid ratably through payroll deductions. Delinquent notes receivable from participants are reclassified as distributions based upon the terms of the Plan document.

Payment of Benefits

On termination of service due to death, disability or retirement, participants may elect to receive an amount equal to the value of the vested interest in their account in either a lump sum amount or in various annuity options. For termination of service due to other reasons, a participant may receive the value of the vested interest in their account as a lump sum distribution. Benefits are payable in the form of cash or property.

Plan Expenses

Certain operating expenses including, among others, professional fees of the Plan, are paid by the Plan Sponsor. As noted above, certain administrative expenses were paid by the Plan from the forfeitures.

NOTE 2: SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Basis of Accounting

The Plan's financial statements have been prepared in conformity with accounting principles generally accepted in the United States of America and under the accrual basis method of accounting. Benefits are recorded when paid.

Use of Estimates

The preparation of the financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect reported amounts of net assets available for benefits at the date of the financial statements and the accompanying footnotes and the changes in net assets available for benefits during the reporting period and when applicable disclosures of contingent assets and liabilities at the date of the financial statements. Actual results could differ from those estimates.

ENZO BIOCHEM, INC.
SALARY REDUCTION PROFIT SHARING PLAN
Notes to Financial Statements

NOTE 2: SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (continued)

Investment Valuation and Income Recognition

The Plan's investments are stated at fair value. The Company stock is valued at quoted market prices. Shares of mutual funds are valued at quoted market prices, which represent the net asset values of shares held by the Plan at year end.

Interest income is recorded on the accrual basis. Investment earnings are reinvested in the respective funds. Investment earnings include the Plan's proportionate share of realized gains and losses on the disposal of investments, and appreciation or depreciation in the fair value of the underlying investments comprising the respective mutual funds. All purchases and sales are recorded on a trade date basis.

The Plan presents in the statement of changes in net asset available for benefits, the net depreciation in fair value of its investments, which consists of the realized gains or losses and the unrealized depreciation on those investments.

NOTE 3: RECENT ACCOUNTING DEVELOPMENTS

In May 2011, the FASB issued ASU No. 2011-04, Amendments to Achieve Common Fair Value Measurement and Disclosure Requirements in US GAAP and International Financial Reporting Standards (Topic 820) - Fair Value Measurement. The new guidance relates to fair value measurements, related disclosures and consistent meaning of the term "fair value" in US GAAP and International Financial Reporting Standards. The amendment clarifies how to apply the existing fair value measurements and disclosures. For fair value measurements classified within level 3, an entity is required to disclose quantitative information about the unobservable inputs. A reporting entity is also required to disclose additional information like valuation processes, a narrative description of the sensitivity of the fair value measurements to changes in unobservable inputs and the interrelationships between those unobservable inputs. For public entities the guidance is to be applied effective during interim and annual periods beginning after December 15, 2011. Early application for public entities is not permitted. The Plan is currently evaluating the impact of the adoption of ASU 2011-04 on its financial statements.

ENZO BIOCHEM, INC.
SALARY REDUCTION PROFIT SHARING PLAN
Notes to Financial Statements

NOTE 4: FAIR VALUE MEASUREMENTS

The Plan adopted guidance under ASC 820, Fair Value Measurements, which establishes a framework for measuring fair value. That framework provides a fair value hierarchy that prioritizes the inputs to valuation techniques used to measure fair value. The hierarchy gives the highest priority to unadjusted quoted prices in active markets for identical assets or liabilities (level 1 measurement) and the lowest priority to unobservable inputs (level 3 measurement). The three levels of the fair value hierarchy under ASC 820 are described as follows:

Level 1 - Inputs to the valuation methodology are unadjusted quoted prices for identical assets or liabilities in active markets that the Plan has the ability to access.

Level 2 - Inputs to the valuation methodology include: quoted prices for similar assets or liabilities in active markets; quoted prices for identical or similar assets or liabilities in inactive markets; inputs other than quoted prices that are observable for the assets or liability; inputs that are derived principally from or corroborated by observable market data by correlation or other means.

If the asset or liability has a specified (contractual) term, the level 2 Input must be observable for substantially the full term of the asset or liability.

Level 3 - Inputs to the valuation methodology are unobservable and significant to the fair value measurements.

The asset or liability's fair value measurement level within the fair value hierarchy is based on the lowest level of any input that is significant to the fair value measurement. Valuation techniques used need to maximize the use of observable inputs and minimize the use of unobservable inputs.

In January 2010, the FASB issued ASU No. 2010-06, Fair Value Measurements and Disclosures (Topic 820): Improving Disclosures about Fair Value Measurements. FASB ASU No. 2010-06, among other things, requires purchases, sales, issuances, and settlements be presented on a gross basis for level 3 measurements and is effective for fiscal years beginning after December 15, 2010, and for interim periods within those fiscal years. Adoption of FASB ASU No. 2010-06 did not have a significant impact on the Plan's financial statements.

There have been no changes in the methodologies used at December 31, 2011 and 2010. The methods described may produce a fair value calculation that may not be indicative of net realizable value or reflective of future fair values. Furthermore, although the Plan believes its valuation methods are appropriate and consistent with other market participants, the use of different methodologies or assumptions to determine the fair value of certain financial instruments could result in a different fair value measurement at the reporting date.

ENZO BIOCHEM, INC.
SALARY REDUCTION PROFIT SHARING PLAN
Notes to Financial Statements

NOTE 4: FAIR VALUE MEASUREMENTS (continued)

The following tables sets forth by level, within the fair value hierarchy, the Plan's investments as of December 31:

	Assets at Fair Value as of	
	December 31, 2011	December 31, 2010
	Level 1	Level 1
Mutual funds		
Mid/large cap stock	\$ 10,930,017	\$ 10,350,544
Money market	616,445	1,366,663
Fixed income	1,000,945	1,036,386
International	488,505	487,681
Small cap stock	572,984	390,974
	\$ 13,608,896	\$ 13,632,248
Common stock-Enzo Biochem, Inc.	1,109,214	1,952,326
	\$ 14,718,110	\$ 15,584,574

The valuation techniques used to measure fair value of investments are included in Note 2.

Changes in Fair Value Levels

The availability of observable market data is monitored to assess the appropriate classification of financial instruments within the fair value hierarchy. Changes in economic conditions or model-based valuation techniques may require the transfer of financial instruments from one fair value level to another. In such instances, the transfer is reported at the beginning of the reporting period. The Plan's investments consist of only level 1 investments and there were no transfers between levels.

ENZO BIOCHEM, INC.
SALARY REDUCTION PROFIT SHARING PLAN
Notes to Financial Statements

NOTE 5: INVESTMENTS

The following table presents fair values, as determined by quoted market price, of the investments representing 5% or more of total net assets at December 31:

	<u>2011</u>	<u>2010</u>
Enzo Biochem, Inc. (495,185 shares at 2011, 369,758 shares at 2010)	\$ 1,109,214	\$ 1,952,326
Fidelity Contrafund	873,400	715,168
Fidelity Freedom 2010	865,310	1,215,155
Fidelity Freedom 2020	1,932,206	1,865,153
Fidelity Freedom 2030	1,403,639	1,260,502
Fidelity Freedom 2015	1,566,288	1,537,934
Fidelity Freedom 2025	1,531,404	1,485,270

ENZO BIOCHEM, INC.
SALARY REDUCTION PROFIT SHARING PLAN
Notes to Financial Statements

NOTE 5: INVESTMENTS (continued)

During the year ended December 31, 2011, the Plan's investments (including gains and losses on investments bought and sold, as well as held during the year) depreciated in value by \$(2,025,397) as follows:

Mutual funds	\$ (689,407)
Common stock	(1,335,990)
	<u>\$ (2,025,397)</u>

NOTE 6: RIGHT TO TERMINATE PLAN

Although it has not expressed any intent to do so, the Company has the right under the Plan to discontinue its contributions at any time and to terminate the Plan subject to the provisions of ERISA.

NOTE 7: TAX STATUS

The Plan adopted the Corporate Plan for Retirement, a Fidelity Management and Research Company prototype plan. The Plan obtained its latest opinion letter in March 2008 in which the Internal Revenue Service stated that the Plan was in compliance with the applicable requirements of the Internal Revenue Code. The Plan has been amended since receiving the opinion letter. However, the plan administrator believes that the Plan is currently designed and being operated in compliance with the applicable requirements of the Internal Revenue Code.

Accounting principles generally accepted in the United States of America require plan management to evaluate tax positions taken by the Plan and recognize a tax liability (or asset) if the plan has taken an uncertain position that more likely than not would not be sustained upon examination by a government authority. The plan administrator has analyzed the tax positions taken by the Plan, and has concluded that as of December 31, 2011, there are no uncertain positions taken or expected to be taken that would require recognition of a liability (or asset) or disclosure in the financial statements. The Plan is subject to routine audits by taxing jurisdictions; however, there are currently no audits for any tax periods in progress. The plan administrator believes it is no longer subject to income tax examinations for years prior to 2008.

NOTE 8: PARTY IN INTEREST TRANSACTIONS

During 2011, the Plan purchased 230,650 shares of common stock of the Plan sponsor, at market prices totaling \$881,984 and sold 105,223 shares of common stock at market prices totaling approximately \$386,558. At December 31, 2011 and 2010, the Plan held Enzo Biochem, Inc. common stock with a fair value of \$1,109,214 and \$1,952,326, respectively.

Fidelity Management Trust Company ("FMTC") is the trustee of the Plan. Certain Plan investments are shares of mutual funds managed by affiliates of FMTC. Therefore, these transactions qualify as party-in-interest transactions. Fees paid by the Plan for the investment management services are included in net depreciation in fair value of investments.

Fees paid by the Plan to the third party Plan administrators amounted to \$5,300 for the year ended December 31, 2011.

NOTE 9: RISKS AND UNCERTAINTIES

The Plan invests in various investment securities. Investment securities are exposed to various risk such as interest rate, market, and credit risks. Due to the level of risk associated with certain investment securities, it is at least reasonably possible that changes in the values of investment securities will occur in the near term and that such changes could materially affect participants' account balances and the amounts reported in the statements of net assets available for benefits.

Users of these financial statements should be aware that the financial markets' volatility may significantly impact the subsequent valuation of the Plan's investments. Accordingly, the valuation of investments at December 31, 2011 may

not necessarily be indicative of amounts that could be realized in a current market exchange.

NOTE 10: MUTUAL FUND FEES

Investments in mutual funds are subject to sales charges in the form of front-end loads, back-end loads or 12b-1 fees. 12b-1 fees, which are ongoing fees allowable under Section 12b-1 of the Investment Company Act of 1940, are annual fees deducted to pay for marketing and distribution costs of the funds. These fees are deducted prior to the allocation of the Plan's investment earnings activity, and thus not separately identifiable as an expense.

ENZO BIOCHEM, INC.
SALARY REDUCTION PLAN
Schedule H, Line 4i
Schedule of Assets (Held at End of Year)
E.I.N. # 13-2866202
Plan # 001
December 31, 2011

(a)	Identity of Issue, Borrower, Lessor or Similar Party (b)	Description of Investment Including Maturity Date, Rate of Interest, Collateral, Par or Maturity Value (c)	Cost** (d)	Current Value (e)
*	Enzo Biochem, Inc.	Common Stock		\$ 1,109,214
	Pimco Total Return	Mutual Fund		317,262
	MSIFT Mid Cap Growth Portfolio	Mutual Fund		253,710
	NB Genesis	Mutual Fund		447,636
	Allianz NFJ Dividend Value	Mutual Fund		90,069
	Columbia Acorn International Select	Mutual Fund		243,296
	Allianz NFJ Small Cap Value	Mutual Fund		125,348
	Royce Value Plus	Mutual Fund		98,704
*	Fidelity Fund	Mutual Fund		118,438
*	Fidelity Contrafund	Mutual Fund		873,400
*	Fidelity Capital & Income	Mutual Fund		127,207
*	Fidelity Government Income	Mutual Fund		343,425
*	Fidelity Leveraged Company	Mutual Fund		50,071
*	Fidelity International Discovery	Mutual Fund		92,054
*	Fidelity Emerging Markets	Mutual Fund		75,642
*	Fidelity Growth Discovery	Mutual Fund		111,257
*	Fidelity Freedom Income	Mutual Fund		84,220
*	Fidelity Freedom 2000	Mutual Fund		13,167
*	Fidelity Freedom 2010	Mutual Fund		865,310
*	Fidelity Freedom 2020	Mutual Fund		1,932,206
*	Fidelity Freedom 2030	Mutual Fund		1,403,639
*	Spartan Extended Market Index	Mutual Fund		191,860
*	Spartan International Index	Mutual Fund		77,513
*	Fidelity Retirement Money Market	Mutual Fund		228,333
*	Fidelity Retirement Government Money Market	Mutual Fund		388,112
*	Spartan 500 Equity Index	Mutual Fund		360,896
*	Fidelity Freedom 2040	Mutual Fund		419,098
*	Fidelity Freedom 2005	Mutual Fund		115,664
*	Fidelity Freedom 2015	Mutual Fund		1,566,288
*	Fidelity Freedom 2025	Mutual Fund		1,531,404
*	Fidelity Freedom 2035	Mutual Fund		677,187
*	Fidelity Freedom 2045	Mutual Fund		296,585
*	Fidelity Freedom 2050	Mutual Fund		86,321
*	Fidelity Cash Reserves	Mutual Fund		3,574
*	Notes receivable - participants	5.00% -9.25%	\$ 0	400,949
		Maturity through December 2015		
				\$ 15,119,059

* Party-in-interest

**Cost information omitted with respect to participant or beneficiary directed transactions.

See Independent Auditor's Report.

SIGNATURE

Pursuant to the requirements of the Securities Exchange Act of 1934, a trustee of the below named employee benefit plan has duly caused this annual report to be signed on its behalf by the undersigned hereunto duly authorized.

Enzo Biochem, Inc. Salary Reduction Profit Sharing Plan

Date: June 25, 2012

/s/ Andrew R.Crescenzo

By: Andrew R.Crescenzo
Trustee