

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

FORM S-3

**REGISTRATION STATEMENT
UNDER
THE SECURITIES ACT OF 1933**

GTx, Inc.

(Exact name of registrant as specified in its charter)

Delaware
(State or other jurisdiction of
incorporation or organization)

62-1715807
(I.R.S. Employer
Identification Number)

175 Toyota Plaza
7th Floor
Memphis, TN 38103
(901) 523-9700

(Address, including zip code, and telephone number, including area code, of registrant's principal executive offices)

MARC S. HANOVER
CHIEF EXECUTIVE OFFICER
GTx, Inc.
175 Toyota Plaza
7th Floor
Memphis, TN 38103
(901) 523-9700

(Name, address, including zip code, and telephone number, including area code, of agent for service)

Copies to:

Henry P. Doggrell
Vice President, Chief Legal Officer and Secretary
GTx, Inc.
175 Toyota Plaza
7th Floor
Memphis, TN 38103
(901) 523-9700

Chadwick Mills
Cooley LLP
3175 Hanover Street
Palo Alto, CA 94304-1130
(650) 843-5654

Approximate date of commencement of proposed sale to the public: From time to time after the effective date of this Registration Statement.

If the only securities being registered on this Form are being offered pursuant to dividend or interest reinvestment plans, please check the following box:

If any of the securities being registered on this Form are to be offered on a delayed or continuous basis pursuant to Rule 415 under the Securities Act of 1933, as amended, other than securities offered only in connection with dividend or interest reinvestment plans, check the following box:

If this Form is filed to register additional securities for an offering pursuant to Rule 462(b) under the Securities Act, please check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering:

If this Form is a post-effective amendment filed pursuant to Rule 462(c) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering.

If this Form is a registration statement pursuant to General Instruction I.D. or a post-effective amendment thereto that shall become effective upon filing with the Commission pursuant to Rule 462(e) under the Securities Act, check the following box.

If this Form is a post-effective amendment to a registration statement filed pursuant to General Instruction I.D. filed to register additional securities or additional classes of securities pursuant to Rule 413(b) under the Securities Act, check the following box.

Indicate by check mark whether the Registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer" and "smaller reporting company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer Accelerated filer x
Non-accelerated filer (Do not check if a smaller reporting company) Smaller reporting company o

CALCULATION OF REGISTRATION FEE

Title of Each Class of Securities to be Registered	Amount to be Registered(1)	Proposed Maximum Offering Price Per Unit(2)	Proposed Maximum Aggregate Offering Price(2)	Amount of Registration Fee
Common Stock, par value \$0.001 per share	22,155,690	\$ 1.15	\$ 25,479,043.50	\$ 3,281.71

- (1) Includes 10,179,642 shares of common stock that may be issued upon the exercise of outstanding warrants. Pursuant to Rule 416 under the Securities Act of 1933, as amended, the shares of common stock being registered hereunder include such indeterminate number of shares of common stock as may be issuable with respect to the shares of common stock being registered hereunder as a result of stock splits, stock dividends or similar transactions.
- (2) Estimated solely for the purpose of calculating the amount of the registration fee pursuant to Rule 457 promulgated under the Securities Act. The offering price per share and the aggregate offering price are based upon the average of the high and low prices of the registrant's common stock as reported on The NASDAQ Global Market on August 5, 2014.

The Registrant hereby amends this registration statement on such date or dates as may be necessary to delay its effective date until the Registrant shall file a further amendment that specifically states that this registration statement shall thereafter become effective in accordance with Section 8(a) of the Securities Act of 1933, as amended, or until the registration statement shall become effective on such date as the Securities and Exchange Commission, acting pursuant to said Section 8(a), may determine.

The information in this prospectus is not complete and may be changed. The selling stockholders may not sell these securities until the registration statement filed with the Securities and Exchange Commission is effective. This prospectus is not an offer to sell these securities and it is not soliciting offers to buy these securities in any state where such offer or sale is not permitted.

SUBJECT TO COMPLETION, DATED AUGUST 6, 2014

PROSPECTUS

22,155,690 Shares



Common Stock

This prospectus relates to the disposition from time to time of up to 22,155,690 shares of our common stock, which includes 10,179,642 shares of our common stock issuable upon the exercise of outstanding warrants, which are held by the selling stockholders named in this prospectus. We are not selling any common stock under this prospectus and will not receive any of the proceeds from the sale of shares by the selling stockholders.

The selling stockholders identified in this prospectus, or their permitted transferees or other successors-in-interest that may be identified in a supplement to this prospectus or, if required, a post-effective amendment to the registration statement of which this prospectus is a part, may offer the shares from time to time through public or private transactions at fixed prices, at prevailing market prices, at varying prices determined at the time of sale, or at privately negotiated prices. We provide more information about how the selling stockholders may sell their shares of common stock in the section entitled "Plan of Distribution" beginning on page 5 of this prospectus. We will not be paying any underwriting discounts or commissions in connection with any offering of common stock under this prospectus.

Our common stock is listed on The NASDAQ Global Market under the symbol "GTXI." On August 5, 2014, the last reported sale price of our common stock on The NASDAQ Global Market was \$1.15.

Investing in our common stock involves a high degree of risk. You should review carefully the risks and uncertainties incorporated by reference herein under the heading "Risk Factors" on page 2 of this prospectus, and under similar headings in the other documents that are filed after the date hereof and incorporated by reference into this prospectus.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or determined if this prospectus is truthful or complete. Any representation to the contrary is a criminal offense.

The date of this prospectus is _____, 2014.

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ABOUT THIS PROSPECTUS

This prospectus is part of a registration statement on Form S-3 that we filed with the Securities and Exchange Commission, or SEC, using the “shelf” registration process. Under this process, the selling stockholders may from time to time, in one or more offerings, sell the common stock described in this prospectus.

You should rely only on the information contained in or incorporated by reference into this prospectus (as supplemented and amended). We have not authorized anyone to provide you with different information. This document may only be used where it is legal to sell these securities. The information contained in this prospectus (and in any supplement or amendment to this prospectus) is accurate only as of the date on the front of the document, and any information we have incorporated by reference is accurate only as of the date of the document incorporated by reference, regardless of the time of delivery of this prospectus or any sale of our common stock. Our business, financial condition, results of operations and prospects may have changed since those dates.

We urge you to read carefully this prospectus (as supplemented and amended), together with the information incorporated herein by reference as described under the heading “Incorporation by Reference” before deciding whether to invest in any of the common stock being offered.

This prospectus incorporates by reference market data, industry statistics and other data that have been obtained from, or compiled from, information made available by third parties. We have not independently verified their data. This prospectus and the information incorporated herein by reference includes trademarks, service marks and trade names owned by us or other companies. All trademarks, service marks and trade names included or incorporated by reference into this prospectus are the property of their respective owners.

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PROSPECTUS SUMMARY

This summary highlights selected information contained elsewhere in this prospectus or incorporated by reference in this prospectus, and does not contain all of the information that you need to consider in making your investment decision. You should carefully read the entire prospectus (as supplemented and amended), including the financial data and related notes, risk factors and other information incorporated by reference in this prospectus, before making an investment decision. Unless otherwise mentioned or unless the context requires otherwise, all references in this prospectus to “GTx,” “the company,” “we,” “us,” “our” or similar references mean GTx, Inc.

GTx, Inc.

We are a biopharmaceutical company dedicated to the discovery, development and commercialization of small molecules for the treatment of cancer, including treatments for breast and prostate cancer, cancer supportive care, including prevention and treatment of cancer-related muscle wasting, and other serious medical conditions.

We are developing selective androgen receptor modulators, or SARMs, a new class of drugs with the potential to be used as a hormonal therapy for the treatment of metastatic breast cancer, as well as the potential to prevent and treat muscle wasting in patients with cancer and other musculoskeletal wasting or muscle loss conditions, including chronic sarcopenia (age related muscle loss). Our lead SARM product candidate is enobosarm (GTx-024). Enobosarm is the generic name given to the compound by the USAN Council and the World Health Organization and is the first compound to receive the SARM stem in its name, recognizing enobosarm as the first in this new class of compounds.

Additionally, we are developing GTx-758 (Capesaris®), an oral nonsteroidal selective estrogen receptor alpha agonist, for secondary hormonal therapy in men with metastatic and nonmetastatic castration resistant prostate cancer, and, potentially, as a secondary hormonal treatment for advanced prostate cancer used in combination with androgen deprivation therapy.

We were originally incorporated under the name Genotherapeutics, Inc. in Tennessee in September 1997. We changed our name to GTx, Inc. in 2001, and we reincorporated in Delaware in 2003. Our principal executive office is located at 175 Toyota Plaza, 7th Floor, Memphis, TN 38103, and our telephone number is (901) 523-9700. Our website address is www.gtxinc.com. Information found on, or accessible through, our website is not a part of, and is not incorporated into, this prospectus, and you should not consider it part of this prospectus.

The Offering

The selling stockholders named in this prospectus may offer and sell up to 22,155,690 shares of our common stock, which includes 10,179,642 shares of our common stock issuable upon the exercise of outstanding warrants. The shares issuable upon exercise of the warrants will become eligible for sale by the selling stockholders under this prospectus only as the warrants are exercised. Our common stock is currently listed on The NASDAQ Global Market under the symbol “GTXI.” Shares of common stock that may be offered under this prospectus, when issued and paid for in the case of shares issuable upon exercise of the outstanding warrants, will be fully paid and non-assessable. We will not receive any of the proceeds of sales by the selling stockholders of any of the common stock covered by this prospectus. Throughout this prospectus, when we refer to the shares of our common stock being registered on behalf of the selling stockholders, we are referring to the shares and the shares underlying the warrants issued to the selling stockholders pursuant to the securities purchase agreement we entered into with the selling stockholders on March 3, 2014, and when we refer to the selling stockholders in this prospectus, we are referring to the purchasers under the securities purchase agreement and, as applicable, their permitted transferees or other successors-in-interest that may be identified in a supplement to this prospectus or, if required, a post-effective amendment to the registration statement of which this prospectus is a part.

RISK FACTORS

An investment in our common stock involves a high degree of risk. Before deciding whether to invest in our common stock, you should consider carefully the risks and uncertainties discussed under the heading “Risk Factors” contained in our quarterly report on Form 10-Q for the quarter ended June 30, 2014 filed with the SEC on August 5, 2014 and incorporated by reference in this prospectus, as the same may be amended, supplemented or superseded by the risks and uncertainties described under similar headings in the other documents that are filed after the date hereof and incorporated by reference into this prospectus. Additional risks not presently known to us or that we currently believe are immaterial may also significantly impair our business operations. Please also read carefully the section below entitled “Special Note Regarding Forward-Looking Statements.”

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus and the documents incorporated by reference contain forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, or the Securities Act, and Section 21E of the Securities Exchange Act of 1934, as amended, or the Exchange Act. These statements are based on our management’s beliefs and assumptions and on information currently available to us. Discussions containing these forward-looking statements may be found, among other places, in the sections entitled “Business,” “Risk Factors” and “Management’s Discussion and Analysis of Financial Condition and Results of Operations” incorporated by reference from our most recent annual report on Form 10-K and in our most recent quarterly report on Form 10-Q, as well as any amendments thereto reflected in subsequent filings with the SEC. All statements, other than statements of historical facts, are forward-looking statements for purposes of these provisions, including, without limitation, any statements relating to:

- the implementation of our business strategies, including our ability to preserve or realize any significant value from our enobosarm (GTx-024) and GTx-758 (Capesaris®) programs;
- the therapeutic and commercial potential of our product candidates;
- the timing of regulatory discussions and submissions, and the anticipated timing, scope and outcome of related regulatory actions or guidance;
- our ability to establish and maintain potential new collaborative, partnering or other strategic arrangements for the development and commercialization of our product candidates;
- the anticipated progress of our clinical programs, including whether any ongoing clinical trials will achieve clinically relevant results;
- the timing, scope and anticipated initiation, enrollment and completion of our ongoing clinical trials and any other future clinical trials that we may conduct;
- our ability to obtain and maintain regulatory approvals of our product candidates and any related restrictions, limitations, and/or warnings in the label of an approved product candidate;
- our ability to market, commercialize and achieve market acceptance for our product candidates;
- our ability to protect our intellectual property and operate our business without infringing upon the intellectual property rights of others;
- our estimates regarding the sufficiency of our cash resources, expenses, capital requirements and needs for additional financing, and our ability to obtain additional financing; and
- our projected financial performance.

In some cases, you can identify forward-looking statements by terms such as “anticipate,” “believe,” “could,” “estimate,” “expect,” “intend,” “may,” “plan,” “potential,” “predict,” “project,” “should,” “will,” “would” and similar expressions intended to identify forward-looking statements. These statements involve known and unknown risks, uncertainties and other factors that may cause our actual results, levels of activity, performance, time frames or achievements to be materially different from the information expressed or implied by these forward-looking statements. While we believe that we have a reasonable basis for each forward-looking statement, we caution you that these statements are based on a combination of facts and factors currently known by us and our projections of

the future, about which we cannot be certain. We discuss many of these risks, uncertainties and other factors in greater detail under the heading “Risk Factors” contained in our quarterly report on Form 10-Q for the quarter ended June 30, 2014 filed with the SEC on August 5, 2014 and incorporated by reference in this prospectus, as the same may be amended, supplemented or superseded by the risks and uncertainties described under similar headings in the other documents that are filed after the date hereof and incorporated by reference into this prospectus. Given these risks, uncertainties and other factors, you should not place undue reliance on these forward-looking statements. Also, these forward-looking statements represent our estimates and assumptions only as of the date such forward-looking statements are made. You should carefully read this prospectus, together with the information incorporated herein by reference as described under the heading “Incorporation by Reference,” completely and with the understanding that our actual future results may be materially different from what we expect. We can give no assurances that any of the events anticipated by the forward-looking statements will occur or, if any of them do, what impact they will have on our business, results of operations and financial condition. We hereby qualify all of our forward-looking statements by these cautionary statements.

Except as required by law, we assume no obligation to update these forward-looking statements publicly, or to update the reasons actual results could differ materially from those anticipated in these forward-looking statements, even if new information becomes available in the future.

The selling stockholders will receive all of the net proceeds from sales of the common stock sold pursuant to this prospectus. However, in the case of warrants issued to the selling stockholders on March 6, 2014, upon exercise of the warrants, the selling stockholders would pay us an exercise price of \$1.67 per share of common stock, subject to any adjustment pursuant to the terms of the warrants, or an aggregate of \$17.0 million if the warrants are exercised in full. The exercise price of the warrants is payable only in cash. The proceeds to us of such warrant exercises, if any, are expected to be used for working capital and general corporate purposes.

SELLING STOCKHOLDERS

On March 3, 2014, we entered into a securities purchase agreement with the selling stockholders pursuant to which we issued and sold in a private placement an aggregate of 11,976,048 shares of our common stock and warrants to purchase up to 10,179,642 additional shares of common stock. We also entered into a registration rights agreement with the selling stockholders in connection with the closing of the transactions contemplated by the securities purchase agreement, which was subsequently amended and restated, pursuant to which we agreed to file the registration statement of which this prospectus is a part to cover the resale of the shares and the shares underlying the warrants issued to the selling stockholders pursuant to the securities purchase agreement, and to keep such registration statement effective until the earlier of March 6, 2016, or the date on which all of the shares registered for resale under the registration statement have been sold under the registration statement or have been sold or are available for resale without restriction under Rule 144 of the Securities Act. The warrants, which have a one year term expiring on March 6, 2015, have a per share exercise price of \$1.67 that is payable only in cash. The exercise price and number of shares of common stock issuable upon exercise of the warrants may be adjusted in certain circumstances, including stock splits, stock dividends, reclassifications and the like.

We are registering the resale of the above-referenced shares to permit each of the selling stockholders identified below, or their permitted transferees or other successors-in-interest that may be identified in a supplement to this prospectus or, if required, a post-effective amendment to the registration statement of which this prospectus is a part, to resell or otherwise dispose of the shares in the manner contemplated under "Plan of Distribution" in this prospectus (as may be supplemented and amended). This prospectus covers the sale or other disposition by the selling stockholders of up to the total number of shares of common stock issued to the selling stockholders pursuant to the securities purchase agreement, plus the total number of shares of common stock issuable upon exercise of the warrants issued to the selling stockholders pursuant to the securities purchase agreement. Throughout this prospectus, when we refer to the shares of our common stock being registered on behalf of the selling stockholders, we are referring to the shares and the shares underlying the warrants issued to the selling stockholders pursuant to the securities purchase agreement, and when we refer to the selling stockholders in this prospectus, we are referring to the purchasers under the securities purchase agreement and, as applicable, their permitted transferees or other successors-in-interest that may be identified in a supplement to this prospectus or, if required, a post-effective amendment to the registration statement of which this prospectus is a part.

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The following table sets forth the name of each selling stockholder, the number and percentage of our common stock beneficially owned by the selling stockholders as of August 5, 2014, the number of shares that may be offered under this prospectus, and the number and percentage of our common stock beneficially owned by the selling stockholders assuming all of the shares covered hereby are sold. Beneficial ownership is determined in accordance with the rules of the SEC and includes voting or investment power with respect to our common stock. Generally, a person "beneficially owns" shares of our common stock if the person has or shares with others the right to vote those shares or to dispose of them, or if the person has the right to acquire voting or disposition rights within 60 days. The number of shares in the column "Number of Shares Offered" represents all of the shares that a selling stockholder may offer and sell from time to time under this prospectus. The selling stockholders may sell some, all or none of their shares. We do not know how long the selling stockholders will hold the shares before selling them, and we currently have no agreements, arrangements or understandings with the selling stockholders regarding the sale or other disposition of any of the shares. The shares covered hereby may be offered from time to time by the selling stockholders.

All information contained in the table below and the footnotes thereto is based upon information provided to us by the selling stockholders. The information regarding shares of common stock to be beneficially owned after the offering assumes the sale of all shares being offered by the selling stockholders under this prospectus. The percentage of shares owned prior to and after the offering is based both on 76,014,531 shares of common stock outstanding as of August 5, 2014, and on the assumption that all shares issuable upon the exercise of the above-referenced warrants are issued and outstanding as of that date. Unless otherwise indicated in the footnotes to this table, we believe that each of the selling stockholders named in this table has sole voting and investment power with respect to the shares of common stock indicated as beneficially owned.

Name and Address	Prior to Offering		Number of Shares Offered(3)	After Offering	
	Number of Shares Beneficially Owned	Percentage of Shares Beneficially Owned		Number of Shares Beneficially Owned	Percentage of Shares Beneficially Owned
J. R. Hyde, III 17 West Pontotoc Ave. Suite 200 Memphis, Tennessee 38103	29,681,876(1)	34.4%	11,077,845	18,604,031	21.6%
The Pyramid Peak Foundation 6410 Poplar Ave. Suite 710 Memphis, Tennessee 38119	11,077,845(2)	12.9%	11,077,845	—	*

* Less than 1%.

- (1) Mr. Hyde has the sole power to vote or to direct the vote and the sole power to dispose or to direct the disposition of 27,366,430 shares, which include 5,988,024 shares issued to Mr. Hyde pursuant to the securities purchase agreement, 145,352 shares held by Pittco Associates II, L.P. and 3,915,716 shares held by Pittco Investments, L.P., entities controlled by Mr. Hyde, 5,089,821 shares issuable upon the exercise of the warrant issued to Mr. Hyde pursuant to the securities purchase agreement and 85,923 shares issuable to Mr. Hyde pursuant to our Directors' Deferred Compensation Plan. Mr. Hyde also has shared voting and dispositive power over 216,462 shares held by Mr. Hyde's spouse, 1,844,851 shares held by trusts for the benefit of Mr. Hyde's children (the "Family Trusts") and 254,133 shares held in grantor retained annuity trusts on behalf of Mr. Hyde (the "GRATs"). As trustee of the Family Trusts and the GRATs, John H. Pontius shares voting and dispositive power over the shares held by the Family Trusts and the GRATs. Mr. Pontius' business address is 17 West Pontotoc Ave., Suite 200, Memphis, Tennessee 38103.
- (2) Includes 5,089,821 shares issuable upon the exercise of the warrant issued to the Pyramid Peak Foundation ("Foundation") pursuant to the securities purchase agreement. James R. Boyd, Lee B. Harper, O. Mason Hawkins and Andrew R. McCarroll are each a director of the Foundation. Each of such

individuals may be deemed to share beneficial ownership of the shares beneficially owned by the Foundation, but disclaim beneficial ownership of such shares.

- (3) The number of shares offered hereby, for each selling stockholder, consists of 5,988,024 shares issued pursuant to the securities purchase agreement and 5,089,821 shares issuable upon the exercise of the warrant issued to such selling stockholder pursuant to the securities purchase agreement. The shares issuable upon exercise of these warrants will become eligible for sale by the selling stockholders under this prospectus only as these warrants are exercised.

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Relationships with the Selling Stockholders

J. R. Hyde, III has served as the Chairman of our Board of Directors since November 2000 and is our largest stockholder. Except with respect to the foregoing and the transactions contemplated by the securities purchase agreement as described above, none of the selling stockholders has, or within the past three years has had, any position, office or other material relationship with us.

PLAN OF DISTRIBUTION

We are registering the shares of common stock issued to the selling stockholders and issuable upon exercise of the warrants issued to the selling stockholders to permit the resale of these shares of common stock by the selling stockholders from time to time from after the date of this prospectus. We will not receive any of the proceeds from the sale by the selling stockholders of the shares of common stock. We will bear all fees and expenses incident to our obligation to register the shares of common stock.

Each selling stockholder may, from time to time, sell any or all of their shares of common stock covered hereby on The NASDAQ Global Market or any other stock exchange, market or trading facility on which the shares are traded or in private transactions. These sales may be at fixed prices, at prevailing market prices at the time of the sale, at varying prices determined at the time of sale, or privately negotiated prices. A selling stockholder may use any one or more of the following methods when selling shares:

- ordinary brokerage transactions and transactions in which the broker-dealer solicits purchasers;
- block trades in which the broker-dealer will attempt to sell the shares as agent but may position and resell a portion of the block as principal to facilitate the transaction;
- purchases by a broker-dealer as principal and resale by the broker-dealer for its account;
- an exchange distribution in accordance with the rules of the applicable exchange;
- privately negotiated transactions;
- settlement of short sales, to the extent permitted by law;
- in transactions through broker-dealers that agree with the selling stockholders to sell a specified number of such shares at a stipulated price per share;
- through the writing or settlement of options or other hedging transactions, whether through an options exchange or otherwise;
- a combination of any such methods of sale; or
- any other method permitted pursuant to applicable law.

The selling stockholders may also sell the shares of common stock under Rule 144 under the Securities Act, if available, rather than under this prospectus.

Broker-dealers engaged by the selling stockholders may arrange for other brokers-dealers to participate in sales. Broker-dealers may receive commissions or discounts from the selling stockholders (or, if any broker-dealer acts as agent for the purchaser of shares, from the purchaser) in amounts to be negotiated, but, except as set forth in a supplement to this prospectus, in the case of an agency transaction not in excess of a customary brokerage commission in compliance with FINRA Rule 2440; and in the case of a principal transaction a markup or markdown in compliance with FINRA IM-2440-1.

In connection with the sale of the shares of common stock or interests therein, the selling stockholders may enter into hedging transactions with broker-dealers or other financial institutions, which may in turn engage in short sales of the shares of common stock in the course of hedging the positions they assume. The selling stockholders may also sell the shares of common stock short and deliver these securities to close out their short positions or to return borrowed shares in connection with such short sales, or loan or pledge the shares of common stock to broker-dealers that in turn may sell these securities. The selling stockholders may also enter into option or other transactions with broker-dealers or other financial institutions or create one or more derivative securities which require the

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delivery to such broker-dealer or other financial institution of shares of common stock offered by this prospectus, which shares such broker-dealer or other financial institution may resell pursuant to this prospectus (as supplemented or amended to reflect such transaction).

The selling stockholders and any broker-dealers or agents that are involved in selling the shares of common stock may be deemed to be “underwriters” within the meaning of the Securities Act in connection with such sales. In such event, any commissions received by such selling stockholders, broker-dealers

or agents and any profit on the resale of the shares purchased by them may be deemed to be underwriting commissions or discounts under the Securities Act. Selling stockholders who are “underwriters” within the meaning of Section 2(11) of the Securities Act will be subject to the prospectus delivery requirements of the Securities Act and may be subject to certain statutory liabilities of, including but not limited to, Sections 11, 12 and 17 of the Securities Act and Rule 10b-5 under the Exchange Act. Each selling stockholder has informed us that it is not a registered broker-dealer or an affiliate of a registered broker-dealer. In no event shall any broker-dealer receive fees, commissions and markups which, in the aggregate, would exceed eight percent (8%).

We are required to pay certain fees and expenses incurred by us incident to the registration of the shares. We have agreed to indemnify the selling stockholders against certain losses, claims, damages and liabilities, including liabilities under the Securities Act, and the selling stockholders may be entitled to contribution. We may be indemnified by the selling stockholders against certain losses, claims, damages and liabilities, including liabilities under the Securities Act that may arise from any written information furnished to us by the selling stockholders specifically for use in this prospectus, or we may be entitled to contribution.

The selling stockholders will be subject to the prospectus delivery requirements of the Securities Act including Rule 172 thereunder unless an exemption therefrom is available.

We agreed to cause the registration statement of which this prospectus is a part to remain effective until the earlier to occur of March 6, 2016 or the date on which all of the shares registered hereby are either sold pursuant to the registration statement or sold or available for resale without restriction under Rule 144 under the Securities Act. The shares of common stock will be sold only through registered or licensed brokers or dealers if required under applicable state securities laws. In addition, in certain states, the shares of common stock covered hereby may not be sold unless they have been registered or qualified for sale in the applicable state or an exemption from the registration or qualification requirement is available and is complied with.

Under applicable rules and regulations under the Exchange Act, any person engaged in the distribution of the shares of common stock may not simultaneously engage in market making activities with respect to the shares of common stock for the applicable restricted period, as defined in Regulation M, prior to the commencement of the distribution. In addition, the selling stockholders will be subject to applicable provisions of the Exchange Act and the rules and regulations thereunder, including Regulation M, which may limit the timing of purchases and sales of shares of common stock by the selling stockholders or any other person. We will make copies of this prospectus available to the selling stockholders and have informed them of the need to deliver a copy of this prospectus at or prior to the time of the sale (including by compliance with Rule 172 under the Securities Act).

There can be no assurance that any selling stockholder will sell any or all of the shares of common stock we registered on behalf of the selling stockholders pursuant to the registration statement of which this prospectus forms a part.

Once sold under the registration statement of which this prospectus forms a part, the shares of common stock will be freely tradable in the hands of persons other than our affiliates.

VALIDITY OF COMMON STOCK

The validity of the common stock being offered hereby has been passed upon for us by Cooley LLP, Palo Alto, California.

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EXPERTS

Ernst & Young LLP, independent registered public accounting firm, has audited our financial statements included in our Annual Report on Form 10-K for the year ended December 31, 2013, and the effectiveness of our internal control over financial reporting as of December 31, 2013, as set forth in their reports, which are incorporated by reference in this prospectus and elsewhere in the registration statement. Our financial statements are incorporated by reference in reliance on Ernst & Young LLP’s reports, given on their authority as experts in accounting and auditing.

WHERE YOU CAN FIND MORE INFORMATION

We are a reporting company and file annual, quarterly and current reports, proxy statements and other information with the SEC. We have filed with the SEC a registration statement on Form S-3 under the Securities Act with respect to the resale of the common stock the selling stockholders are offering under this prospectus. This prospectus does not contain all of the information set forth in the registration statement and the exhibits to the registration statement. For further information with respect to us and the common stock offered by the selling stockholders under this prospectus, we refer you to the registration statement and the exhibits filed as a part of the registration statement. You may read and copy the registration statement, as well as our reports, proxy statements and other information, at the SEC’s Public Reference Room at 100 F Street, N.E., Washington, D.C. 20549. Please call the SEC at 1-800-SEC-0330 for more information about the operation of the public reference room. The SEC also maintains an Internet site that contains reports, proxy and information statements and other information regarding issuers that file electronically with the SEC, including GTx. The SEC’s Internet site can be found at www.sec.gov. We maintain a website at www.gtxinc.com. Information found on, or accessible through, our website is not a part of, and is not incorporated into, this prospectus, and you should not consider it part of this prospectus.

INCORPORATION BY REFERENCE

The SEC allows us to incorporate by reference the information we file with it, which means that we can disclose important information to you by referring you to another document that we have filed separately with the SEC. You should read the information incorporated by reference because it is an important part of this prospectus. Information in this prospectus supersedes information incorporated by reference that we filed with the SEC prior to the date of this prospectus, while information that we file later with the SEC will automatically update and supersede the information in this prospectus. We incorporate by reference into this prospectus and the registration statement of which this prospectus is a part the information or documents listed below that we have filed with the SEC (Commission File No. 000-50549):

- our Annual Report on Form 10-K for the fiscal year ended December 31, 2013, filed with the SEC on March 12, 2014;
- the information specifically incorporated by reference into our Annual Report on Form 10-K for the fiscal year ended December 31, 2013 from our definitive proxy statement on Schedule 14A for our 2014 Annual Meeting of Stockholders, filed with the SEC on March 24, 2014;

- our Quarterly Reports on Form 10-Q for the quarters ended March 31, 2014 and June 30, 2014, filed with the SEC on May 12, 2014 and August 5, 2014, respectively;
- our Current Reports on Form 8-K, filed with the SEC on January 29, 2014, March 4, 2014, March 6, 2014, April 4, 2014, April 15, 2014, May 8, 2014, May 9, 2014, June 2, 2014 and June 12, 2014; and
- the description of our common stock set forth in our registration statement on Form 8-A, filed with the SEC on January 13, 2004, including any further amendments thereto or reports filed for the purposes of updating this description.

We also incorporate by reference any future filings (other than current reports furnished under Item 2.02 or Item 7.01 of Form 8-K and exhibits filed on such form that are related to such items unless such Form 8-K expressly provides to the contrary) made with the SEC pursuant to Sections 13(a), 13(c), 14 or 15(d) of the Exchange Act, including those made after the date of the initial filing of the registration statement of which this prospectus is a part

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and prior to effectiveness of such registration statement, until we file a post-effective amendment that indicates the termination of the offering of the common stock made by this prospectus and will become a part of this prospectus from the date that such documents are filed with the SEC. Information in such future filings updates and supplements the information provided in this prospectus. Any statements in any such future filings will automatically be deemed to modify and supersede any information in any document we previously filed with the SEC that is incorporated or deemed to be incorporated herein by reference to the extent that statements in the later filed document modify or replace such earlier statements.

We will furnish without charge to each person, including any beneficial owner, to whom a prospectus is delivered, upon written or oral request, a copy of any or all of the documents incorporated by reference into this prospectus but not delivered with the prospectus, including exhibits that are specifically incorporated by reference into such documents. You should direct any requests for documents to GTx, Inc., Attention: Corporate Secretary, 175 Toyota Plaza, 7th Floor, Memphis, TN 38103. Our phone number is (901) 523-9700.

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PART II

INFORMATION NOT REQUIRED IN THE PROSPECTUS

Item 14. Other Expenses of Issuance and Distribution

The following table sets forth the estimated costs and expenses payable by the registrant in connection with the common stock being registered. The selling stockholders will not bear any portion of such expenses. All the amounts shown are estimates, except for the SEC registration fee.

	Amount
SEC registration fee	\$ 3,282
Accounting fees and expenses	15,000
Legal fees and expenses	100,000
Printing and miscellaneous fees and expenses	30,000
Total	<u>\$ 148,282</u>

Item 15. Indemnification of Directors and Officers

The registrant's certificate of incorporation contains provisions permitted under Delaware law relating to the liability of directors. These provisions eliminate a director's personal liability for monetary damages resulting from a breach of fiduciary duty, except in circumstances involving wrongful acts, such as:

- any breach of the director's duty of loyalty to the registrant or its stockholders;
- any act or omission not in good faith or that involves intentional misconduct or a knowing violation of the law;
- any act related to unlawful stock repurchases, redemptions or other distribution or payments of dividends; or
- any transaction from which the director derived an improper personal benefit.

These provisions do not limit or eliminate the registrant's rights or any stockholder's rights to seek non-monetary relief, such as an injunction or rescission, in the event of a breach of a director's fiduciary duty. These provisions will not alter a director's liability under federal securities laws.

As permitted by Section 145 of the Delaware General Corporation Law, the registrant's bylaws require the registrant to indemnify its directors and executive officers to the fullest extent not prohibited by the Delaware law. The registrant may expand the extent of such indemnification by individual contracts with the registrant's directors and executive officers. Further, the registrant may decline to indemnify any director or executive officer in connection with any proceeding initiated by such person or any proceeding by such person against the registrant or its directors, officers, employees or other agents, unless such indemnification is expressly required to be made by law or the proceeding was authorized by the registrant's board of directors.

The registrant has entered into indemnity agreements with each of its current directors and its executive officers to give such directors and officers additional contractual assurances regarding the scope of the indemnification set forth in the registrant's certificate of incorporation and bylaws and to provide additional procedural protections. At present, there is no pending litigation or proceeding involving any of the registrant's directors, officers or employees for which indemnification is sought, nor is the registrant aware of any threatened litigation that may result in claims for indemnification.

The registrant has the power to indemnify its other officers, employees and other agents, as permitted by Delaware law, but the registrant is not required to do so.

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The registrant has a directors' and officers' insurance and registrant reimbursement policy. The policy insures the registrant's directors and officers against unindemnified losses arising from certain wrongful acts in their capacities as directors and officers and reimburses the registrant for those losses for which the registrant has lawfully indemnified the directors and officers. The policy contains various exclusions, none of which apply to any offerings pursuant to this registration statement.

The registration rights agreement that the registrant entered into with the selling stockholders identified in the prospectus included in this registration statement provides for cross-indemnification in connection with registration of the registrant's common stock on behalf of such selling stockholders, including for some liabilities arising under the Securities Act.

Item 16. Exhibits

Exhibit Number	Description of Document
3.1	Restated Certificate of Incorporation of GTx, Inc.(1)
3.2	Certificate of Amendment of Restated Certificate of Incorporation of GTx, Inc.(2)
3.3	Certificate of Amendment of Restated Certificate of Incorporation of GTx, Inc.(3)
3.4	Amended and Restated Bylaws of GTx, Inc.(4)
4.1	Reference is made to Exhibits 3.1, 3.2, 3.3 and 3.4
4.2	Specimen of Common Stock Certificate(5)
4.3	Form of Common Stock Warrant, issued by GTx, Inc. pursuant to the Securities Purchase Agreement, dated March 3, 2014, among GTx, Inc., J.R. Hyde, III and The Pyramid Peak Foundation(6)
4.4	Amended and Restated Registration Rights Agreement among GTx, Inc., J.R. Hyde, III and The Pyramid Peak Foundation, dated August 4, 2014(7)
5.1+	Opinion of Cooley LLP
23.1+	Consent of Independent Registered Public Accounting Firm
23.2+	Consent of Cooley LLP (included in Exhibit 5.1)
24.1+	Power of Attorney is contained on the signature pages

* To be filed by amendment or as an exhibit to a Current Report on Form 8-K and incorporated herein by reference, if applicable.

+ Filed herewith.

- (1) Filed as Exhibit 4.1 to GTx, Inc.'s registration statement on Form S-3 (File No. 333-127175), filed with the SEC on August 4, 2005, and incorporated herein by reference.
- (2) Filed as the like numbered Exhibit to GTx, Inc.'s Current Report on Form 8-K (File No. 000-50549), filed with the SEC on May 6, 2011, and incorporated herein by reference.
- (3) Filed as the like numbered Exhibit to GTx, Inc.'s Current Report on Form 8-K (File No. 000-50549), filed with the SEC on May 9, 2014, and incorporated herein by reference.
- (4) Filed as Exhibit 3.2 to GTx, Inc.'s Current Report on Form 8-K (File No. 000-50549), filed with the SEC on July 26, 2007, and incorporated herein by reference.
- (5) Filed as the like numbered Exhibit to GTx, Inc.'s registration statement on Form S-1/A (File No. 333-109700), filed with the SEC on December 22, 2003, and incorporated herein by reference.
- (6) Filed as Exhibit 4.7 to GTx, Inc.'s Annual Report on Form 10-K (File No. 000-50549), filed with the SEC on March 12, 2014, and incorporated herein by reference.
- (7) Filed as Exhibit 4.6 to GTx, Inc.'s Quarterly Report on Form 10-Q (File No. 000-50549), filed with the SEC on August 5, 2014, and incorporated herein by reference.

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Item 17. Undertakings

The undersigned registrant hereby undertakes:

(1) To file, during any period in which offers or sales are being made, a post-effective amendment to this registration statement:

(i) to include any prospectus required by Section 10(a)(3) of the Securities Act of 1933;

(ii) to reflect in the prospectus any facts or events arising after the effective date of the registration statement (or the most recent post-effective amendment thereof) which, individually or in the aggregate, represent a fundamental change in the information set forth in the registration statement. Notwithstanding the foregoing, any increase or decrease in volume of securities offered (if the total dollar value of securities offered would not exceed that

which was registered) and any deviation from the low or high end of the estimated maximum offering range may be reflected in the form of prospectus filed with the Commission pursuant to Rule 424(b) if, in the aggregate, the changes in volume and price represent no more than a 20% change in the maximum aggregate offering price set forth in the "Calculation of Registration Fee" table in the effective registration statement; and

(iii) to include any material information with respect to the plan of distribution not previously disclosed in the registration statement or any material change to such information in the registration statement;

provided, however, that paragraphs (1)(i), (1)(ii) and (1)(iii) do not apply if the information required to be included in a post-effective amendment by those paragraphs is contained in reports filed with or furnished to the Commission by the registrant pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934 that are incorporated by reference in the registration statement, or is contained in a form of prospectus filed pursuant to Rule 424(b) that is part of the registration statement.

(2) That, for the purpose of determining any liability under the Securities Act of 1933, each such post-effective amendment shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial *bona fide* offering thereof.

(3) To remove from registration by means of a post-effective amendment any of the securities being registered which remain unsold at the termination of the offering.

(4) That, for the purpose of determining liability under the Securities Act of 1933 to any purchaser:

(i) Each prospectus filed by the registrant pursuant to Rule 424(b)(3) shall be deemed to be part of the registration statement as of the date the filed prospectus was deemed part of and included in the registration statement; and

(ii) Each prospectus required to be filed pursuant to Rule 424(b)(2), (b)(5), or (b)(7) as part of a registration statement in reliance on Rule 430B relating to an offering made pursuant to Rule 415(a)(1)(i), (vii), or (x) for the purpose of providing the information required by Section 10(a) of the Securities Act of 1933 shall be deemed to be part of and included in the registration statement as of the earlier of the date such form of prospectus is first used after effectiveness or the date of the first contract of sale of securities in the offering described in the prospectus. As provided in Rule 430B, for liability purposes of the issuer and any person that is at that date an underwriter, such date shall be deemed to be a new effective date of the registration statement relating to the securities in the registration statement to which that prospectus relates, and the offering of such securities at that time shall be deemed to be the initial *bona fide* offering thereof. *Provided, however,* that no statement made in a registration statement or prospectus that is part of the registration statement or made in a document incorporated or deemed incorporated by reference into the registration statement or prospectus that is part of the registration statement will, as to a purchaser with a time of contract of sale prior to such effective date, supersede or modify any statement that was made in the registration statement or prospectus that was part of the registration statement or made in any such document immediately prior to such effective date.

(5) That, for the purpose of determining liability under the Securities Act of 1933 to any purchaser, if the registrant is subject to Rule 430C, each prospectus filed pursuant to Rule 424(b) as part of a registration statement

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relating to an offering, other than registration statements relying on Rule 430B or other than prospectuses filed in reliance on Rule 430A, shall be deemed to be part of and included in the registration statement as of the date it is first used after effectiveness. *Provided, however,* that no statement made in a registration statement or prospectus that is part of the registration statement or made in a document incorporated or deemed incorporated by reference into the registration statement or prospectus that is part of the registration statement will, as to a purchaser with a time of contract of sale prior to such first use, supersede or modify any statement that was made in the registration statement or prospectus that was part of the registration statement or made in any such document immediately prior to such date of first use.

(6) That, for the purpose of determining liability of the registrant under the Securities Act of 1933, each filing of the registrant's annual report pursuant to Section 13(a) or Section 15(d) of the Securities Exchange Act of 1934 (and, where applicable, each filing of an employee benefit plan's annual report pursuant to section 15(d) of the Securities Exchange Act of 1934) that is incorporated by reference in the registration statement shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial *bona fide* offering thereof.

Insofar as indemnification for liabilities arising under the Securities Act of 1933 may be permitted to directors, officers and controlling persons of the registrant pursuant to the foregoing provisions, or otherwise, the registrant has been advised that in the opinion of the Securities and Exchange Commission such indemnification is against public policy as expressed in the Securities Act and is, therefore, unenforceable. In the event that a claim for indemnification against such liabilities (other than the payment by the registrant of expenses incurred or paid by a director, officer or controlling person of the registrant in the successful defense of any action, suit or proceeding) is asserted by such director, officer or controlling person in connection with the securities being registered, the registrant will, unless in the opinion of its counsel the matter has been settled by controlling precedent, submit to a court of appropriate jurisdiction the question whether such indemnification by it is against public policy as expressed in the Securities Act of 1933 and will be governed by the final adjudication of such issue.

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SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, the registrant certifies that it has reasonable grounds to believe that it meets all of the requirements for filing on Form S-3 and has duly caused this registration statement to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of Memphis, State of Tennessee, on August 6, 2014.

By: /s/ MARC S. HANOVER

Marc S. Hanover

President, Chief Operating Officer and Interim Chief Executive Officer

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints Marc S. Hanover, Henry P. Doggrell and Jason T. Shackelford, and each of them severally, as true and lawful attorneys-in-fact and agents, with full powers of substitution and resubstitution, for them and in their name, place and stead, in any and all capacities, to sign any and all amendments (including pre-effective and post-effective amendments) to this registration statement, and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, and generally to do all such things in their names and behalf in their capacities as officers and/or directors to enable GTx, Inc. to comply with the provisions of the Securities Act of 1933, as amended, and all requirements of the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as he might or could do in person, ratifying and confirming all that said attorneys-in-fact and agents, or any of them, or their or his substitutes or substitute, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Act, this Registration Statement has been signed by the following persons in the capacities and on the dates indicated:

Signatures	Title	Date
/s/ MARC S. HANOVER Marc S. Hanover	President, Chief Operating Officer and Interim Chief Executive Officer, and Director <i>(Principal Executive Officer)</i>	August 6, 2014
/s/ JASON T. SHACKELFORD Jason T. Shackelford	Corporate Controller, Senior Director, Accounting and Corporate Controller and Acting Principal Financial and Accounting Officer <i>(Principal Financial and Accounting Officer)</i>	August 6, 2014
/s/ J.R. HYDE, III J.R. Hyde, III	Chairman of the Board of Directors	August 6, 2014
/s/ Michael G. Carter Michael G. Carter, M.D.	Director	August 6, 2014
/s/ BARRINGTON J.A. FURR Barrington J.A. Furr, Ph.D.	Director	August 6, 2014
/s/ J. KENNETH GLASS J. Kenneth Glass	Director	August 6, 2014
/s/ KENNETH S. ROBINSON Kenneth S. Robinson, M.D., M.Div.	Director	August 6, 2014

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23.1+	Consent of Independent Registered Public Accounting Firm
23.2+	Consent of Cooley LLP (included in Exhibit 5.1)
24.1+	Power of Attorney is contained on the signature pages

* To be filed by amendment or as an exhibit to a Current Report on Form 8-K and incorporated herein by reference, if applicable.
+ Filed herewith.

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 - (7) Filed as Exhibit 4.6 to GTX, Inc.'s Quarterly Report on Form 10-Q (File No. 000-50549), filed with the SEC on August 5, 2014, and incorporated herein by reference.
-

August 6, 2014

GTx, Inc.
175 Toyota Plaza, 7th Floor
Memphis, TN 38103

Ladies and Gentlemen:

We have represented GTx, Inc. (the “**Company**”) in connection with the filing of a Registration Statement on Form S-3 (the “**Registration Statement**”) with the Securities and Exchange Commission, including a related prospectus (the “**Prospectus**”), covering the registration for resale of 22,155,690 shares of the Company’s common stock, par value \$0.001 per share (the “**Common Stock**”), held by certain selling stockholders identified in the Prospectus (the “**Shares**”), including 10,179,642 shares of Common Stock (the “**Warrant Shares**”) issuable upon the exercise of outstanding warrants held by such selling stockholders (the “**Warrants**”), and the Company has requested our opinion in connection with certain related matters.

In connection with this opinion, we have examined (i) the Registration Statement and the Prospectus, (ii) the Company’s Certificate of Incorporation and Bylaws, each as currently in effect, (iii) the Warrants, and (iv) such other documents, records, certificates, memoranda and other instruments as we deem necessary as a basis for this opinion. We have assumed the genuineness and authenticity of all documents submitted to us as originals, the conformity to originals of all documents submitted to us as copies thereof, and the due execution and delivery of all documents where due execution and delivery are a prerequisite to the effectiveness thereof (except that we have not assumed the due execution and delivery of documents by the Company).

Our opinion is expressed only with respect to the federal laws of the United States of America and the General Corporation Law of the State of Delaware. We express no opinion as to whether the laws of any particular jurisdiction other than those identified above are applicable to the subject matter hereof.

Based on the foregoing, and in reliance thereon, we are of the opinion that (i) the Shares have been validly issued and are fully paid and nonassessable, and (ii) the Warrant Shares, when issued and sold against payment therefor in accordance with the terms of the Warrants, will be validly issued, fully paid and nonassessable.

We consent to the reference to our firm under the caption “Validity of Common Stock” in the Prospectus and to the filing of this opinion as an exhibit to the Registration Statement.

Sincerely,

Cooley LLP

By: /s/ Chadwick L. Mills
Chadwick L. Mills

Consent of Independent Registered Public Accounting Firm

We consent to the reference to our firm under the caption "Experts" in the Registration Statement (Form S-3) and related Prospectus of GTx, Inc., for the registration of 22,155,690 shares of its common stock, which includes shares of common stock issuable upon exercise of outstanding warrants, and to the incorporation by reference therein of our reports dated March 12, 2014, with respect to the financial statements of GTx, Inc. and the effectiveness of internal control over financial reporting of GTx, Inc., included in its Annual Report (Form 10-K) for the year ended December 31, 2013, filed with the Securities and Exchange Commission.

/s/ Ernst & Young LLP

Memphis, Tennessee
August 6, 2014
