

PROSPECTUS

64,311,112 Shares



Common Stock

This prospectus relates to the disposition from time to time of up to 64,311,112 shares of our common stock, 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 7 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 January 8, 2015, the last reported sale price of our common stock on The NASDAQ Global Market was \$0.739.

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 January 8, 2015.

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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.

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 that we believe have the potential to be used as a hormonal therapy for the treatment of advanced 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. Our lead 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 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 64,311,112 shares of our common stock. 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 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 issued to the selling stockholders pursuant to the securities purchase agreement we entered into with the selling stockholders on November 9, 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 September 30, 2014 filed with the SEC on November 10, 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;
- 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 our ongoing and planned clinical trials of enobosarm and GTx-758 will achieve clinically relevant results;
- the timing, scope and anticipated initiation, enrollment and completion of our ongoing and planned clinical trials;
- the timing of potential regulatory discussions and submissions, and the anticipated timing, scope and outcome of related regulatory actions or guidance;
- 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 ability to cause our common stock to remain listed on an established trading market;
- our estimates regarding the sufficiency of our cash resources and our expenses, capital requirements and need 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 September 30, 2014 filed with the SEC on November 10, 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.

USE OF PROCEEDS

The selling stockholders will receive all of the net proceeds from sales of the common stock sold pursuant to this prospectus.

SELLING STOCKHOLDERS

On November 9, 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 64,311,112 immediately separable units, comprised of an aggregate of 64,311,112 shares of our common stock and warrants to purchase up to 64,311,112 additional shares of our common stock (which warrants we refer to in this prospectus as the New Warrants), for an aggregate purchase price of approximately \$43.4 million. Pursuant to the securities purchase agreement, we agreed to file the registration statement of which this prospectus is a part to cover the resale of the shares issued to the selling stockholders, and to keep such registration statement effective until the earlier of November 14, 2016, or the date on which all of the 64,311,112 shares registered for resale under this registration statement have been sold or can be sold publicly without restriction or limitation under Rule 144 under the Securities Act. This prospectus and the related registration statement do not cover the resale of the shares of our common stock underlying the New Warrants; however, pursuant to the securities purchase agreement, we agreed to file one or more additional registration statements in the future covering the resale of the shares underlying the New Warrants.

We are registering the resale of the shares issued pursuant to the securities purchase agreement 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. 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 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.

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.

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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 December 1, 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. In this regard, solely for purposes of the following table, we have assumed that the New Warrants will be exercisable for shares of our common stock within 60 days of December 1, 2014. Under the terms of the New Warrants, the New Warrants will become exercisable on the earlier to occur of (a) the date we obtain stockholder approval of an amendment to our certificate of incorporation to increase our authorized common stock to an amount necessary to effect the share settlement of all of the New Warrants or (b) the trading day immediately prior to the occurrence of certain “fundamental transactions” (as defined in the New Warrants), but in no event later than June 1, 2015. Since we do not currently have a sufficient number of authorized and unreserved shares of common stock necessary to settle exercises of the New Warrants in full in shares of common stock, each New Warrant includes a provision that requires us to net cash settle such New Warrant upon exercise if at the time of such exercise, there are then an insufficient number of authorized and reserved shares of common stock to effect a share settlement of such New Warrant. Under the securities purchase agreement, we have agreed to seek such stockholder approval at a special or annual meeting to be held no later than May 27, 2015. In this prospectus, we refer to the date of such stockholder approval, should it occur, as the Stockholder Approval Date and we have assumed, solely for purposes of the following table, that the New Warrants will be exercisable for shares of our common stock within 60 days of December 1, 2014 and when they become exercisable, will be exercisable solely for shares of our common stock. Finally, 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.

All information contained in the table below and the footnotes thereto is based upon information provided to us by the selling stockholders. The information in the table below and the footnotes thereto 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 on 140,325,643 shares of common stock outstanding as of December 1, 2014. 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(8)	After Offering	
	Number of Shares Beneficially Owned(1)	Percentage of Shares Beneficially Owned(1)		Number of Shares Beneficially Owned	Percentage of Shares Beneficially Owned
J. R. Hyde, III 17 West Pontotoc Ave. Suite 100 Memphis, Tennessee 38103	57,139,043(2)	38.5%	24,545,455	54,245,996	31.9%
The Pyramid Peak Foundation 6410 Poplar Ave. Suite 710 Memphis, Tennessee 38119	60,168,755(3)	35.4%	24,545,455	35,623,300	21.0%
Entities Affiliated with BVF Partners c/o BVF Partners One Sansome Street, 30 th Floor San Francisco, California 94104	14,355,574(4)	9.999%	11,111,111	11,111,111	7.3%
Formanek Investment Trust 6075 Poplar Ave., Suite 726 Memphis, Tennessee 38119	7,400,000(5)	5.1%	3,700,000	3,700,000	2.6%
John H. Pontius 17 West Pontotoc Ave. Suite 100 Memphis, Tennessee 38103	2,643,213(6)	1.9%	181,818	2,461,395	1.8%
Marc S. Hanover c/o GTx, Inc. 175 Toyota Plaza, 7th Floor Memphis, Tennessee	1,523,573(7)	1.1%	227,273	1,296,300	0.9%

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(1) Under the terms of the New Warrants, the number of shares of our common stock that may be acquired by a selling stockholder upon any exercise of a New Warrant is generally limited to the extent necessary to ensure that, following such exercise, such selling stockholder would not, together with its affiliates and any other persons or entities whose beneficial ownership of our common stock would be aggregated with such selling stockholder for purposes of Section 13(d) of the Exchange Act, beneficially own in excess of 38.5% of (a) the total number of shares of our common stock then issued and outstanding or (b) the then combined voting power of all of our voting securities (the “38.5% blocker”). In addition, under the terms of the New Warrants issued to the entities affiliated with BVF Partners, the number of shares of our common stock that may be acquired by these selling stockholders

upon any exercise of a New Warrant is generally limited to the extent necessary to ensure that, following such exercise, the total number of shares of our common stock then beneficially owned by these selling stockholders, together with their affiliates and any other persons or entities whose beneficial ownership of our common stock would be aggregated with such selling stockholders for purposes of Section 13(d) of the Exchange Act, would not exceed 9.999% of the total number of shares of our common stock then issued and outstanding (unless waived on at least 61 days' prior notice) (the "9.999% blocker"). For purposes of each of the 38.5% blocker and the 9.999% blocker, beneficial ownership is determined in accordance with Section 13(d) of the Exchange Act and the rules and regulations promulgated thereunder. These warrant exercise limitations are reflected in the numbers and percentages of shares of common stock shown as beneficially owned by the selling stockholders. Also, solely for purposes of this table, the New Warrants are assumed to be exercisable within 60 days of December 1, 2014.

- (2) 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 51,423,597 shares, which include 24,545,455 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 a warrant issued to Mr. Hyde in March 2014, 2,893,047 shares issuable upon exercise of a New Warrant, and 104,588 shares issuable to Mr. Hyde pursuant to our Directors' Deferred Compensation Plan. With respect to the New Warrant held by Mr. Hyde, the New Warrant covers the exercise of up to 24,545,455 shares; however, as a result of the 38.5% blocker, the New Warrant held by Mr. Hyde is exercisable for only up to 2,893,047 shares prior to the offering and is fully exercisable for all 24,545,455 shares after the offering. The number of shares exercisable prior to the offering will change depending upon changes in the outstanding shares. 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 "Hyde Family Trusts") and 3,654,133 shares held in grantor retained annuity trusts on behalf of Mr. Hyde (the "Hyde GRATs"). As trustee of the Hyde Family Trusts and certain of the Hyde GRATs, John H. Pontius shares voting and dispositive power over all of the shares held by the Hyde Family Trusts and 254,133 shares held in the Hyde GRATs. Lorie Jernigan, as trustee of certain of the Hyde GRATs, shares voting and dispositive power over the remaining 3,400,000 shares held in the Hyde GRATs. Ms. Jernigan's business address is 17 West Pontotoc Ave., Suite 100 Memphis, TN 38103.
- (3) Includes 5,089,821 shares issuable upon the exercise of a warrant issued to the Pyramid Peak Foundation ("Foundation") in March 2014 and 24,545,455 shares issuable upon exercise of a New Warrant. 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.
- (4) Biotechnology Value Fund, L.P., Biotechnology Value Fund II, L.P., Investment 10, L.L.C. and MSI BVF SPV, LLC are affiliated entities. Amounts beneficially owned by such entities represent the following securities acquired in the private placement: (i) 5,146,271 shares of common stock and a New Warrant to purchase up to an additional 5,146,271 shares of common stock acquired by Biotechnology Value Fund, L.P., (ii) 2,666,747 shares of common stock and a New Warrant to purchase up to an additional 2,666,747 shares of common stock acquired by Biotechnology Value Fund II, L.P., (iii) 1,430,041 shares of common stock and a New Warrant to purchase up to an additional 1,430,041 shares of common stock acquired by Investment 10, L.L.C. and (iv) 1,868,052 shares of common stock and a New Warrant to purchase up to an additional 1,868,052 shares of common stock acquired by MSI BVF SPV, LLC. Certain shares of common stock underlying the New Warrants held by these entities are excluded in the total number of shares held due to a blocker that prevents the exercise of these New Warrants if the number of shares of common stock to be issued pursuant to such exercise would, when aggregated with all other shares of common stock owned by such holder at such time, result in the holder beneficially owning more than 9.999% of all of the common stock of GTX outstanding at such time. As a result of the 9.999% blocker, the New Warrants held by these entities are exercisable for up to an aggregate of only 3,244,463 shares prior to the offering and are fully exercisable for all 11,111,111 shares after the offering. The number of shares exercisable prior to the offering will change depending upon changes in the outstanding shares or waiver of the 9.999% blocker. BVF Partners L.P. as the general partner of Biotechnology Value Fund, L.P. and Biotechnology Value Fund II, L.P., and the investment adviser of each of Investment 10, LLC and MSI BVF SPV, LLC, may be deemed to beneficially own the shares listed above that are beneficially owned in the aggregate by Biotechnology Value Fund, L.P., Biotechnology Value Fund II, L.P., Investment 10, L.L.C. and MSI BVF SPV, LLC. BVF Inc., as the general partner of BVF Partners L.P., may be deemed to beneficially own the shares that are beneficially owned by BVF Partners L.P. Mark Lampert, as a director and officer of BVF Inc., may be deemed to beneficially own the shares that are beneficially owned by BVF Inc. Each of BVF Partners L.P., BVF Inc. and Mr. Lampert disclaims beneficial ownership of the shares beneficially owned by Biotechnology Value Fund, L.P., Biotechnology Value

Fund II, L.P., Investment 10, L.L.C. and MSI BVF SPV, LLC and this prospectus shall not be construed as an admission that any such person or entity is the beneficial owner of any such securities.

- (5) Includes 3,700,000 shares issuable upon exercise of a New Warrant. Peter R. Formanek is a trustee of the Formanek Investment Trust and has voting and investment control over the shares beneficially owned by the Formanek Investment Trust. Each of the other trustees of the Formanek Investment Trust, Jonathan P. Formanek and Walter Rothchild, may be deemed to share voting and investment control over the shares beneficially owned by the Formanek Investment Trust, but Walter Rothchild disclaims beneficial ownership of such shares. The business address for each of Peter R. Formanek and Walter Rothchild is 6075 Poplar Avenue, Suite 726, Memphis, TN 38119. Jonathan P. Formanek's business address is 3111 Welborn Street, Dallas TX 75219.
- (6) Includes 181,818 shares issuable upon exercise of a New Warrant and 61,000 shares of common stock issuable upon the exercise of stock options held by Mr. Pontius. Mr. Pontius also has shared voting and dispositive power over 1,844,851 shares held by the Hyde Family Trusts, 254,133 shares held in the Hyde GRATs, 31,520 shares held by trusts for the benefit of Mr. Pontius' family members (the "Pontius Family Trusts") and 11,000 shares held by certain other trusts for which Mr. Pontius serves as trustee. As trustee of certain of the Pontius Family Trusts, Patricia Pontius (Mr. Pontius' spouse) shares the power to vote and dispose of shares held by the Pontius Family Trusts and beneficially owned by Mr. Pontius. Mrs. Pontius' business address is 2157 York Avenue, Memphis, Tennessee 38104.
- (7) Includes 352,875 shares held by Equity Partners XII, LLC, an entity controlled by Mr. Hanover, 227,273 shares issuable upon exercise of a New Warrant, 124,014 shares held by trusts of which Mr. Hanover is the trustee, and 379,000 shares of common stock issuable upon the exercise of options held by Mr. Hanover.
- (8) The number of shares offered hereby, for each selling stockholder, consists solely of the shares issued pursuant to the securities purchase agreement. Under the terms of the securities purchase agreement, we have agreed to file one or more registration statements covering the resale of the shares underlying the New Warrants following the Shareholder Approval Date.

Positions or Offices with GTx

Set forth below is information with respect to the positions or offices the selling stockholders or their affiliates or associates have or have had with us during the past three years:

- J. R. Hyde, III has served as the Chairman of our Board of Directors since November 2000 and is currently our largest stockholder.
- Marc S. Hanover is a co-founder of GTx and has served as our interim Chief Executive Officer since April 2014. Mr. Hanover has also served as our President and Chief Operating Officer since our inception in September 1997, and served as our acting principal financial officer from December 31, 2013 until his appointment as our interim Chief Executive Officer in April 2014. Mr. Hanover also previously served as a member of our Board of Directors from our inception until August 2011, and was again elected to our Board of Directors in April 2014.
- John H. Pontius, who serves as the President of Pittco Management, LLC, an investment and business management firm affiliated with Mr. Hyde, previously served on our Board of Directors until his resignation from our Board of Directors in August 2011.

Other Relationships

In March 2014, we sold an aggregate of 11,976,048 immediately separable units in a private placement, or the March Private Placement, which units consisted of an aggregate of 11,976,048 shares of our common stock and warrants to purchase up to 10,179,642 additional shares of our common stock. The units were sold to Mr. Hyde and The Pyramid Peak Foundation, or the Foundation, for gross proceeds of approximately \$21.3 million. In the March Private Placement, each of Mr. Hyde and the Foundation purchased 5,988,024 units, consisting of 5,988,024 shares of our common stock and a warrant to purchase 5,089,821 shares of our common stock for total consideration payable to us by each of Mr. Hyde and the Foundation of approximately \$10.6 million. The warrants, which may only be exercised for cash, have an exercise price of \$1.67 per share and a one year term expiring in March 2015. As part of the March Private Placement, we entered into a registration rights agreement with Mr. Hyde and the Foundation pursuant to which we filed a registration statement with the SEC registering the resale by Mr. Hyde and the Foundation of the 11,976,048 shares we issued at the closing of the March Private Placement and the 10,179,642 shares of our common stock underlying the warrants we issued at the closing of the March Private Placement, and we agreed 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 that registration statement have been publicly sold or are available for resale without restriction under Rule 144 of the Securities Act.

Except with respect to the foregoing and the transactions contemplated by the November 2014 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 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 delivery to such broker-dealer or other financial institution of shares of common stock offered by this prospectus,

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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 November 14, 2016, or the date on which all of the shares registered for resale under the registration statement have been sold or can be sold publicly without restriction or limitation 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, San Francisco, 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 Report on Form 10-Q for the quarter ended March 31, 2014, filed with the SEC on May 12, 2014;
- our Quarterly Report on Form 10-Q for the quarter ended June 30, 2014, filed with the SEC on August 5, 2014, as amended by Amendment No. 1 to Quarterly Report on Form 10-Q/A filed with the SEC on December 12, 2014;
- our Quarterly Report on Form 10-Q for the quarter ended September 30, 2014, filed with the SEC on November 10, 2014;
- 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, June 12, 2014, October 8, 2014, November 10, 2014 (other than the information furnished under Item 2.02 thereof and the accompanying Exhibit 99.1) and November 17, 2014; and

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- 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 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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