

PROSPECTUS

8,773,308 Shares



Common Stock

This prospectus relates to the disposition from time to time of up to 8,773,308 shares of our common stock, which includes 3,289,988 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. We will, however, receive the net proceeds of any warrants exercised for cash.

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 have agreed to pay certain expenses incurred in connection with the registration of these shares, however, 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 Capital Market under the symbol “GTXI.” On November 2, 2017, the last reported sale price of our common stock on The NASDAQ Capital Market was \$8.64.

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 November 2, 2017.

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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 muscle-related diseases and other serious medical conditions. Our current strategy is focused on the further development of selective androgen receptor modulators, or SARMs, a class of drugs that we believe has the potential to treat serious medical conditions where unmet medical needs in muscle-related diseases may benefit from increasing muscle mass, such as stress urinary incontinence and Duchenne muscular dystrophy. 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, in 2015, we entered into an exclusive worldwide license agreement with the University of Tennessee Research Foundation to develop its proprietary selective androgen receptor degrader, or SARD, technology which we believe has the potential to provide compounds that can degrade multiple forms of androgen receptor by inhibiting tumor growth in patients with progressive castration-resistant prostate cancer, including those patients who do not respond to or are resistant to current therapies.

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 8,773,308 shares of our common stock, which includes 3,289,988 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 Capital 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 September 25, 2017, 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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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, 2017 filed with the SEC on August 14, 2017 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 SARM and SARD programs;
- the therapeutic and commercial potential of, and our ability to advance the development of, SARMs and our SARD program;
- 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 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 preclinical and clinical programs, including whether our ongoing clinical trials will achieve clinically relevant results;
- the timing of 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 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 operating and 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

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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, 2017 filed with the SEC on August 14, 2017 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. However, in the case of warrants issued to the selling stockholders pursuant to the securities purchase agreement on September 29, 2017, upon any exercise of these warrants for cash, the selling stockholders would pay us an exercise price of \$9.02 per share of common stock, subject to any adjustment pursuant to the terms of the warrants. We expect to use any such warrant exercise proceeds primarily for working capital and general corporate purposes. These warrants are also exercisable on a cashless basis by net exercise. If any of these warrants are exercised on a cashless basis, we would not receive any cash payment from the applicable selling stockholder upon any such cashless exercise of a warrant.

SELLING STOCKHOLDERS

On September 25, 2017, 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 5,483,320 immediately separable units, comprised of an aggregate of 5,483,320 shares of our common stock and warrants to purchase up to 3,289,988 additional shares of our common stock (which warrants we refer to in this prospectus as the 2017 Warrants), for an aggregate

purchase price of approximately \$48.5 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 of our common stock and the shares underlying the 2017 Warrants issued to the selling stockholders pursuant to the securities purchase agreement, and to keep such registration statement effective until the earlier to occur of September 29, 2019 or the date on which all of the shares of our common stock 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 2017 Warrants, which have a five year term expiring on September 29, 2022, have a per share exercise price of \$9.02. The exercise price and number of shares of common stock issuable upon exercise of the 2017 Warrants may be adjusted in certain circumstances, including stock splits, stock dividends, reclassifications and the like. The shares issuable upon exercise of the 2017 Warrants will become eligible for sale by the selling stockholders under this prospectus only as the 2017 Warrants are exercised. We cannot predict when or whether any of the selling stockholders will exercise their 2017 Warrants.

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

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2017 Warrants issued to the selling stockholders. 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 of our common stock and the shares underlying the 2017 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.

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 of our common stock covered hereby may be offered from time to time by the selling stockholders.

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 September 30, 2017, the number of shares of our common stock 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 of our common stock registered hereunder 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 of our common stock in the column “Number of Shares Offered” represents all of the shares of our common stock that a selling stockholder may offer and sell from time to time under this prospectus.

The information in the table below and the footnotes thereto regarding shares of common stock to be beneficially owned after the offering assumes that all of the selling stockholders have exercised the 2017 Warrants in full pursuant to cash exercises and further assumes the sale of all shares being offered by the selling stockholders 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 that all of the selling stockholders have exercised the 2017 Warrants in full pursuant to cash exercises and further 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 21,541,909 shares of common stock outstanding as of September 30, 2017 and, with respect to the percentage of shares owned after the offering, on the assumption that all of the selling stockholders have exercised the 2017 Warrants in full pursuant to cash exercises and therefore that all shares of common stock issuable upon exercise of the 2017 Warrants were 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. Except as otherwise indicated below, based on the information provided to us by the selling stockholders, none of the selling stockholders is a broker-dealer or an affiliate of a broker-dealer.

Name and Address	Prior to Offering		Number of Shares Offered ⁽²⁾	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, TN 38103	9,223,794 ⁽³⁾	38.5%	1,808,931	8,167,695	29.9%
CDK Associates, L.L.C. 731 Alexander Road, Bldg. 2, Suite 500 Princeton, NJ 08540	1,080,914 ⁽⁴⁾	4.99%	1,537,590	—	—
Amzak Health Investors, LLC 980 North Federal Highway, Suite 315 Boca Raton, FL 33432	1,356,697 ⁽⁵⁾	6.2%	1,356,697	—	—
Aisling Capital IV LP 888 7th Avenue, 12th Floor New York, NY 10106	1,356,697 ⁽⁶⁾	6.2%	1,356,697	—	—

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The Pyramid Peak Foundation 1350 Concourse Avenue, Suite 383 Memphis, TN 38104	7,183,900 ⁽⁷⁾	29.5%	904,465	6,279,435	23.0%
Boxer Capital, LLC 11682 El Camino Real, Suite 320 San Diego, CA 92130	904,465 ⁽⁸⁾	4.1%	904,465	—	—
Abingworth BioEquities Master Fund Ltd 38 Jermyn Street London SW1Y 6DN, United Kingdom	542,678 ⁽⁹⁾	2.5%	542,678	—	—
Jack W. Schuler 100 N. Field Drive, Suite 360 Lake Forest, IL 60045	1,709,862 ⁽¹⁰⁾	7.9%	361,785	1,348,077	5.4%

- (1) Under the terms of the 2017 Warrants, the number of shares of our common stock that may be acquired by a selling stockholder upon any exercise of a 2017 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 a specified percentage of the total number of shares of our common stock then issued and outstanding and/or the then combined voting power of all of our voting securities (the “Blockers”). Certain of the Blockers are waivable by the selling stockholders’ on at least 61 days’ prior notice to us up to a specified maximum percentage. If the operation of the Blockers currently limits the beneficial ownership of a selling stockholder, such limitation is noted in the footnotes that follow. In addition, as noted in footnote (2), the number of shares shown under the column titled “Number of Shares Offered” is shown without regard to the foregoing limitations on exercise.
- (2) The number of shares offered hereby, for each selling stockholder, consists solely of the shares issued to such selling stockholder pursuant to the securities purchase agreement and the shares issuable upon exercise of the 2017 Warrants issued to such selling stockholder. The shares issuable upon exercise of the 2017 Warrants will become eligible for sale by the selling stockholders under this prospectus only as the 2017 Warrants are exercised. In addition, the number of shares offered hereby shown under the column titled “Number of Shares Offered” includes the maximum number of shares issuable upon the exercise of the 2017 Warrants without regard to the limitations on exercise described in footnote (1) above.
- (3) 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 6,767,668 shares, which include 1,130,582 shares issued to Mr. Hyde pursuant to the securities purchase agreement, 14,535 shares held by Pittco Associates III, L.P. and 391,571 shares held by Pittco Investments, L.P., entities controlled by Mr. Hyde, 2,454,483 shares issuable upon the exercise of a warrant issued to Mr. Hyde in November 2014, or the 2014 Warrant, 678,349 shares issuable upon exercise of a 2017 Warrant, and 36,456 shares issuable to Mr. Hyde pursuant to our Directors’ Deferred Compensation Plan. With respect to the 2014 Warrant and the 2017 Warrant held by Mr. Hyde, or the Hyde Warrants, the Hyde Warrants cover the exercise of up to an aggregate of 3,132,832 shares; however, the number of shares of our common stock that may be acquired by Mr. Hyde upon the exercise of each of the Hyde Warrants is generally limited to the extent necessary to ensure that, following such exercise, Mr. Hyde would not, together with his affiliates and any other persons or entities whose beneficial ownership of our common stock would be aggregated with Mr. Hyde 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. As a result of these restrictions, the Hyde Warrants are exercisable for up to an aggregate of 2,380,000 shares of our common stock within 60 days of September 30, 2017, and the number and percentage of shares beneficially owned by Mr. Hyde in the table above reflects this restriction. See footnote (1). The number of shares exercisable prior to the offering will change depending upon changes in the outstanding shares. As set forth in footnote (1), the number of shares shown under “Number of Shares Offered” in the table above includes all shares issuable upon the exercise of the 2017 Warrant held by Mr. Hyde without regard to the foregoing limitation on exercise; likewise, the number of shares shown under “Number of Shares Beneficially Owned” after the offering assumes the 2017 Warrant held by Mr. Hyde has been exercised in full and all such shares have been sold pursuant to this prospectus. Mr. Hyde also has shared voting and dispositive power over 21,646 shares held by Mr. Hyde’s spouse, 184,480 shares held by trusts for the benefit of Mr. Hyde’s children (the “Hyde Family Trusts”) and 2,250,000 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. Lorie Jernigan, as trustee of certain of the Hyde GRATs, shares voting and dispositive power over 500,000 shares held in the Hyde GRATs, Wilson Sights, as trustee of certain of the Hyde GRATs, shares voting and dispositive power over 250,000 shares held in the Hyde GRATs, John H. Pontius, as trustee of certain of the Hyde GRATs, shares voting and dispositive power over 250,000 shares held in the Hyde GRATs, Lorie Rivers, as trustee of certain of the Hyde GRATs, shares voting and dispositive power over 750,000 shares held in the Hyde GRATs, and Andrew Seamons, as trustee of certain of the Hyde GRATs, shares voting and dispositive power over 500,000 shares

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held in the Hyde GRATs. The business address for Ms. Jernigan, Ms. Rivers, Mr. Sights and Mr. Seamons is 17 West Pontotoc Ave., Suite 100 Memphis, TN 38103.

- (4) Includes (i) 960,994 shares of common stock held by the selling stockholder and (ii) 119,920 shares of common stock issuable upon exercise of a 2017 Warrant held by the selling stockholder that is exercisable within 60 days of September 30, 2017. With respect to the 2017 Warrant held by the selling stockholder, such 2017 Warrant covers the exercise of up to an aggregate of 576,596 shares; however, the number of shares of our common stock that may be acquired by the selling stockholder upon the exercise of such 2017 Warrant is generally limited to the extent necessary to ensure that, following such exercise, the 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 the selling stockholder for purposes of Section 13(d) of the Exchange Act, beneficially own in excess of 4.99% of the total number of shares of our common stock then issued and outstanding; provided, that such Blocker is waivable by the selling stockholder on at least 61 days’ prior notice to us up to a 9.99% maximum. As a result of these restrictions, such 2017 Warrant is exercisable for up to an aggregate of 119,920 shares of our common stock within 60 days of September 30, 2017, and the number and percentage of shares beneficially owned by the selling stockholder in the table above reflects this restriction. See footnote (1). The number of shares exercisable prior to the offering will change depending upon changes in the outstanding shares and any waiver of the 4.99% Blocker. As set forth in footnote (1), the number of shares shown under “Number of Shares Offered” in the table above includes all shares issuable upon the exercise of the 2017 Warrant held by the selling stockholder without regard to the foregoing limitation on exercise; likewise, the number of shares shown under “Number of Shares Beneficially Owned” after the offering assumes the 2017 Warrant held by the selling stockholder has been exercised in full and all such shares have been sold pursuant to this prospectus. These securities

are held by CDK Associates, L.L.C. and may be deemed to be beneficially owned by (a) Caxton Corporation, the manager of CDK Associates, LLC and (b) Bruce Kovner, the chairman and sole shareholder of Caxton Corporation. The selling stockholder has represented to us that it is an affiliate of a broker-dealer. The selling stockholder has also represented to us that it acquired the shares being registered hereunder in the ordinary course of its business, and at the time of its purchase of the shares and its 2017 Warrant, the selling stockholder did not have any agreements or understandings, directly or indirectly, with any person to distribute such securities.

- (5) Includes (i) 847,936 shares of our common stock held by the selling stockholder and (ii) 508,761 shares of our common stock issuable upon exercise of a 2017 Warrant held by the selling stockholder. Michael D. Kazma, Joyce Erony and Anders Hove are managers of the selling stockholder and hold shared voting and dispositive power over the securities owned by the selling stockholder.
- (6) Includes (i) 847,936 shares of our common stock held by the selling stockholder and (ii) 508,761 shares of common stock issuable upon exercise of a 2017 Warrant held by the selling stockholder. The shares of common stock (including those issuable upon exercise of a 2017 Warrant) are owned directly by Aisling Capital IV, L.P. (“Aisling”) and held indirectly by Aisling Capital Partners IV, LP (“Aisling GP”), as general partner of Aisling, Aisling Capital Partners IV LLC (“Aisling Partners”), as general partner of Aisling GP, and each of the individual managing members of Aisling Partners. The individual managing members (collectively, the “Managers”) of Aisling Partners are Dr. Andrew Schiff and Steve Elms. Aisling GP, Aisling Partners and the Managers share voting and dispositive power over the shares directly held by Aisling.
- (7) Includes (i) 4,390,243 shares of our common stock held by The Pyramid Peak Foundation (“Foundation”), (ii) 2,454,483 shares issuable upon exercise of a warrant issued to Foundation in November 2014 and (iii) 339,174 shares issuable upon exercise of a 2017 Warrant held by the Foundation. 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.
- (8) Includes (i) 565,291 shares of our common stock held by the selling stockholder and (ii) 339,174 shares of common stock issuable upon exercise of a 2017 Warrant held by the selling stockholder. The voting and investment power over such shares is controlled by a two thirds vote of the investment committee of Boxer Capital, LLC which comprises Aaron Davis, Christopher Fuglesang and Shehan Dissanayake.
- (9) Includes (i) 339,174 shares of our common stock held by the selling stockholder and (ii) 203,504 shares issuable upon exercise or a 2017 Warrant held by the selling stockholder. An investment committee of Abingworth LLP, comprised of Stephen W. Bunting, Timothy Haines, Kurt von Emster, and Genghis Lloyd-Harris, approves investment and voting decisions of Abingworth BioEquities Master Fund Ltd (“ABE”), the selling stockholder, by a majority vote, and no individual member has the sole control or voting power over the securities held by ABE. From time to time, the investment committee may delegate investment and voting authority over certain securities held by ABE to employees of Abingworth LLP subject to the supervision and oversight of the investment committee, including any limits on such authority imposed by the investment committee in its discretion and the right of the investment committee to revoke such authority at any time.
- (10) Includes (i) 1,574,193 shares of our common stock held or otherwise beneficially owned by the selling stockholder and (ii) 135,669 shares of common stock issuable upon the exercise of a 2017 Warrant held by the selling stockholder. Jack W. Schuler has sole voting and dispositive power over 947,498 of such shares and shared voting and dispositive power over 626,695 of such shares, which shares are owned by the Schuler Family Foundation, of which Mr. Schuler serves as a

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director along with his wife and daughter. The indicated ownership does not include 27,935 shares of GTx common stock owned by three irrevocable trusts (the “Trusts”) established for the benefit of Mr. Schuler’s adult children.

Relationships with the Selling Stockholders

Positions or Offices with GTx

J.R. Hyde, III has served as a director of GTx since November 2000 and is currently our largest stockholder. From November 2000 to March 2015, Mr. Hyde served as non-executive Chairman of our Board of Directors. In connection with Robert J. Wills’ assumption of duties as our Executive Chairman in March 2015, Mr. Hyde was appointed as our Lead Director and has served in such capacity since March 2015.

Other Relationships

In November 2014, we sold an aggregate of 64,311,112 immediately separable units in a private placement, or the 2014 Private Placement, which units consisted 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 for an aggregate purchase price of approximately \$43.4 million, or \$0.675 per unit. In the 2014 Private Placement, each of Mr. Hyde and The Pyramid Peak Foundation purchased 24,545,455 units, consisting of 24,545,455 shares of our common stock and a warrant to purchase 24,545,455 shares of our common stock for total consideration payable to us by each of Mr. Hyde and The Pyramid Peak Foundation of approximately \$16.6 million. Pursuant to the securities purchase agreement under which we sold the above-referenced units to the investors, we filed two registration statements with the SEC, one in 2014 and one in 2015, to register the resale of the above-referenced shares and the shares underlying the above-referenced warrants, and agreed to keep such registration statements effective for up to two years following the closing of the 2014 Private Placement. We agreed to bear all expenses of such registration of the resale of these shares, including the legal expenses of the investors of up to \$5,000 per investor per registration statement.

In October 2016, we sold an aggregate of 17,283,947 shares of our common stock in a registered direct offering, or the Registered Direct, at a purchase price of \$0.81 per share. The investors in the Registered Direct included Mr. Hyde, The Pyramid Peak Foundation and Jack W. Schuler. In the Registered Direct, each of Mr. Hyde and The Pyramid Peak Foundation purchased 7,716,049 shares of our common stock for total consideration payable to us by each of Mr. Hyde and The Pyramid Peak Foundation of approximately \$6.3 million, and Mr. Schuler purchased 1,234,567 shares of our common stock for total consideration payable to us by Mr. Schuler of approximately \$1.0 million.

The share and per share information provided above under “Other Relationships” has not been retroactively adjusted to give effect to the one-for-ten reverse stock split of our outstanding common stock that we effected on December 5, 2016.

Except with respect to the foregoing and the transactions contemplated by the securities purchase agreement as described above, none of the selling stockholders (or their control persons) has, or within the past three years has had, any position, office or other material relationship with us or any of our affiliates.

PLAN OF DISTRIBUTION

We are registering the shares of common stock issued to the selling stockholders and issuable upon exercise of the 2017 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 Capital 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:

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- 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, 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(a)(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. 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

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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 September 29, 2019 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, 2016, and the effectiveness of our internal control over financial reporting as of December 31, 2016, 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, 2016, filed with the SEC on March 24, 2017;
- the information specifically incorporated by reference into our Annual Report on Form 10-K for the fiscal year ended December 31, 2016 from our definitive proxy statement on Schedule 14A for our 2017 Annual Meeting of Stockholders, filed with the SEC on March 31, 2017;
- our Quarterly Reports on Form 10-Q for the quarters ended March 31, 2017 and June 30, 2017, filed with the SEC on May 15, 2017 and August 14, 2017, respectively;
- our Current Reports on Form 8-K, filed with the SEC on January 9, 2017, May 3, 2017, May 11, 2017, June 12, 2017, September 13, 2017 and September 29, 2017; 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 and prior to effectiveness of such registration statement, until we file a post-effective amendment that indicates the

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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.