

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

**FORM S-8**

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

**GTx, Inc.**

(Exact name of registrant as specified in its charter)

**Delaware**  
(State or other jurisdiction of  
incorporation or organization)

**62-1715807**  
(I.R.S. Employer  
Identification No.)

**175 Toyota Plaza  
7th Floor  
Memphis, Tennessee 38103  
(901) 523-9700**  
(Address of principal executive offices, including zip code)

**GTx, Inc. 2004 Equity Incentive Plan  
GTx, Inc. Amended and Restated 2004 Non-Employee Directors' Stock Option Plan**  
(Full titles of the plans)

**Mitchell S. Steiner, M.D., F.A.C.S.  
Chief Executive Officer  
GTx, Inc.  
175 Toyota Plaza  
7th Floor  
Memphis, Tennessee 38103  
(901) 523-9700**  
(Name, address, including zip code, and telephone number, including area code, of agent for service)

Copies to:  
**Suzanne Sawochka Hooper, Esq.  
Chadwick L. Mills, Esq.  
Cooley Godward Kronish LLP  
Five Palo Alto Square  
3000 El Camino Real  
Palo Alto, CA 94306-2155  
(650) 843-5000**

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

Large accelerated filer ☐

Accelerated filer ☒

Non-accelerated filer ☐  
(Do not check if a smaller reporting company)

Smaller reporting company ☐

**CALCULATION OF REGISTRATION FEE**

Title of Securities to be Registered	Amount to be Registered (1)	Proposed Maximum Offering Price Per Share(2)	Proposed Maximum Aggregate Offering Price(2)	Amount of Registration Fee
Common Stock, par value \$.001 per share	3,768,667 shares	\$ 3.705-\$4.20	\$ 14,049,929.76	\$ 1,001.76

- (1) Pursuant to Rule 416 promulgated under the Securities Act of 1933, as amended (the “Securities Act”), this Registration Statement shall also cover any additional shares of the Registrant’s Common Stock that become issuable under the plans set forth herein by reason of any stock dividend, stock split, recapitalization or other similar transaction effected without receipt of consideration that increases the number of outstanding shares of the Registrant’s Common Stock.
- (2) Estimated solely for the purpose of calculating the amount of the registration fee pursuant to Rule 457(h) and Rule 457(c) promulgated under the Securities Act. The offering price per share and the aggregate offering price are based upon (a) the weighted average exercise price for outstanding options granted under the Registrant’s 2004 Equity Incentive Plan (\$4.20) and (b) the average of the high and low prices of the Registrant’s Common Stock as reported on The NASDAQ Global Market on March 12, 2010 (\$3.705). The chart below details the calculations of the registration fee:

Title of Securities to be Registered	Number of Shares	Offering Price Per Share (2)	Aggregate Offering Price
Common Stock, par value \$0.001 per share, issuable upon the exercise of outstanding options granted under the GTx, Inc. 2004 Equity Incentive Plan	175,795	\$ 4.20(a)	\$ 738,339.00
Common Stock, par value \$0.001 per share, reserved for future grant under the GTx, Inc. 2004 Equity Incentive Plan	3,464,872	\$ 3.705(b)	\$ 12,837,350.76
Common Stock, par value \$0.001 per share, reserved for future grant under the GTx, Inc. Amended and Restated 2004 Non-Employee Directors’ Stock Option Plan	128,000	\$ 3.705(b)	\$ 474,240.00
Proposed Maximum Aggregate Offering Price			\$ 14,049,929.76
<b>Registration Fee</b>			<b>\$ 1,001.76</b>

## EXPLANATORY NOTE

This Registration Statement on Form S-8 is being filed for the purpose of registering an additional (i) 3,640,667 shares of the Registrant's Common Stock to be issued pursuant to the Registrant's 2004 Equity Incentive Plan, and (ii) 128,000 shares of the Registrant's Common Stock to be issued pursuant to the Registrant's Amended and Restated 2004 Non-Employee Directors' Stock Option Plan.

## INCORPORATION BY REFERENCE OF CONTENTS OF REGISTRATION STATEMENTS ON FORM S-8

The contents of the Registration Statements on Form S-8 (File Nos. 333-149661, 333-136527 and 333-112576) are incorporated by reference herein.

## EXHIBITS

Exhibit Number	Description
3.1	Restated Certificate of Incorporation of GTx, Inc. <sup>(1)</sup>
3.2	Amended and Restated Bylaws of GTx, Inc. <sup>(2)</sup>
4.1	Reference is made to Exhibits 3.1 and 3.2
4.2	Specimen Common Stock Certificate <sup>(3)</sup>
4.3	Amended and Restated Registration Rights Agreement between Registrant and Oracle Partners, L.P. dated August 7, 2003 <sup>(3)</sup>
4.4	Amended and Restated Registration Rights Agreement between Registrant and J. R. Hyde, III dated August 7, 2003 <sup>(3)</sup>
4.5	Consent, Waiver and Amendment between the Registrant and Oracle Partners, L.P., Oracle Investment Management, Inc. and Oracle Institutional Partners, L.P. dated November 29, 2007 <sup>(4)</sup>
4.6	Consent, Waiver and Amendment between Registrant and J. R. Hyde, III and Pittco Associates, L.P. dated December 3, 2007 <sup>(4)</sup>
4.7	Registration Rights Agreement between Registrant and Merck & Co., Inc. dated December 18, 2007 <sup>(5)</sup>
5.1	Opinion of Cooley Godward Kronish LLP
23.1	Consent of Independent Registered Public Accounting Firm
23.2	Consent of Cooley Godward Kronish LLP is contained in Exhibit 5.1 to this Registration Statement
24.1	Power of Attorney (contained on the signature pages hereto)
99.1	GTx, Inc. 2004 Equity Incentive Plan, as amended effective November 4, 2008 and Form of Stock Option Agreement <sup>(6)</sup>
99.2	GTx, Inc. Amended and Restated 2004 Non-Employee Directors' Stock Option Plan, as amended effective November 4, 2008 <sup>(7)</sup>
99.3	Form of Stock Option Agreement under the GTx, Inc. Amended and Restated 2004 Non-Employee Directors' Stock Option Plan <sup>(8)</sup>

- 
- (1) Filed as Exhibit 4.1 to the Registrant's Registration Statement on Form S-3 (File No. 333-127175), filed with the SEC on August 4, 2005, and incorporated herein by reference.
- (2) Filed as the like numbered Exhibit to the Registrant's Current Report on Form 8-K (File No. 000-50549), filed with the SEC on July 26, 2007, and incorporated herein by reference.
- (3) Filed as the like numbered Exhibit to the Registrant's Registration Statement on Form S-1 or amendments thereto (File No. 333-109700), originally filed with the Securities and Exchange Commission on October 15, 2003, as amended, and incorporated herein by reference.
- (4) Filed as the like numbered Exhibit to the Registrant's Registration Statement on Form S-3 (File No. 333-148321), filed with the SEC on December 26, 2007, and incorporated herein by reference.

- (5) Filed as the like numbered Exhibit to the Registrant's Current Report on Form 8-K (File No. 000-50549), filed with the SEC on December 18, 2007, and incorporated herein by reference.
- (6) Filed as Exhibit 10.52 to the Registrant's Annual Report on Form 10-K (File No. 000-50549), filed with the SEC on March 3, 2009, and incorporated herein by reference.
- (7) Filed as Exhibit 10.51 to the Registrant's Annual Report on Form 10-K (File No. 000-50549), filed with the SEC on March 3, 2009, and incorporated herein by reference.
- (8) Filed as Exhibit 10.35 to the Registrant's Quarterly Report on Form 10-Q (File No. 000-50549), filed with the SEC on August 9, 2006, and incorporated herein by reference.

## SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, the Registrant certifies that it has reasonable grounds to believe that it meets all of the requirements for filing on Form S-8 and has duly caused this Registration Statement to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of Memphis, State of Tennessee, on this 16<sup>th</sup> day of March, 2010.

**GTx, Inc.**

By: /s/ MITCHELL S. STEINER

Mitchell S. Steiner, M.D., F.A.C.S.

Chief Executive Officer

## POWER OF ATTORNEY

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

Pursuant to the requirements of the Securities Act of 1933, this Registration Statement has been signed by the following persons in the capacities and on the dates indicated.

Signature	Title	Date
<u>/s/ MITCHELL S. STEINER</u> Mitchell S. Steiner, M.D., F.A.C.S.	Chief Executive Officer, Vice-Chairman and Director ( <i>Principal Executive Officer</i> )	March 16, 2010
<u>/s/ MARK E. MOSTELLER</u> Mark E. Mosteller	Chief Financial Officer ( <i>Principal Accounting and Financial Officer</i> )	March 16, 2010
<u>/s/ J.R. HYDE, III</u> J.R. Hyde, III	Chairman of the Board of Directors	March 16, 2010
<u>/s/ MARC S. HANOVER</u> Marc S. Hanover	Director	March 16, 2010
<u>/s/ MICHAEL G. CARTER</u> Michael G. Carter, M.D.	Director	March 16, 2010
<u>/s/ J. KENNETH GLASS</u> J. Kenneth Glass	Director	March 16, 2010
<u>/s/ ROBERT W. KARR</u> Robert W. Karr, M.D.	Director	March 16, 2010
<u>/s/ JOHN H. PONTIUS</u> John H. Pontius	Director	March 16, 2010
<u>/s/ KENNETH S. ROBINSON</u> Kenneth S. Robinson, M.D., M.Div.	Director	March 16, 2010
<u>/s/ TIMOTHY R. G. SEAR</u> Timothy R. G. Sear	Director	March 16, 2010

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March 16, 2010

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

Ladies and Gentlemen:

You have requested our opinion with respect to certain matters in connection with the filing by GTx, Inc. (the “**Company**”) of a Registration Statement on Form S-8 (the “**Registration Statement**”) with the Securities and Exchange Commission covering the offering of up to (i) 3,640,667 shares of the Company’s Common Stock, par value \$0.001 per share (“**Common Stock**”), pursuant to the Company’s 2004 Equity Incentive Plan (the “**Incentive Plan Shares**”); and (ii) 128,000 shares of Common Stock pursuant to the Company’s Amended and Restated 2004 Non-Employee Directors’ Stock Option Plan (the “**Directors’ Plan Shares**”).

In connection with this opinion, we have examined the Registration Statement and related Prospectuses, the Company’s Restated Certificate of Incorporation and Amended and Restated Bylaws, as currently in effect, the Company’s 2004 Equity Incentive Plan (the “**Incentive Plan**”), the Company’s Amended and Restated 2004 Non-Employee Directors’ Stock Option Plan (the “**Directors’ Plan**”), and such other documents, records, certificates, memoranda and other instruments as we deem necessary as a basis for this opinion. We have assumed the genuineness and authenticity of all documents submitted to us as originals, the conformity to originals of all documents submitted to us as copies thereof, and the due execution and delivery of all documents where due execution and delivery are a prerequisite to the effectiveness thereof.

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

On the basis of the foregoing, and in reliance thereon, we are of the opinion that the Incentive Plan Shares and the Directors’ Plan Shares, when sold and issued in accordance with the Incentive Plan and the Directors’ Plan, respectively, and the Registration Statement and related Prospectuses, will be validly issued, fully paid and nonassessable (except as to shares issued pursuant to certain deferred payment arrangements, which will be fully paid and nonassessable when such deferred payments are made in full).

We consent to the filing of this opinion as an exhibit to the Registration Statement.

Very truly yours,

**COOLEY GODWARD KRONISH LLP**

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

FIVE PALO ALTO SQUARE, 3000 EL CAMINO REAL, PALO ALTO, CA 94306-2155 T: (650) 843-5000 F: (650) 849-7400 WWW.COOLEY.COM



**Consent of Independent Registered Public Accounting Firm**

We consent to the incorporation by reference in the Registration Statement (Form S-8) pertaining to the 2004 Equity Incentive Plan and the Amended and Restated 2004 Non-Employee Directors' Stock Option Plan of GTx, Inc. of our reports dated March 15, 2010, with respect to the financial statements of GTx, Inc., and the effectiveness of internal control over financial reporting of GTx, Inc. included in its Annual Report (Form 10-K) for the year ended December 31, 2009, filed with the Securities and Exchange Commission.

/s/ Ernst & Young LLP

Memphis, Tennessee  
March 16, 2010