

Prospectus Supplement No. 2
(To Prospectus dated May 9, 2013)

NOVELOS THERAPEUTICS, INC.
28,458,734 shares of common stock

This prospectus supplement supplements the Prospectus dated May 9, 2013, relating to the sale of 28,458,734 shares of common stock consisting of shares underlying warrants to purchase common stock. The underlying shares consist of warrants to purchase up to 9,248,334 shares of our common stock at an exercise price of \$0.60 per share, expiring on December 6, 2016, warrants to purchase up to 2,710,400 shares of our common stock at an exercise price of \$1.25 per share, expiring on June 13, 2017, warrants to purchase up to 5,500,000 shares of our common stock at an exercise price of \$0.50 per share, expiring February 20, 2014, and warrants to purchase up to 11,000,000 of our common stock at an exercise price of \$0.50 per share, expiring February 20, 2018. This prospectus supplement should be read in conjunction with the Prospectus.

Leadership Transition

On July 29, 2013, we issued a press release announcing that Harry Palmin, the company's President and CEO and a Director, will step down from his positions with the company, in order to pursue other opportunities, upon the naming of his successor. A search process is underway to select a replacement for Mr. Palmin, during which time he will continue in his current roles to ensure an orderly transition. In addition, Kim Hawkins, the Company's Vice President of Clinical Development, has notified the Company of her resignation, effective August 9, 2013, in order to accept a position at a large pharmaceutical company and Kevin Kozak, M.D., Ph.D., the Director of Radiation Oncology, Mercy Regional Cancer Center, has agreed to serve as Chief Medical Officer, effective August 1, 2013, on a consulting basis.

Compensatory Arrangements of Certain Officers

On July 26, 2013 the employment agreement between the Company and Harry Palmin, President and CEO was amended to provide for a lump sum payment of \$150,000, equal to six months base salary, to provide for the continuation of benefits for six months following a termination without cause prior to March 31, 2014, to provide for the acceleration of vesting of all of Mr. Palmin's unvested options in the event of a termination without cause or resignation for good reason, to extend the exercise period of Mr. Palmin's options to a period of 18 months following termination, and to provide for the payment of \$150,000 to Mr. Palmin upon the completion of certain milestones prior to September 30, 2013.

On July 26, 2013 the Company also entered into Retention Agreements with Joanne M. Protano, the Company's Vice President Finance, Chief Financial Officer and Treasurer, and Christopher J. Pazoles, the Company's Senior Vice President of Research and Development. The Retention Agreements provide that if the executives remain employed with the Company as of December 31, 2013, they will receive a retention bonus equal to thirty percent of their respective base salaries on that date. Each agreement further provides that if the executive is terminated without cause or resigns with good reason on or before June 30, 2014, the executive will receive a lump sum payment equal to six months' base salary and will be entitled to participate in the Company's health and disability insurance plans for six months following termination. Upon such a termination, all unvested options held by the executive would be credited with an additional six months of vesting and the exercise period for all vested options held by the executive would be extended to eighteen months following termination. The total cash amounts that may become payable to the executive officers pursuant to the retention agreements is approximately \$392,000.

Investing in our common stock involves a high degree of risk.
See Risk Factors beginning on page 6 of the Prospectus.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or passed on the adequacy or accuracy of this prospectus supplement. Any representation to the contrary is a criminal offense.

The date of this prospectus supplement is July 31, 2013