

PROSPECTUS SUPPLEMENT

(To Prospectus Supplements dated April 3, 2025 and August 6, 2025
and Prospectus dated November 13, 2023)



**Up to \$80,000,000
Common Stock**

This Prospectus Supplement supplements the prospectus supplement dated April 3, 2025 (the “Initial ATM Prospectus Supplement”) and the prospectus supplement dated August 6, 2025 (together with the Initial ATM Prospectus Supplement, the “ATM Prospectus Supplements”), relating to the offer and sale of shares of our common stock, \$0.001 par value per share, having an aggregate offering price of up to \$11,635,000 pursuant to the terms of an equity distribution agreement (the “Equity Distribution Agreement”) with Canaccord Genuity LLC (“Canaccord”). Through the date hereof, we have sold an aggregate of \$11,635,000 of shares of our common stock through Canaccord under the Equity Distribution Agreement.

We are filing this Prospectus Supplement to amend the ATM Prospectus Supplements to increase the maximum amount of shares that we are eligible to sell pursuant to the Equity Distribution Agreement. Pursuant to this Prospectus Supplement, we are registering the offer and sale of up to \$80,000,000 of shares of our common stock. This Prospectus Supplement should be read in conjunction with the ATM Prospectus Supplements, and is qualified by reference thereto, except to the extent that the information herein amends or supersedes the information contained in the ATM Prospectus Supplements. This Prospectus Supplement is not complete without, and may only be delivered or utilized in connection with, the ATM Prospectus Supplements, and any future amendments or supplements thereto.

On March 28, 2025, the date we filed our Annual Report on Form 10-K for the fiscal year ended December 31, 2024, we became subject to the offering limits in General Instruction I.B.6 of Form S-3. As of the date immediately prior to the date of this Prospectus Supplement, the aggregate market value of our common stock held by non-affiliates was greater than \$75 million, which was calculated based on 16,009,124 shares of our outstanding common stock and a closing price of \$6.80 per share, the closing price of our common stock on August 12, 2025.

Our common stock trades on the Nasdaq Global Market under the symbol “BTAI.” On August 15, 2025, the last reported sale price of our common stock on the Nasdaq Global Market was \$5.48 per share.

INVESTING IN OUR COMMON STOCK INVOLVES RISKS. SEE THE “RISK FACTORS” ON PAGE S-8 OF THE INITIAL ATM PROSPECTUS SUPPLEMENT AND IN THE DOCUMENTS INCORPORATED BY REFERENCE IN THE REGISTRATION STATEMENT CONCERNING FACTORS YOU SHOULD CONSIDER BEFORE INVESTING IN OUR COMMON STOCK.

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

Canaccord Genuity

The date of this prospectus supplement is August 18, 2025.
