Filed pursuant to Rule 433 of the Securities Act of 1933, as amended Registration No. 333-253259 Issuer Free Writing Prospectus dated April 27, 2021 Relating to Preliminary Prospectus Supplement dated April 27, 2021

Free Writing Prospectus

Benitec Biopharma Inc. (the "Company") has filed a registration statement (including a prospectus) with the Securities and Exchange Commission for the offering to which this communication relates. Before you invest, you should read the prospectus in that registration statement, the preliminary prospectus supplement dated April 27, 2021 and other documents the issuer has filed with the SEC for more complete information about the Company and this offering.

The information in this free writing prospectus supplements the preliminary prospectus supplement dated April 27, 2021, as follows:

Benitec Biopharma Increases Previously Announced Bought Deal Offering of Common Stock to \$12.9 Million

HAYWARD, Calif., April 27, 2021—Benitec Biopharma Inc. (NASDAQ: BNTC) ("Benitec" or "the Company"), a development-stage, gene therapy-focused, biotechnology company developing novel genetic medicines based on the proprietary DNA-directed RNA interference ("ddRNAi") platform, today announced that, due to demand, the underwriter has agreed to increase the size of the previously announced offering and purchase on a firm commitment basis 3,036,366 shares of common stock of the Company at a price to the public of \$4.25 per share, less underwriting discounts and commissions. The Company has also granted the underwriter a 30-day option to purchase up to an additional 455,454 shares of common stock at the public offering price, less underwriting discounts and commissions. The offering is expected to close on or about April 30, 2021, subject to satisfaction of customary closing conditions.

H.C. Wainwright & Co. is acting as the sole book-running manager for the offering.

The gross proceeds of the offering are expected to be approximately \$12.9 million, prior to deducting underwriting discounts and commissions and offering expenses payable by the Company and excluding the exercise of the underwriter's option to purchase additional shares. The Company intends to use the net proceeds from the offering for the continued advancement of development activities for its product pipeline, general corporate purposes, and strategic growth opportunities.

The shares of common stock are being offered pursuant to an effective registration statement on FormS-3 (File No. 333-253259) that was filed with the U.S. Securities and Exchange Commission ("SEC") on February 18, 2021 and declared effective on February 26, 2021. The shares of common stock are being offered only by means of a prospectus supplement forming a part of the effective registration statement. A preliminary prospectus supplement and accompanying prospectus relating to the offering have been filed with the SEC and are available on the SEC's website at www.sec.gov. A final prospectus supplement and accompanying prospectus relating to the offering will be filed with the SEC and, upon filing, may be obtained on the SEC's website at http://www.sec.gov or by contacting H.C. Wainwright & Co., LLC, 430 Park Avenue, New York, NY 10022, by email at placements@hcwco.com or by phone at (212) 856-5711.

This press release shall not constitute an offer to sell or a solicitation of an offer to buy these securities, nor shall there be any sale of these securities in any state or other jurisdiction in which such offer, solicitation or sale would be unlawful prior to the registration or qualification under the securities laws of any such state or other jurisdiction.

About Benitec Biopharma Inc.

Benitec Biopharma Inc. ("Benitec" or the "Company") is a development-stage biotechnology company focused on the advancement of novel genetic medicines with headquarters in Hayward, California. The proprietary platform, called DNA-directed RNA interference, or ddRNAi, combines RNA interference, or RNAi, with gene therapy to create medicines that facilitate sustained silencing of disease-causing genes following a single administration. The Company is developing ddRNAi-based therapeutics for chronic and life-threatening human conditions including Oculopharyngeal Muscular Dystrophy (OPMD) and Chronic Hepatitis B. A comprehensive overview of the Company can be found on Benitec's website at www.benitec.com.

Forward Looking Statements

Except for the historical information set forth herein, the matters set forth in this press release include forward-looking statements, including statements regarding pertaining to the offering of the Company's securities, including the use of net proceeds therefrom. These forward-looking statements are based on the Company's current expectations and subject to risks and uncertainties that may cause actual results to differ materially, including unanticipated developments in and risks related to: the closing of the public offering, use of proceeds, market and other conditions, unanticipated delays; further research and development and the results of clinical trials possibly being unsuccessful or insufficient to meet applicable regulatory standards or warrant continued development; the ability to enroll sufficient numbers of subjects in clinical trials; determinations made by the FDA and other governmental authorities; the Company's ability to protect and enforce its patents and other intellectual property rights; the Company's dependence on its relationships with its collaboration partners and other third parties; the efficacy or safety of the Company's products and the products of the Company's collaboration partners; the acceptance of the Company's products and the products of the Company's collaboration partners in the marketplace; market competition; sales, marketing, manufacturing and distribution requirements; greater than expected expenses; expenses relating to litigation or strategic activities; the Company's ability to satisfy its capital needs through increasing its revenue and obtaining additional financing; the impact of the current COVID-19 pandemic, the disease caused by the SARS-CoV-2 virus, which may adversely impact the Company's business and preclinical and future clinical trials; the impact of local, regional, and national and international economic and financial markets conditions and events; and other risks detailed from time to time in the Company's reports filed with the Securities and Ex

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