

MERRIMACK PHARMACEUTICALS, INC.

14,300,000 Shares

Common Stock

March 28, 2012

This free writing prospectus relates only to the shares of common stock described below and should be read together with the preliminary prospectus dated March 23, 2012 relating to this offering, included in Post-Effective Amendment No. 2 to the Registration Statement on Form S-1 (File No. 333-175427) relating to these securities.

Common stock offered by us: 14,300,000 shares

Over-allotment option: 2,145,000 shares

Common stock to be outstanding after this offering: 92,396,254 shares

Initial public offering price: \$7.00 per share

Net proceeds: Approximately \$93.5 million, or approximately \$107.5 million if the underwriters exercise their over-allotment option in full, after deducting underwriting discounts and commissions and estimated offering expenses payable by us but prior to the payment of accrued dividends on our series B convertible preferred stock.

Potential purchase by investors identified by us: The underwriters will not receive any underwriting discount or commission on the sale of shares of our common stock in this offering to certain investors identified by us. We have directed the underwriters to reserve up to approximately \$36.5 million in shares of our common stock for such sales at the initial public offering price. Sanofi has indicated an interest in purchasing this entire amount. However, because indications of interest are not binding agreements or commitments to purchase, Sanofi may determine to purchase fewer shares than it has indicated an interest in purchasing or not to purchase any shares in this offering.

Potential purchases by affiliates of existing principal stockholder: Separately, entities affiliated with Fidelity Investments, one of our existing principal stockholders, also have indicated an interest in purchasing an aggregate of up to approximately \$28.7 million in shares of our common stock in this offering at the initial public offering price. Following such an investment, entities affiliated with Fidelity Investments would beneficially own approximately 10.42% of our common stock after the offering. However, because indications of interest are not binding agreements or commitments to purchase, these entities may determine to purchase fewer shares than they have indicated an interest in purchasing or not to purchase any shares in this offering.

The issuer has filed a registration statement (including a prospectus) with the U.S. Securities and Exchange Commission (the "SEC") for the offering to which this communication relates. Before you invest, you should read the prospectus in that registration statement and other documents the issuer has filed with the SEC for more complete information about the issuer and this offering. You may get these documents for free by visiting EDGAR on the SEC web site at www.sec.gov. Alternatively, the issuer, any underwriter or any dealer participating in the offering will arrange to send you the prospectus if you request it by calling toll-free J.P. Morgan Securities LLC, c/o Broadridge Financial Solutions at 1-866-803-9204.

QuickLinks

[Filed Pursuant to Rule 433 Issuer Free Writing Prospectus dated March 28, 2012 Relating to Preliminary Prospectus dated March 23, 2012 Registration No. 333-175427](#)