

Prospectus Supplement No. 3
(to Prospectus dated April 21, 2017)

2,317,460 Shares



Gemphire Therapeutics Inc.

Common Stock

This prospectus supplement supplements the prospectus dated April 21, 2017 (the "Prospectus"), which forms a part of our Registration Statement on Form S-1 (Registration No. 333-217296). This prospectus supplement is being filed to update and supplement the information in the Prospectus with information contained in our Current Report on Form 8-K, filed with the Securities and Exchange Commission on May 30, 2017 (the "Current Report"). Accordingly, we incorporate by reference the Current Report into this prospectus supplement.

The Prospectus and this prospectus supplement relate to the resale, from time to time, of up to 2,317,460 shares of common stock of Gemphire Therapeutics Inc. (the "Company") by the selling stockholders listed on page 10 of the Prospectus, which includes (i) 1,324,256 shares of our common stock, par value \$0.001 per share (the "Common Stock") issued on March 15, 2017 and (ii) an aggregate of 993,204 shares of our Common Stock (the "Warrant Shares") issuable upon exercise of common stock purchase warrants issued on March 15, 2017 (the "Warrants") by the selling stockholders listed on page 10 of the Prospectus, including their transferees, pledgees or donees or their respective successors (the "Selling Stockholders").

This prospectus supplement should be read in conjunction with the Prospectus. This prospectus supplement updates and supplements the information in the Prospectus. If there is any inconsistency between the information in the Prospectus and this prospectus supplement, you should rely on the information in this prospectus supplement.

Our Common Stock trades on the NASDAQ Global Market under the symbol "GEMP". On May 26, 2017, the last reported sale price per share of our Common Stock was \$10.50 per share.

We are an emerging growth company as that term is used in the Jumpstart Our Business Startups Act of 2012 and, as such, have elected to comply with certain reduced public company reporting requirements for the Prospectus, this prospectus supplement and future filings.

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 determined if this prospectus is truthful or complete. Any representation to the contrary is a criminal offense.

The date of this prospectus supplement is May 30, 2017.
