December 1, 2015

Synthetic Biologics Announces Positive Topline Results from First Phase 2a Clinical Trial of SYN-004, the Company's Candidate for the Prevention of C. difficile Infection

-- SYN-004 Degraded IV Ceftriaxone in Gastrointestinal Tract without Affecting Antibiotic Levels in the Bloodstream --

-- First Patients Dosed in Phase 2b Proof-of-Concept Clinical Trial for SYN-004 --

-- SYN to Host Microbiome Clinical Program Seminar in NYC on Thursday, December 10, 2015 --

ROCKVILLE, Md., Dec. 1, 2015 /PRNewswire/ --Synthetic Biologics, Inc. (NYSE MKT: SYN), a clinical stage company focused on developing therapeutics to protect the gut microbiome while targeting pathogen specific diseases, announced positive topline results from the first Phase 2a study of SYN-004, the Company's candidate designed to protect the gut microbiome from the unintended effects of certain commonly used intravenous (IV) beta-lactam antibiotics for the prevention *C. difficile* infection (CDI) and antibiotic-associated diarrhea (AAD). Topline results from the ten ileostomized participants who completed the Phase 2a open-label study demonstrated that SYN-004 successfully degraded residual IV ceftriaxone in the chyme (digestive fluid in the small intestine) without affecting the intended level of ceftriaxone in the bloodstream.

Evaluation of the chyme from the ileostomized participants indicates that both dosage strengths of SYN-004 (75 mg and 150 mg) degrade residual IV ceftriaxone present in the chyme, supporting the mechanism of action of SYN-004. In addition, both dosage strengths of SYN-004 appear to be well tolerated by the participants in the study. Overall, the topline

data support the hypothesis that SYN-004 has the capacity to degrade residual IV ceftriaxone in the GI tract, thereby preserving the balance of the gut microbiome for the prevention of CDI, AAD and emergence of antibiotic-resistant organisms, without affecting the antibiotic level in the bloodstream intended for treatment of a primary infection.

"The completion of the first Phase 2a clinical trial for SYN-004 is an important achievement for Synthetic Biologics. These positive topline results demonstrate the potential for SYN-004 to protect the gut microbiome from the damaging effects of certain IV beta-lactam antibiotics for the prevention of *C. difficile* infection and antibiotic-associated diarrhea," stated Jeffrey Riley, President and Chief Executive Officer of Synthetic Biologics. "The second Phase 2a clinical trial for SYN-004 is currently ongoing to evaluate the GI antibiotic-degrading effects and the safety of SYN-004 in the presence of the proton pump inhibitor (PPI), esomeprazole, in participants with functioning ileostomies. We anticipate reporting topline results from the second Phase 2a of SYN-004 during the first half of 2016."

Mr. Riley concluded, "We are pleased to report additional progress from our SYN-004 program. We have begun dosing patients in the SYN-004 Phase 2b proof-of-concept clinical trial that is intended to evaluate the effectiveness of SYN-004 to prevent *C. difficile* infection and *C. difficile* associated diarrhea, as well as antibiotic-associated diarrhea in up to 370 patients hospitalized for a lower respiratory tract infection and receiving IV ceftriaxone."

About *C. difficile*

The U.S. Centers for Disease Control and Prevention (CDC) has categorized *C. difficile* as an "urgent public health threat," and has stated the need for research to better understand the role of normal gut bacteria. SYN-004 is intended to block the unintended harmful effects of certain IV beta-lactam antibiotics within the GI tract and maintain the natural balance of the gut microbiome, potentially preventing the 453,000 *C. difficile* infections[i] and approximately 29,000 *C. difficile*-related deaths[ii] in the United States each year. During 2012, approximately 14 million U.S. patients received approximately 118 million doses of IV beta-lactam antibiotics[iii] that could be inactivated in the GI tract by SYN-004.

First SYN-004 Phase 2a Clinical Trial Design

The Phase 2a randomized, multi-center, open-label study evaluated the ability of two different dose strengths of SYN-004 to degrade residual IV ceftriaxone in the GI tract of 10 healthy participants with functioning ileostomies, without affecting the concentrations of IV ceftriaxone in the bloodstream. The study consisted of two treatment phases for all participants: 1) the administration of IV ceftriaxone alone, and 2) the administration of IV ceftriaxone with one of two dosage strengths of oral SYN-004. Chyme samples were collected from the participants to measure the capability of SYN-004 to degrade the residual antibiotic in the GI tract. Participants were enrolled at two trial sites located in Canada.

About Synthetic Biologics, Inc.

Synthetic Biologics, Inc. (NYSE MKT: SYN) is a clinical-stage company developing therapeutics to protect the microbiome while targeting pathogen-specific diseases. The Company's lead candidates in Phase 2 development include: (1) SYN-004 which is designed to protect the gut microbiome from the effects of certain commonly used intravenous (IV) antibiotics for the prevention of C. difficile infection and antibiotic-associated diarrhea (AAD),

and (2) SYN-010 which is intended to reduce the impact of methane producing organisms in the gut microbiome to treat an underlying cause of irritable bowel syndrome with constipation (IBS-C). In addition, the Company is developing a Phase 2 oral estriol drug for the treatment of relapsing-remitting multiple sclerosis (MS) and cognitive dysfunction in MS, and in collaboration with Intrexon Corporation (NYSE: XON), a preclinical stage monoclonal antibody for the prevention and treatment of Pertussis and discovery stage biotherapeutics for the treatment of phenylketonuria (PKU). For more information, please visit Synthetic Biologics' website at www.syntheticbiologics.com.

This release includes forward-looking statements on Synthetic Biologics' current expectations and projections about future events. In some cases, forward-looking statements can be identified by terminology such as "may," "should," "potential," "continue," "expects," "anticipates," "intends," "plans," "believes," "estimates," and similar expressions. These statements are based upon current beliefs, expectations and assumptions and are subject to a number of risks and uncertainties, many of which are difficult to predict and include statements regarding the potential for SYN-004 to protect the gut microbiome from the damaging effects of certain IV beta-lactam antibiotics for the prevention of C. difficile infection and antibiotic-associated diarrhea, the timing of the reporting of topline results from the second Phase 2a of SYN-004, the potential market for SYN-004, and the intended therapeutics results of SYN-004 and SYN-010. The forward-looking statements are subject to risks and uncertainties that could cause actual results to differ materially from those set forth or implied by any forward-looking statements. Important factors that could cause actual results to differ materially from those reflected in Synthetic Biologics' forward-looking statements include, among others, a failure to receive the necessary regulatory approvals for commercialization of Synthetic Biologics' therapeutics, a failure of Synthetic Biologics' clinical trials, and those conducted by investigators, to be commenced or completed on time or to achieve desired results, a failure of Synthetic Biologics' clinical trials to receive anticipated funding, a failure of Synthetic Biologics' products for the prevention and treatment of diseases to be successfully developed or commercialized, Synthetic Biologics' inability to maintain its licensing agreements, or a failure by Synthetic Biologics or its strategic partners to successfully commercialize products and other factors described in Synthetic Biologics' report on Form 10-K for the year ended December 31, 2014 and any other filings with the SEC. The information in this release is provided only as of the date of this release, and Synthetic Biologics undertakes no obligation to update any forward-looking statements contained in this release on account of new information, future events, or otherwise, except as required by law.

[i] Leffler DA et al. N Engl J Med 2015; 372:1539-1548.

[ii] Leffler DA et al. N Engl J Med 2015; 372:1539-1548.

[iii] This information is an estimate derived from the use of information under license from the following IMS Health Incorporated information service: CDM Hospital database for full year 2012. IMS expressly reserves all rights, including rights of copying, distribution and republication.

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