April 22, 2019

Molecular Templates Announces FDA Acceptance of IND Application for MT-5111, An Engineered Toxin Body Targeting HER2

Dosing in Phase I Study in Patients with HER2-Positive Cancers Expected to Start in 3Q19

AUSTIN, Texas, April 22, 2019 (GLOBE NEWSWIRE) -- Molecular Templates, Inc., (Nasdaq: MTEM) a clinical stage biopharmaceutical company focused on the discovery and development of Engineered Toxin Bodies (ETBs), a new class of targeted biologic therapies that possess unique mechanisms of action in oncology, announced that the U.S. Food and Drug Administration (FDA) has accepted its Investigational New Drug (IND) application for MT-5111, an ETB targeting HER2. MTEM expects to start dosing in a Phase I study in relapsed/refractory patients with HER2-positive solid tumors in 3Q19.

This Phase I study is an open-label, dose escalation and expansion study of MT-5111 given as monotherapy in subjects with HER2-positive solid tumors. The primary objective of the trial is to evaluate the safety and tolerability of MT-5111 and determine the recommended Phase II dose in subjects with advanced HER2-positive solid tumors.

“We are excited to be advancing MT-5111, which utilizes our proprietary de-immunized toxin scaffold, into the clinic for the treatment of patients with HER2-positive cancers. HER2 is a well validated target that is central to disease and when existing HER2-targeting therapies fail, the target persists, suggesting that a HER2-targeted therapy with a new mechanism of action has good potential to provide benefit to patients,” said Eric Poma, Ph.D., CEO and CSO of Molecular Templates. “We have seen promising responses to our lead pipeline candidate MT-3724 in DLBCL and we are excited to further leverage the novel mechanism of action of our ETB platform with MT-5111. We look forward to providing an update on the Phase I study by year-end 2019.”

About MT-5111
MT-5111 is an ETB consisting of a single chain variable fragment (scFv) with affinity for HER2, fused to the enzymatically active de-immunized Shiga-like toxin-A subunit (SLTA). MT-5111 specifically binds and kills HER2 expressing cells in a manner consistent with SLTA mediated cellular cytotoxicity. MT-5111 has been specifically designed to avoid competition with and to overcome the primary mechanisms of tumor resistance to current HER2 targeted therapies. To accomplish this, first, MT-5111 binds a HER2 domain that is distinct from the trastuzumab and pertuzumab binding sites, which results in MT-5111 HER2-mediated binding and cell kill even in the presence of these monoclonal antibodies. As such, MT-5111 may have the potential to be combined with other HER2 targeted

therapies. Second, SLTA is a large molecule protein and is not a substrate of drug efflux transporters such as MDR1 which has been demonstrated to be one of the primary mechanisms of resistance to the antibody drug conjugate, T-DM1. Third, MT-5111 mediated ribosomal inhibition and cell death take place intracellularly so changes in the tumor microenvironment which inhibit immune-mediated mechanisms such as antibody-dependent cell-mediated cytotoxicity (ADCC) are not expected to inhibit MT-5111 activity. Finally, mutations to the HER2 kinase domain that can induce constitutive downstream signaling to drive tumor proliferation are not expected to interfere with MT-5111 activity, given that its mechanism of action is not dependent upon kinase domain binding and MT-5111 works directly on ribosomes to mediate ribosomal inhibition and cell death. Based on these mechanisms, MT-5111 represents a novel HER2 targeted therapy which could provide benefit in subjects with HER2-positive cancers and potentially overcome mechanisms of tumor resistance to existing HER2 targeted therapies.

About Molecular Templates
Molecular Templates is a clinical-stage oncology company focused on the discovery and development of differentiated, targeted, biologic therapeutics for cancer. We believe our proprietary biologic drug platform technology, referred to as engineered toxin bodies, or ETBs, provides a differentiated mechanism of action that may address some of the limitations associated with currently available cancer therapeutics. ETBs utilize a genetically engineered form of Shiga-like Toxin A subunit, or SLTA, a ribosome inactivating bacterial protein, that can be targeted to specifically destroy cancer cells. Additional information about Molecular Templates can be obtained at http://www.mtem.com.

Forward-Looking Statements
This press release contains forward-looking statements for purposes of the Private Securities Litigation Reform Act of 1995 (the "Act"). Molecular Templates disclaims any intent or obligation to update these forward-looking statements, and claims the protection of the Act's Safe Harbor for forward-looking statements. All statements, other than statements of historical facts, included in this press release regarding strategy, future operations, future financial position, future revenue, projected expenses, prospects, plans and objectives of management are forward-looking statements. In addition, when or if used in this press release, the words "may," "could," "should," "anticipate," "believe," "estimate," "expect," "intend," "plan," "predict" and similar expressions and their variants, as they relate to Molecular Templates may identify forward-looking statements. Examples of such statements include, but are not limited to, statements relating to the development of the Company's lead program, MT-3724; the expected timing of submitting various IND applications and conducting studies; and the Company's belief that its proprietary biologic drug platform technology, or ETBs, provides for a differentiated mechanism of action that may address some of the limitations associated with currently available cancer therapeutics.

Forward-looking statements are not guarantees of future performance and involve risks and uncertainties. Actual events or results may differ materially from those discussed in the forward-looking statements as a result of various factors including, but not limited to, the uncertainties inherent in the preclinical and clinical development process; whether the Company's cash resources will be sufficient to fund its continuing operations for the periods and/or trials anticipated; the ability of the Company to protect its intellectual property rights; and legislative, regulatory, political and economic developments, as well as those risks identified under the heading "Risk Factors" in the Company's filings with the SEC. Any

forward-looking statements contained in this press release speak only as of the date hereof, and the Company specifically disclaims any obligation to update any forward-looking statement, whether because of new information, future events or otherwise.

Investor Contact:

Adam Cutler
Chief Financial Officer
adam.cutler@mtem.com
862-204-4006

Source: Molecular Templates, Inc.

Source: Molecular Templates, Inc.