TLC Submits Investigational New Drug (IND) Application for TLC19 Inhalable Liposomal Hydroxychloroquine for COVID-19

1% of oral dose for 30-fold lung exposure and reduced cardiotoxicity
A cost-effective, easily accessible, user-friendly potential treatment/prevention option

SOUTH SAN FRANCISCO, CA and TAIPEI, Taiwan – August 14 , 2020 – TLC (Nasdaq: TLC, TWO: 4152), a clinical-stage specialty pharmaceutical company developing novel nanomedicines to target areas of unmet medical need, today announced the submission of an Investigational New Drug (IND) Application to the Taiwan Food and Drug Administration (TFDA) for TLC19 Hydroxychloroquine Liposome Inhalation Suspension for the treatment of coronavirus disease 2019 (COVID-19).

Is hydroxychloroquine (HCQ) still a viable drug in the prevention and treatment of COVID-19? Studies by X. Yao *et al* and S. Perinel *et al* suggest that HCQ can prevent the acidification of intracellular organelles, inhibit lysosomal release of viral genome and interfere with the glycosylation of the angiotensin-converting enzyme-2 (ACE2) receptor on the host cell, reducing the binding efficiency between the receptor and spike protein on the surface of the coronavirus and thereby reducing the chances of COVID-19 infection and replication. Therefore, on the molecular and cellular levels, HCQ has been shown to achieve antiviral activity against SARS-CoV-2, the strain of coronavirus that causes COVID-19. A study by Fan *et al, a* pharmacokinetics review team from the US Food and Drug Administration (FDA), emphasized the importance of translating *in vitro* antiviral activity to appropriate clinical dosing regimens and concluded that "antiviral effect against SARS-Cov-2 [is] not likely achievable with a safe oral dosing regimen" of HCQ due to dose confinement by potential cardiotoxicity. The FDA revoked emergency use authorization for HCQ, and recent clinical trials studying orally administered HCQ, such as SOLIDARITY and RECOVERY, which proposed the highest dosing regimen of 1600mg on day 1 and 800mg the next 9 days, were halted. Fan *et al* suggested that "a strategy to increase the drug exposure at the site of action (e.g., through targeted delivery) while minimizing the systemic exposure may be desirable."

TLC19 utilizes TLC's existing proprietary liposome technology to encapsulate ~1/100 of the oral HCQ dose into an inhalable formulation for direct deposit into the airways and lungs. A recent manuscript showed that, at equivalent doses, inhalable liposomal HCQ achieved increased exposure (~30-fold) and half-life (~2.5-fold) in the lungs than oral HCQ. Thus, TLC19 can achieve antiviral effect with a miniscule dose compared to orally administered HCQ while lowering blood and heart exposure, giving TLC19 the potential to treat COVID-19.

TLC19 is administered using a vibration mesh nebulizer. TLC is working in collaboration with MicroBase Technology Corporation, who specializes in the development of

inhalation devices for the treatment of respiratory diseases with an ISO 17025 accredited laboratory capable of aerosol performance analysis, to expedite the development of TLC19's inhalation suspension formulation.

In May 2020, TLC19 had the privilege of been selected by the Taiwan FDA and Center for Drug Evaluation (CDE) for its "CDE Can Help: Project COVID-19 - Regulatory Science Consultation Program" and was able to have several consultation meetings with the CDE prior to IND submission. The CDE further suggested continuous communications once the project has entered the clinical stage to ensure the most efficient development plan and regulatory pathway to increase the probability of success.

"Thanks to the guidance and support from the CDE, TLC is able to rapidly complete the IND submission. We look forward to the prompt initiation of a Phase I clinical trial to enroll healthy volunteers in Taiwan to collect pharmacokinetic and safety data on a new liposome formulation with the new inhalation route. Data from this trial will serve as a sound basis for subsequent dose estimation in patients with COVID-19, who will be the subjects of our Phase II/III clinical trials, scheduled to take place in the United States and other countries impacted the hardest by the pandemic," said George Yeh, President of TLC. "TLC19 is administered with a light and commercially available portable nebulizer whose ease of use is especially suitable for outpatient treatment of mild COVID-19 patients, or as pre- and post-exposure prophylaxis for high-risk groups like healthcare professionals (HCP). Should clinical results be positive, TLC19 may serve as a practical bridging strategy to battle the virus until an effective and safe vaccine becomes globally and commonly available."

TLC19 sources its active pharmaceutical ingredient from a US DMF, CEP, Canadian DMF and GMP-registered manufacturer and its liposomal formulation from a PIC/S GMP-compliant facility which can be easily scaled up to meet commercial demands.

About TLC

TLC (NASDAQ: TLC, TWO: 4152) is a clinical-stage specialty pharmaceutical company dedicated to the research and development of a diverse, wholly owned portfolio of novel nanomedicines that maximize the potential of its proprietary lipid-assembled drug delivery platform (LipAD™), including BioSeizer® sustained release technology and NanoX™ active drug loading technology, which are versatile in the choice of active pharmaceutical ingredients and scalable in manufacturing.

Cautionary Note on Forward-Looking Statements

This press release contains forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. Forward-looking statements contained in this press release include, without limitation, statements regarding TLC's expectations regarding the clinical development of TLC's product candidates, including TLC19, the clinical benefits of TLC's product candidates, the timing, scope, progress and outcome of TLC's clinical trials, how sufficient cash and equivalents will be to fund

operations, the anticipated timelines for the release of clinical data and progress of TLC's manufacturing capabilities. Words such as "may," "believe," "will," "expect," "plan," "anticipate," "estimate," "intend" and similar expressions (as well as other words or expressions referencing future events, conditions or circumstances) are intended to identify forward-looking statements. These forward-looking statements are not guarantees of future performance and involve a number of risks, assumptions, uncertainties and factors, including risks that the outcome of any clinical trial is inherently uncertain and product candidates may prove to be unsafe or ineffective, or may not achieve commercial approval, and delays or disruptions on our business or clinical trials due to the COVID-19 pandemic. Other risks are described in the Risk Factors section of TLC's annual report on Form 20-F for the year ended December 31, 2019 filed with the U.S. Securities and Exchange Commission (the "SEC") as well as subsequent filings with the SEC. All forward-looking statements are based on TLC's expectations and assumptions as of the date of this press release. Actual results may differ materially from these forward-looking statements. Except as required by law, TLC expressly disclaims any responsibility to update any forward-looking statement contained herein, whether as a result of new information, future events or otherwise.

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