**Phoenix PharmaLabs, Inc.**

**Executive Summary**

Phoenix PharmaLabs, Inc. (PPL) is a privately held, preclinical drug discovery company focused on the development and commercialization of new potent, non-addictive treatments for pain and new therapies for the treatment of opiate addiction.

Opioids are the most widely prescribed drugs for treatment of moderate to severe pain. They are also the most powerful analgesics for treatment of acute and chronic pain. However, their use is plagued by serious side effects including abuse and addiction, severe withdrawal, constipation, respiratory depression, and death from overdose. More than 2 million Americans are seriously addicted to opioids, and many of them initially became addicted after being given prescription opioids for pain relief by a physician. The CDC reports that, "This is a major public health problem that is getting worse, and getting worse rapidly."

The leading potent opioid analgesics in use today such as Morphine, Oxycodone, Hydrocodone, Methadone, Fentanyl, etc. bind strongly to the mu receptor in the brain and then aggressively agonize that receptor, leading to a number of severe side effects including euphoria (which leads to abuse and addiction), severe withdrawal, constipation, respiratory depression, and death from overdose.

PPL has developed a novel family of New Molecular Entity (NME) ligands with high binding affinity at all three opiate receptors: mu, kappa and delta. These unique ligands have high binding affinity at all three opioid receptors and more balanced receptor activity than other opioids, with partial agonist / antagonist activity at mu, somewhat higher, but not full, kappa agonist activity, and moderate delta activity. Thus, PPL-103 derives potent analgesia primarily from mu and kappa, but does not stimulate those receptors so intensely that they trigger the negative side effects of either receptor. **This profile results in first-ever opiate analgesics that appear to be non-addicting and free of all significant dangerous side effects.**

The reason that other opioids are addicting is because they produce a euphoric "high". Without that euphoria, drugs would not be abused and would not be addicting. Our compounds have clearly demonstrated in self-administration studies as well as conditioned place preference (CPP) and conditioned place aversion (CPA) studies that they do not produce either euphoria or dysphoria. Research has shown that there is a very high correlation between these animal studies and human abuse liability (HAL) studies and other indications of the potential for abuse and addiction in humans [1].

Studies of PPL’s drugs have been conducted by prominent scientists at leading institutions including Lou Harris and colleagues at Virginia Commonwealth University (VCU), Jim Woods and colleagues at the University of Michigan, and Larry Toll and colleagues at SRI International and Torrey Pines Institute for Molecular Studies. Study results in rodents and monkeys performed by the National Institutes of Health (NIH) / National Institute on Drug Abuse (NIDA) and SRI International Laboratories demonstrated the following:

* Robust analgesic potency (10-20x stronger than morphine)
* No euphoric reward / abuse and addiction potential (multiple studies)
* No dysphoria (multiple studies)
* Only moderate signs of respiratory depression – even at 150x dosage
* No death from overdose - even at 350x dosage
* LD50 = 500x dosage
* No constipation in rodents at 100x dosage & very limited even at 350x dosage
* No withdrawal symptoms
* No physical dependence in naive rodents
* No Long QT syndrome risk – hERG assay
* No significant diuresis in rodents
* Does not precipitate withdrawal in opioid-dependent monkeys

Since the drugs do not precipitate withdrawal, they offer very promising use for addiction therapy as a preferred substitute for methadone and Suboxone, as well as for pain. The drugs are orally active and inexpensive to manufacture using PPL's manufacturing process. Key patents were issued in the US in March 2015, and are currently being internationalized.

The cost and risk of achieving a New Drug Approval (NDA) from the FDA is substantially lower than other NMEs with equivalent market potential. Few drug classes have more longitudinal testing data than opioids for use as a predictor of success in trials. Therefore, the risk of pharmaceutical product development is significantly reduced compared to the risk of developing less understood drug classes.

Furthermore, a vast amount of opioid testing data is available concerning the transition of effects of pure opioid compounds from animals to humans. Consequently, our scientific experts and advisors predict that the risk of problems in toxicology and safety pharmacology is very low. The predictive validity from animals to humans is very high, and thus there is a high level of confidence that the compounds will be safe, effective and beneficial for humans.

Recently our drug family has also attracted attention for Animal Health applications, primarily due to the lack of respiratory depression and GI tract side effects as well as the likelihood that the drugs would likely be unscheduled (or at most scheduled in a low level class).

The strategic objective of our company is to enter into one or more license agreements with appropriate market leader(s) that have the resources and motivation to further develop, commercialize, and maximize the market potential of PPL’s family of drugs.  We intend to advance our compounds through Proof of Concept (POC) in humans at which point they will be very well positioned for out-licensing.  It is possible, however, that we could decide to enter one or more license agreements or an acquisition or an IPO before that point is reached. In the meantime we are exploring various potential funding opportunities and strategic collaborations.

[1] O’Connor EC, Chapman K, Butler P, Mead NM. (2011) The predictive validity of the rat self- administration model for abuse liability. *Neurosci Biobehav Rev* 35:912-938.