VIRGINIA COMMONWEALTH UNIVERSITY

"Use of Combinations of GRAS and Dietary substances to increase the Oral Bioavailability of Opioids & Phenolic Bioactives"

VCU #10-92, 12-105

Applications

- Enhancing bioavailability and pharmacokinetics of phenylephrine, buprenorphine, resveratrol, natural compounds, and other compounds with phenolic groups
- Novel approach for oral drug delivery

Advantages

- Enhanced absorption and solubility
- Increased bioavailability
- Compounds lack adverse effects
- Used compounds from the FDA's foods or GRAS (generally recognized as safe) lists

Inventors

Phillip M. Gerk, PharmD, PhD

Contact

Magdalena K. Morgan, Ph.D.
Technology Manager
mkmorgan@vcu.edu
Direct 804-827-6095

Technology Summary

Dr. Gerk has developed methods of enhancing the bioavailability of phenylephrine, buprenorphine, and similar compounds by using a combination of GRAS and dietary substances to inhibit their presystemic metabolism. The approach was developed with FDA qualifications in mind from the beginning, and it is appropriate for FDA applications and regulations. *In vitro* and *in vivo* studies indicate the efficacy of the approach.

- Results from *in vivo* studies indicate an enhancement in oral bioavailability of buprenorphine by 2-3 fold.
- Identified agents include a proprietary and unique combination of several GRAS and dietary compounds.
- Regulatory hurdles will be minimized by the choice of compounds. These compounds are considered GRAS by the FDA, since their safety has been previously demonstrated.
- *In vitro* results using single agents and combinations of agents have established potency for defined pathways of metabolism.
- *In vitro-in vivo* extrapolation supports the feasibility of the approach for increasing oral buprenorphine bioavailability comparable to the sublingual route.
- Further mechanistic characterization is desirable to help with development of the technology.
- Protocols for *in vivo* testing in small groups of normal healthy subjects are being developed.
- The selected compounds in appropriate ratios will be identified and validated. The development of marketable dosage forms will require a formulation partner.

Technology Status

Patent Pending: U.S. and foreign rights available, South African Patent Issued No: 2014/02436.

Verenich S, Gerk PM. "Therapeutic Promises of 2-Methoxyestradiol and its Drug Disposition Challenges." *Molecular Pharmaceutics*, 2010, 7(6), 2030-2039.
Joshi AA, Maharao NV, Gerk PM. "Simultaneous quantitation of buprenorphine and its metabolites using LC–MS." Curr Trends Mass Spect. 2016; 14(3):15-19.
Joshi AA, Halquist M, Konsoula Z, Liu Y, Jones JP, Heidbreder C, Gerk PM. "Improving the Oral Bioavailability of Buprenorphine: An In Vivo Proof of Concept." Journal of Pharmacy and Pharmacology, 2016; (in press).

This technology is available for licensing to industry for further development and commercialization.