Investigating the Mechanism Responsible for the Effect of Behavioral Cough Therapy

Laurie Slovarp

University of Montana, Missoula

Follow this and additional works at: https://scholarworks.umt.edu/ugp-reports

Let us know how access to this document benefits you.

Recommended Citation
Slovarp, Laurie, "Investigating the Mechanism Responsible for the Effect of Behavioral Cough Therapy" (2020). University Grant Program Reports. 62.
https://scholarworks.umt.edu/ugp-reports/62

This Report is brought to you for free and open access by the Office of Sponsored Programs at ScholarWorks at University of Montana. It has been accepted for inclusion in University Grant Program Reports by an authorized administrator of ScholarWorks at University of Montana. For more information, please contact scholarworks@mso.umt.edu.
Title: UGP2019: Investigating the Mechanism Responsible for the Effect of Behavioral Cough Therapy

Principal Investigator: Laurie Slovarp, PhD

The following specific aim was completed:

**Demonstrate feasibility and collect preliminary data to quantify expression of TRPV1 receptors in the nose and throat pre and post BCT in patients with refractory chronic cough (RCC).** Minimally invasive brush biopsies, obtained from the nose and larynx will be analyzed using either qPCR for TRPV1 mRNA expression. We propose to analyze both nasal and laryngeal epithelial cells to determine if they respond similarly to behavioral cough therapy (BCT) in patients with RCC. The specific purpose of meeting this aim is to strengthen an R15 or R21 grant proposal that will be submitted within six months of completion of the UGP small grant period.

**Protocol Revisions:**

1. The protocol was modified after discovering brush biopsies yielded so little tissue it was unlikely we would get reliable results with qPCR. I then amended the IRB to allow for forceps biopsies from the epiglottis. I removed the nasal biopsy aspect of the protocol because a forceps biopsy from the nose would be too uncomfortable and result in too much bleeding. The IRB amendment for this protocol change was approved on 6/25/19.

2. The original protocol included cough frequency testing with surface EMG (sEMG) technology with the assistance of Dr. Matt Bundle. The purpose of testing sEMG as a cough frequency monitor on these participants was to determine feasibility for use in future research. This protocol was amended when I discovered the availability of a smart medical wearable cough respiratory monitoring device that includes the capability of monitoring cough. The device is called the Automated Device for Asthma Monitoring and Management (ADAMM) and is made by Healthcare Originals, Inc. (HCO). A collaboration agreement with HCO was signed on 11/22/19. The agreement included the use of 6 ADAMM devices to test its validity as a cough frequency monitor on patients with chronic refractory cough.

3. The study was halted in March 2020 due to the COVID-19 pandemic. At that point we had two participants who were due for their post-treatment biopsies. I submitted an amendment to the IRB in May 2020 to request permission to obtain those two additional biopsies with extra precautions taken to prevent COVID-19 transmission. That amendment was approved on 6/10/20.

**Budget Revisions:**

1. A request was made to pay Fred Rhoderick to complete the qPCR analyses on the biopsies because Dr. Sarjubhai Patel was unavailable to complete them summer 2020 due to research related to COVID-19. This request was approved; however, Mr. Rhoderick ended up volunteering to donate his time.

2. A request was made to purchase a lab fume with HEPA filter and UV light to allow my team to prepare capsaicin dilutions (for a different, but related, project) in my lab in the Curry Health Center rather than in the Skaggs building. That request was approved on 8/6/20. The fume hood was delivered mid-September 2020.
Results:

1. Laryngeal biopsies were collected from four participants before and after behavioral cough therapy. I obtained a pre-treatment biopsy on one additional participant but was unable to obtain the post-treatment biopsy because by the time the IRB approved me to resume the study after the COVID-19 shutdown, that participant had moved out of state.

Fred Rhoderick completed qPCR on the biopsies. Pre and post-treatment biopsies for three participants were viable for qPCR. The results did not support the hypothesis as they showed a increase in TRPV1 gene expression in the only participant who responded to therapy and the hypothesis was that the gene expression would decrease. Minimal change in gene expression was found in the other two participants, who did not improve with therapy. These results need to be interpreted with caution as the RNA integrity of each of the samples was low, which can reduce the reliability of the analysis. A larger data set is needed to draw any conclusive conclusions about the feasibility of this protocol to determine change in TRPV expression following BCT.

2. Data has been collected on six participants for testing validity of the ADAMM device as a cough frequency monitor for patients with refractory chronic cough. Data collection was complete in July 2020 but the data is transferred to a server at HCOs via the internet. HCOs then sends the data for my team to analyze. The full data set was received on 9/8/20. We have analyzed the data on two participants, which has resulted in sensitivity of less than 50%. HCOs has discovered a problem with the way some of the data was processed which resulted in some of the data being lost. They believe they are able to correct the problem and we will be re-launching the study in October 2020. I anticipate a new data set will be collected by the end of 2020.

Future Grant Proposal:

I had planned to submit an R01 proposal for a multi-site clinical trial study of cough desensitization therapy (a novel treatment for RCC that I have completed pilot testing on), which may include collecting pre and post biopsies and use of the ADAMM device as a cough frequency monitor, in February 2021. Due to the delay caused by COVID-19, I am now planning to submit the R01 in June 2021. The multi-site team has been established with researchers from University of Utah, University of Colorado, and Emory University.