Patient Centered Therapeutics

The Use of Image Manipulation to Process Emotion and Improve Clinical and Patient Centered Outcomes for Individuals with Pain

Investigators:

Rachel P. Dreyer (Ph.D.), Mary A. Driscoll (Ph.D.), Cynthia Brandt (MD), Brian Coleman (DC), Luis Marenco (MD)

Yale SCHOOL OF MEDICINE

Confidential and Proprietary, Patient Centered Therapeutics ©2021

the problem

Patient Centered Therapeutics

- High rates of alexithymia are associated with onset and maintenance of chronic pain
  -Inability to identify, express, describe or regulate feelings[1]
- Alexithymia portends poorer pain outcomes and may do so via disruption of affective neural pathways, and its interaction with positive and negative affect[1,2]
- The Gold standard for pain self-management is Cognitive Behavioral Therapy for Chronic Pain (CBT-CP)
  -Less effective for those high on emotional and interpersonal distress
  -Fails to address emotional distress
- Emotional Awareness and Expression Therapy (EAET) for Chronic Pain has been proposed as an alternative intervention
  -Preliminary trials suggest it outperforms CBT-CP on pain reduction
  -Logistical barriers limit availability/uptake
- Need for an effective, portable and scalable intervention that targets emotional processes

Confidential and Proprietary, Patient Centered Therapeutics ©2021

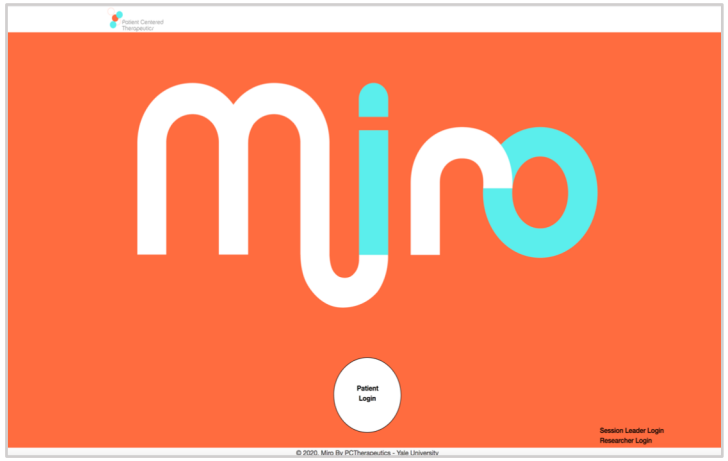
1. Aaron RV et al. Pain. 2019;160:994-1006. 2. Tooyserkani MA et al. Procedia Soc Behav Sci. 2011;30:154-158.

introducing

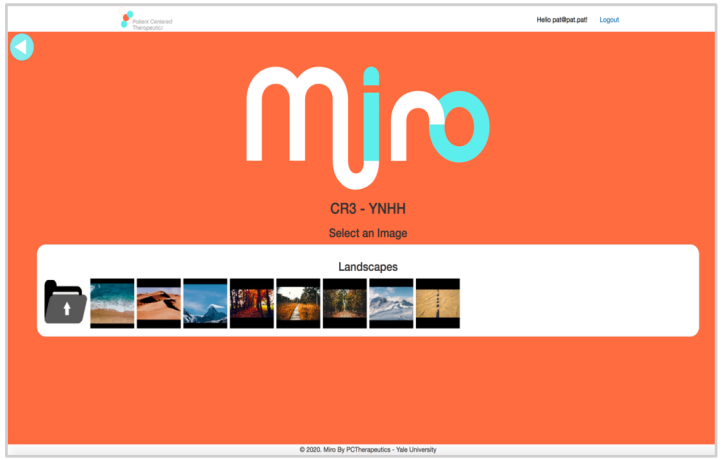
Miro

Patient Centered Therapeutics

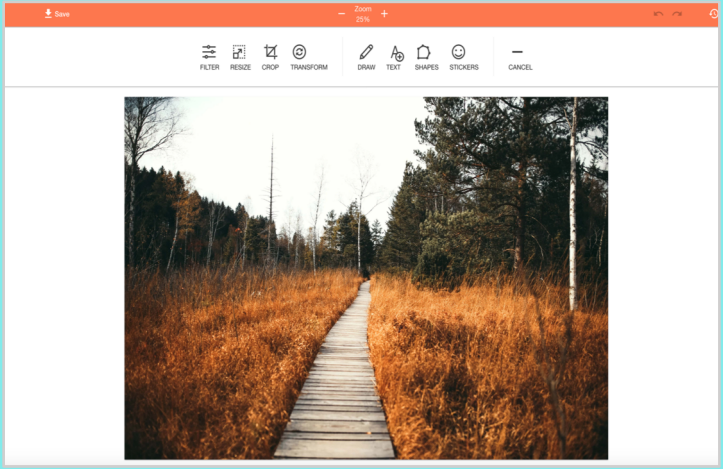
- Miro™ is an innovative digital health application using image modification
- The therapeutic image modification process used in Miro™ is based on existing clinical and research methods
- A new mechanism for individuals with chronic pain and trauma to communicate complex emotions and facilitate patient centered care



Patient portal



Select an image



Modify an image

Once complete, save image

Confidential and Proprietary, Patient Centered Therapeutics ©2021

the science

Patient Centered Therapeutics

"You hardly ever hear anyone describe the pain [after a heart attack]… it's such a weird pain. It's not like when you cut your finger [kind of pain]…It's just such a strange sensation. I have never heard it described, you know?...

it's a kind of pain that is just so out of control – and that I cannot ever describe in words."

- Expression through images has been used in medicine for many years
  - ✔ Therapeutic process
  - ✔ Enables self-expression[1]
  - ✔ Enhanced recovery[2,3]

1. Wang et al. Health Edu & Behav. 1997;24:369-387.
2 .Cabassa et al. Psychist Serv. 2013;64(9).
3. Rajendran et al. Academic Emer Med. 2020;27:92-99.

- Emotion has been predicted from images[4]
  - ✔ Artificial intelligence
  - ✔ Advanced machine learning
  - ✔ Convoluted neural networks

4. Chen et al. IEEE International Symposium on Multimedia (ISM). 2016: 367-368.

- Address barriers related to:
  - ✔ Access to care
  - ✔ Engagement in care
  - ✔ Communication
- May improve:
  - ✔ Patient outcomes
  - ✔ Patient satisfaction

Confidential and Proprietary, Patient Centered Therapeutics ©2021

the industry

Patient Centered Therapeutics

Total worldwide healthcare application vendors

top $17.6 billion in 2016

- $ Medical software and services market
- $ Seek to provide new category of digital therapy
- $ Targeting multiple points of entry in the medical applications market
- $ Used as a stand alone product or bundled with existing evidence based treatments
- $ We can profit by providing a service to medical care organizations
- $ This includes hospitals, insurance companies or academic institutions

Confidential and Proprietary, Patient Centered Therapeutics © 2021

the competition

- Our competition is other software applications that are developed as a unimodal application suite
- Biobeats, Jvion, Affectiva, Beyond Verbal, nVISO

- These companies use artificial intelligence for facial recognition or voice pattern recognition for emotion prediction
- Using Miro in communicating emotions may improve outcomes and lower healthcare costs by reducing inpatient stays and hospital readmissions[1-3]

Our differentiating benefits include a <u>future</u> novel platform and digital therapeutic **capable of predicting various patient and clinical outcomes using image modification**

Confidential and Proprietary, Patient Centered Therapeutics © 2021

1. Jacobs et al. Telemed J E Health. 2019; 10.1089/tmj.2019.0179.
2. O'Connor et al. Appl Clin inform. 2016;7:238=247.
3. Park et al. JMIR Med Inform. 2019;7:e13353.

our team

Patient Centered Therapeutics

Rachel Dreyer, Ph.D.

FOUNDER

+10 yrs health research sector; Project management

Mary Driscoll, Ph.D.

PSYCHOLOGY

+ 15 yrs health research sector (pain); Psychology

Luis Marenco, MD

TECHNOLOGY DEVELOPMENT

+20 yrs medical informatics; Software development

Cynthia Brandt, MD, MPH

MEDICAL

+20 yrs medical informatics; Technology development

Brian Coleman, DC

INNOVATION & ENGINEERING

+10 yrs engineering; Design thinking; R&D

Confidential and Proprietary, Patient Centered Therapeutics © 2021

project / funding pipeline

Formative Evaluation

- Funded through VA to conduct 4-week study in women Veterans with pain and trauma
- Specific aim 1: Stakeholder advisory committee using participatory approach to solicit feedback on the Miro™ app/proposed methods
- Specific aim 2: (a) Test the feasibility (acceptability, retention) of the Miro™ app in the target sample; and (b) examine the number of participants who evidence clinically meaningful improvements in a range of measures.

Feasibility Pilot (Phase 1)

- Seeking funding to conduct larger 8-week feasibility pilot in patients with chronic pain at YNHH
- Specific aim 1: (a) Evaluate the feasibility and acceptability of deploying the Miro™ app in a specialty pain clinic; (b) explore preferences for positive and negative valanced prompts
- Specific aim 2: Conduct qualitative interviews with patients to understand their perceptions of the barriers and facilitators to using the app in the pain clinic and features/capabilities of the Miro™ app
- **Total funds requested (Blavatnik): $75,000**

Feasibility Pilot (Phase 2)

- Seeking funding to extend larger 1-year feasibility pilot in patients with chronic pain at YNHH
- Specific aim 1: (a) Determine which analytical methods of image manipulation most accurately infer patients' emotional and behavioral state.
- Using training data from phase 1 we will test the use of neural networks and affective image classification, including its application to categorized emotion, and the dimensional model of expressing emotion
- Specific aim 2: Conduct qualitative interviews with providers to understand whether the app is acceptable to inform pain care
- **Total funds requested (Blavatnik): $150,000**

Confidential and Proprietary, Patient Centered Therapeutics © 2021

Patient Centered Therapeutics

thank you

call (203) 645-9289

email rachel.dreyer@yale.edu

www.pctherapeutics.com

Confidential and Proprietary, Patient Centered Therapeutics ©2021