![InSyBio logo - Intelligent Systems Biology]

Precision Chronic Pain Treatment Tool: a first-of-its-kind tool for personalizing treatment of Chronic Pain Patients

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In an effort to find a better alternative to the traditionally prescribed opioid analgesics, InSyBio worked in collaboration with Clarity Science LLC and developed a machine learning-based tool for predicting the response of chronic pain patients to 4 different non-opioid pain treatment formulations. This tool is capitalizing on InSyBio's unique machine learning technology to develop machine learning models that are able to predict various response to treatment metrics (including pain severity and interference scales as well as reduction of total drugs) with an unprecedented accuracy. The accuracy of these models in predicting the changes in the response to treatment metrics exceeded 82% for all metrics in a cohort of more than 600 patients while 98.1% of the participants which were classified as responders to non-opioid treatments presented substantial improvement in all metrics in a follow-up after 3-6 months from baseline.

The Precision Chronic Pain Treatment Tool is a first-of-its-kind tool that is able to stratify chronic pain patients into individuals who will benefit from topical analgesics treatment and select the most suitable non-opioid treatment formulation for them using as input a combination of demographics, clinical characteristics and other responses to a simple questionnaire.

The first version of this tool is available for a free trial usage by clinicians treating Chronic pain patients (get it from here: https://pain.insybio.com/index.php?r=site/register) offering them the following features:

- Evaluation of chronic pain situation of patients through the completion of a user-friendly web form

- Monitoring the progress of chronic pain patients over the time (trends, graphical representation of their clinical and demographics characteristics etc.)

- Suggesting suitable patients for non-opioid treatments

- Suggesting the best performing non-opioid treatment among 4 different formulations.

A simpler version of this tool is available for chronic-pain patients (get it from here: https://painpatient.insybio.com/index.php?r=site/registernew) to allow them to identify if a non-opioid treatment is suitable for them and suggest them discussing additional therapeutic options with their physician.

In the next few months this tool will be expanded with additional non-opioid formulations and treatments (such as pain patches), with more specialized versions for specific chronic pain etiologies, such as Osteoarthritis and Rheumatoid Arthritis, and incorporating biomarkers to improve the predictive accuracy of the utilized prognostic models.

Peter Hurwitz, President of Clarity Science states: "*Through their predictive analytic and artificial intelligence algorithms, the team at InSyBio has developed a simple and unique tool that will allow patients and clinicians the ability to identify suitable treatments, and more importantly, treatments that will predict the likelihood of response prior to the patient beginning that treatment. Identifying treatments that may generate a positive outcome prior to prescribing is very exciting as it will cut down on unnecessary treatment trials, adverse events and side effects, time for a patient to feel relief, and cost, just to name a few advantages. With so many treatment options available, anything that may help in identifying the best approach upfront will be welcomed by the healthcare community and patients.*"

Seferina Mavroudi, Chief Scientific Officer of InSyBio states: "*Our tool is based on a Sophisticated, Interpretable Machine Learning approach to provide health care providers with a high accuracy yet trustable and transparent decision aid. Leveraging the power of AI in this way, I think we have arrived at the future of medical decision making.*"

Aigli Korfiati, product development manager of InSyBio states: "*Years of teamwork in building sophisticated AI have now met a huge medical need. Identifying the most beneficial treatment for each chronic pain patient is now possible and straightforward. You answer the questions in our web tool and simultaneously you get the results! Our product development team worked hard towards this goal achieving to optimize the user experience of both clinicians and patients.*"

Find out more details about the tool as well as its user guide in: https://www.insybio.com/manuals/InSyBio%20Precision%20Chronic%20Pain%20Treatment%20Tool%20Manual.pdf

Read more details on the data used for the development of this tool in our recent publication:

Gudin, J., Mavroudi, S., Korfiati, A., Theofilatos, K., Dietze, D., & Hurwitz, P. (2020). Reducing opioid prescriptions by identifying responders on topical analgesic treatment using an individualized medicine and predictive analytics approach. *Journal of pain research*, *13*, 1255.

About InSyBio: InSyBio is an international pioneer bioinformatics revolutionizing the medical field, clinical trials and food/nutrition industries through targeted biomarker discovery and highly-accurate predictive analytics.

Its solutions provide the R&D departments of Pharma, Research Institutes and Food/Nutrition companies, with the means both analytically and computationally to meet their challenging research and innovation goals (such as robust biomarker discovery and accurate predictive models). This is done through a sophisticated, software-as-a-service, machine learning platform which comprehensively integrates multi-omics data reducing the number of samples and additional validation experiments needed. Since 2013, InSyBio has worked with hundreds of academics, large and small companies, hospitals and research centers allowing them to succeed in their biomarker discovery tasks with an increase of at least 10% in predictive accuracy and decrease of at least 80% in overall time and cost.

Visit www.insybio.com to see how InSyBio can help you reach your R&D goals in the era of Precision Medicine and Nutrition.

About Clarity Science LLC: Clarity Science is an international scientific outcomes research Company assisting biopharmaceutical, specialty pharmacies, and other healthcare Companies with the coordination and execution of scientific, IRB-approved, outcomes studies. Managed by a seasoned staff of healthcare professionals, scientific researchers, outcomes statisticians, and guided by physician experts across multiple therapeutic areas, Clarity Science currently coordinates and administers outcomes studies in pain, allergy, podiatry, scar/wound healing, cardio-metabolic, psychiatry, urology, and genomic testing fields. Whether through improving treatment methodologies or identifying new ones, Clarity aspires to make a global positive impact on patient health and to improve the quality of life for patients and their families. Our goal is to conduct scientifically rigorous and valid research that advances innovation in science and ultimately helps healthcare professionals provide improved patient care, leading to improved patient health worldwide (www.claritysciences.org).

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