

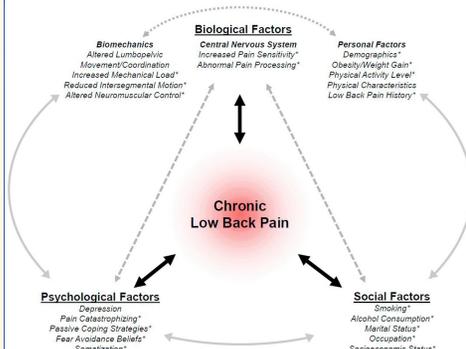
Predicting and Characterizing the Probability for Continued Opioid Use in the Chronic Low Back Pain Population using the novel Network Phenotyping Strategy Method

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INTRODUCTION

Chronic low back pain (CLBP) is one of the leading causes of disability and chronic pain among adults. Currently, both the rate of CLBP occurrence and the cost of treatment continue to rise. Opioids are commonly used to manage CLBP despite evidence against effectiveness. Given the prevalence of chronic low back pain in the United States and the debilitating effects of opioid dependency, identifying effective non-opioid alternatives for chronic low back pain is a top health care priority.



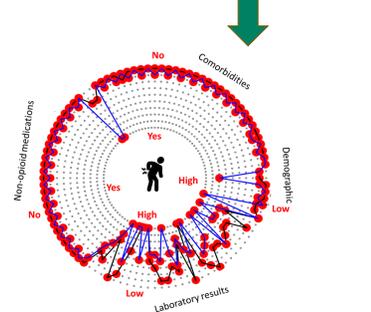
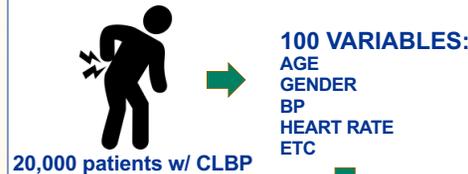
There exist several common, non-opioid, treatments for CLBP including physical therapy and epidural spine injection (ESI), and surgery. Unfortunately, the effectiveness of these therapies are variable, due, in part to the heterogeneous nature of CLBP. Presently, the greatest barrier to defining CLBP phenotypes is the lack of large-scale interdisciplinary efforts to characterize CLBP based on a comprehensive set of biological, biomechanical, clinical, and psychosocial factors within each patient suffering from CLBP. We propose to use our novel Network Phenotyping Strategy (NPS) to overcome this barrier.

OBJECTIVES

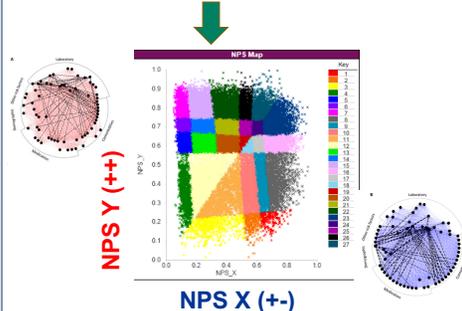
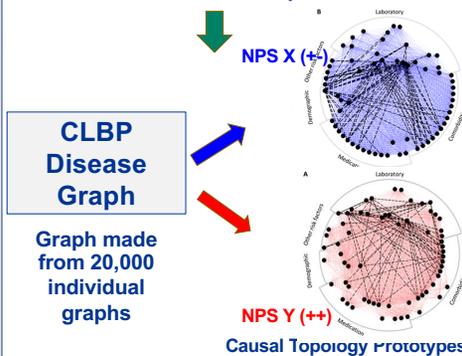
- 1) We will use the NPS methodology to identify subpopulations associated with unique probability for continued opioid use within the CLBP patients.
- 2) We will then determine which variables contribute significantly towards the characteristic probabilities for opioid retention within these unique subpopulations.

NETWORK PHENOTYPING STRATEGY

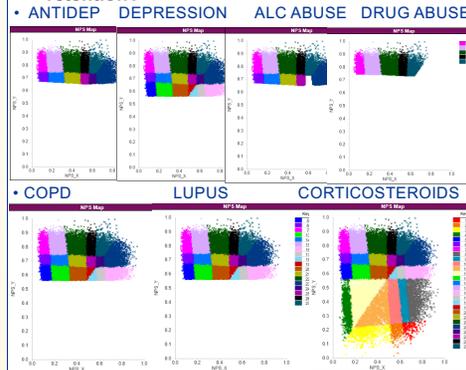
Q1: Which patients are likely to continue using opioids?



Patient 100-partite graph using EMR data for each of the 20,000 patients

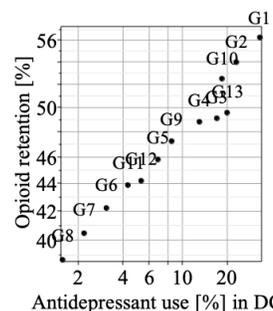
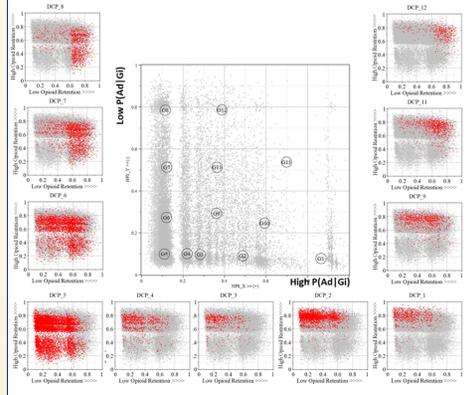


Q2a: Topological Selectivity – which variable is a common factor amongst networks that have a propensity for higher opioid retention?

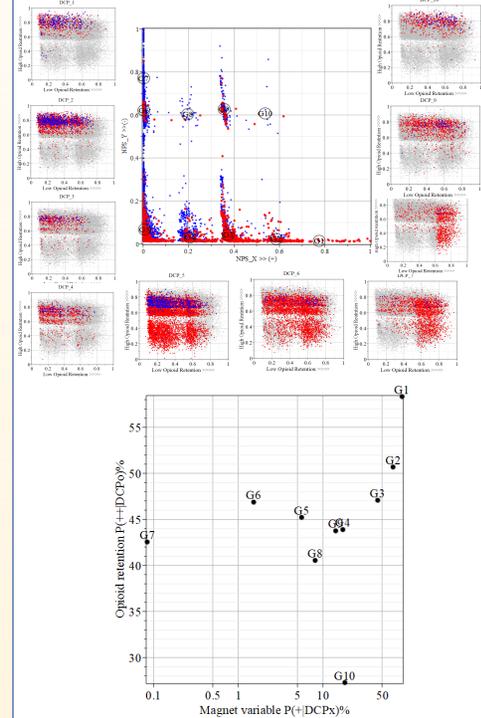


Q2b: Which variable pushes the network of a particular patient in each DCP towards a high probability for opioid retention?

ANTIDEPRESSANT



COPD



SIGNIFICANCE

The NPS methodology allows us not only to elucidate the subphenotypes that exist within heterogeneous disease processes and predict outcomes for patients, it also allows us to perform a careful analysis of the complex relationship between all variables that contribute to the characteristic patient outcomes for each subphenotype.

REFERENCES

Shmigel A, Foley R, Ibrahim H. Epidemiology of Chronic Low Back Pain in US Adults: Data From the 2009-2010 National Health and Nutrition Examination Survey. *Arthritis Care Res (Hoboken)*. 2016;68(11):1688-1694. doi:10.1002/acr.22890

Deyo RA, Von Korff M, Durrkoop D. Opioids for low back pain. *BMJ*. 2015 Jan 5;350:g6380. doi: 10.1136/bmj.g6380. PMID: 25561513; PMCID: PMC6882374.

Von Korff M, Kolodny A, Deyo RA, Chou R. Long-term opioid therapy reconsidered. *Ann Intern Med*. 2011;155(5):325-328. doi:10.7326/0003-4819-155-5-201109060-00011

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