A Novel Approach to Early Directional Diagnosis of Prescription Opioid Addiction

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Prescription opioid addiction is a national health crisis. Today, patients or physicians don't have a way of diagnosing if a relief painkiller causes addiction. Current approaches for diagnosis are based on self-assessment or psychological evaluations. The proposed solution uses the measurement of variations in the Mu Opioid Receptor protein produced by the OPRM1 human-gene. The research/experimentation included behavior of OPRM1 gene in response to exogenous opioids or prescription drugs (oxycodone/ fentanyl). In addition, the increase in protein levels due to agonists were mapped to a user-friendly scale for physicians to act. The research output also included design, fabrication, and testing of a portable-prototype tool to directionally indicate the onset of opioid addiction in patients. Research involved simulating the behavior of human genes addicted to opioids using the human OPRM1 gene on a Saccharomyces-Cerevisiae host. The methods used included yeast-strain preparation with CRISPR/cas9 expressed with OPRM1. The portable solution was calibrated to substitute the colorimetry process of protein detection(spectrophotometer) with neural network-based image-processing algorithms. The results are sent over Bluetooth to a custom-developed mobile app, where they are mapped to a user-friendly scale and displayed for further action by the user. The results verified that OPRM1 protein levels can be measured in presence of an agonist and are proportional to levels of opioids. This incremental solution focuses on diagnosis rather than treatment to save lives.

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