Alto Neuroscience Announces Publication in Nature Neuroscience Highlighting Superiority of Data-Driven Framework for Mapping Human Neurobiology Domains

--Publication highlights first ever, most comprehensive data-driven neurobiological mapping of the mind--

--Findings, published in Nature Neuroscience, validate Alto's rigorous high-science approach and may be translated to future drug discovery and development--

--Intellectual property has been exclusively licensed to Alto by Stanford--

LOS ALTOS, Calif., Nov. 11, 2021 – Alto Neuroscience today announced the publication of the first ever, most comprehensive data-driven neurological mapping of the mind in the journal *Nature Neuroscience*. The paper, "A data-driven framework for mapping domains of human neurobiology," demonstrates superiority of a computational approach to identify mental functions, brain circuits, and neurobiological domains.

In psychiatry, it is accepted that the *Diagnostic and Statistical Manual* (DSM) is poorly predictive of treatment response. To address shortcomings, an expert-driven National Institute of Mental Health (NIMH) framework called the Research Domain Criteria (RDoC) project launched to map brain circuits, behaviors, and other units of analysis. However, how well either DSM or RDoC systematically capture findings from human brain data is unknown, nor whether an unbiased data-driven framework can be discovered that best matches models of mind to biology of the brain. To address these questions, a neuroimaging meta-analysis of 18,155 human brain imaging studies was conducted, encompassing findings from all available papers published on the topic over the past three decades. By applying natural language processing (NLP) on the full content of these papers and machine learning, a superior data-driven framework was developed which also outperformed both DSM and RDoC.

"For decades, functional neuroimaging has been the mainstay for understanding how mental processes relate to brain activity. This existing approach is inherently limited because it uses mental constructs defined decades ago as the premise of brain mapping rather than clear, objective criteria," said Amit Etkin, M.D., Ph.D., founder and chief executive officer of Alto. "In an attempt to better classify and treat psychiatric disease, we examined and synthesized neuroimaging texts and data to develop a working model that effectively translates how the brain and its mental domains interconnect."

Dr. Etkin continued, "These findings support our efforts to match patients with drugs they are most likely to respond to, to help them get better faster. The vast amount of knowledge extracted complements our expansive data set in clinical psychiatry, supporting the rapid, biologically driven, advancement of our drug candidates through the clinic."

NLP is a collection of computational approaches for extracting and representing words quantitatively. By identifying mental functions from comprehensive texts and data on brain circuits and conducting a meta-analysis of the findings, reproducible neurobiological 'domains' resulted that reliably capture brain structure and function links. Modularity, or grouping of domains, exceeded that of RDoC and DSM for brain mapping as well as generalizability, highlighting the disconnect between the current understanding of brain function and how mental health conditions have been historically categorized.

In alignment with its rigorous data-driven approach, Alto Neuroscience will continue to leverage proprietary artificial intelligence (AI)-based methods to advance the largest clinical-stage pipeline in precision psychiatry including 11 assets, with three in Phase 2a studies for major depressive disorder and post-traumatic stress disorder.

The full publication in *Nature Neuroscience* can be accessed online here. For more information about how these mental domains interconnect within the brain, visit http://neuro-knowledge.org/.

About Alto Neuroscience
Alto Neuroscience is pioneering precision psychiatry by developing targeted medicines to help patients get better faster. Differences in individuals' biology impact how they respond to treatment. Alto's human data-driven platform measures brain biomarkers including EEG activity and behavioral patterns, wearable data, genetics, and other factors, to match each patient with the right Alto therapy. The company's clinical-stage pipeline includes drug candidates being studied in mental health conditions targeting cognition, emotion, and sleep processes. For more information, visit https://www.altoneuroscience.com or follow us on Twitter.

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