Psychiatry has lagged behind many fields with respect to identification of relevant biomarkers that may inform disease course and treatment strategies, and most particularly identification of clinically actionable biomarkers that can be routinely used in daily practice. Biomarkers (or biological markers) are objectively measured characteristics reflecting normal or pathogenic biological responses or response to therapeutic intervention. Biomarkers have been successfully and consistently used in other chronic diseases, such as cancer and cardiovascular disease, to assist with disease detection, prognosis, and treatment in ways that have significantly and positively affected patient outcomes. As in these other conditions, biomarkers in psychiatry have potential for identifying the most efficacious and/or minimally aversive medication choice—predicting the trajectory, severity, and/or likelihood of disease development and ultimately aiding in disease prevention. However, to date, psychiatry is still in its infancy with respect to identification, replication, and most importantly, translation of viable biomarkers into routine practice that directly affects patient care.

This issue of Psychiatric Annals describes several promising biomarkers that have come closest to use in daily practice. First, in the article, “Impact of Medical Comorbidity in Biomarker Discovery for Major Depressive Disorder,” Dr. Andrew Czysz discusses the complex relationship between major depressive disorder and general medical comorbidities, and the potential ability for biomarkers to aid in better understanding the timing and course of these relationships. Next, in the article, “Mapping Immune System Dysfunction to Provide Clinically Actionable Biomarkers and to Understand Psychiatric Pathology,” Dr. Brittany L. Mason reports on recent data informing the relationship between immune function and psychiatric disease and treatments, and how inflammatory markers are associated with treatment response. Early but promising results of inflammatory markers, such as C-reactive protein, to inform treatment choice are discussed. Similar work has been ongoing in schizophrenia and psychotic disorders. Then, in the article, “Pathology-Congruent Biases as Biomarkers for Psychopathology,” Drs. Abram Davidov and myself focus on a particular type of attentional bias that serves as a representative example of the interface between cognition, emotion, and behavior. Such biases have been examined in conjunction with neuroimaging and neuropsychological techniques to offer information regarding treatment response, both generally (e.g., a greater likelihood of symptomatic remission) as well as potentially guiding specific treatment selection. There are many other promising cognitive biomarkers that are currently being studied in a similar fashion, including recent results obtained from the Bipolar & Schizophrenia Network on Intermediate Phenotypes study. Finally, in the article, “Personal Devices and Smartphone Applications for Detection of Depression,” Drs. Monica Ramirez Basco, Maria Kyrranini, and Fillia S. Makedon describe innovative work that will allow for real-time measurement of patient behavior that may guide detection of disease onset and/or relapse.

Although many informative biomarkers are actively studied in relationship to various psychiatric diseases,
these articles also highlight several factors that have challenged the ability for the field to advance. As multiple articles in this issue point out, our current approach to diagnosing psychiatric disease results in significant heterogeneity among patients with the same diagnosis. These high levels of heterogeneity have served as the impetus for the Research Domain Criteria\(^4\) as an alternative framework for disease characterization that focuses on shared biological and behavioral function. Biomarker investigation is an important aspect of this framework. Furthermore, although the field is moving slowly but surely toward elucidating meaningful biomarkers for clinical use, much of the work in this area has been hindered by nonspecific, unimodal examination in cross-sectional patient samples. Increased longitudinal, multimodal assessment (eg, the Texas Resilience Against Depression study\(^5\)) can better illuminate the relationship between brain and behavior function and psychiatric disease, and perhaps determine causality of some relationships. Importantly, novel analytic approaches that incorporate artificial intelligence and machine learning approaches can increase the likelihood of replication of early studies and potentially expedite integration of biomarkers into everyday care for psychiatric disease. Finally, innovative approaches using passive data monitoring and other real-world, real-time biomarkers can further enhance our understanding of how symptoms change across time and provide a novel ability to collect data in closer proximity to meaningful events.

Further study is needed to obtain greater specificity regarding the relationship between biomarkers and clinical outcomes, as well as more precise use of biomarkers in aspects of clinical care and disease monitoring within psychiatry. In the meantime, we are ever closer to using biomarkers, such as inflammatory markers, electroencephalogram signatures, and estimates of functional connectivity, to guide treatment selection, and we are making great strides in determining how many other blood-based, cognitive, and neural biomarkers can inform multiple aspects of psychiatric care.

REFERENCES