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Introduction

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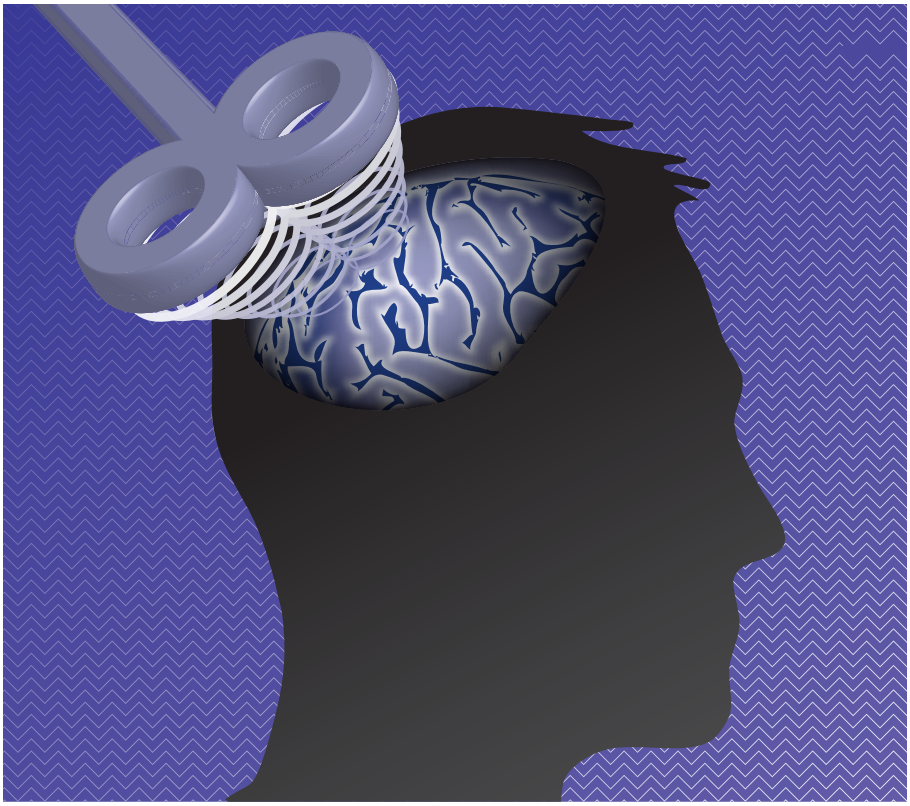

In this month's issue, we focus on innovation and new technologies in the field of psychiatry. In an interview, Dr. Sarah Lisanby outlines issues pertinent to the use of transcranial magnetic stimulation in treating unipolar depression and emphasizes the importance of residents broadening their knowledge in the area of device-based treatments. The benefits and barriers surrounding electronic medical record systems are highlighted in one article. In another interview, Dr. Bradley Peterson discusses innovation in autism research and underscores the interaction between genetic and environmental factors in the pathogenesis of autism spectrum disorders. There is no doubt that novel innovation and technology will continue to play an important role in the quality of care of the patients we serve.

> "Eureka!—I have found it!"
> —Archimedes

Interview with Sarah H. Lisanby, M.D.

Ada Ikeako, M.D.
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The following is an interview with Sarah H. Lisanby, M.D., on transcranial magnetic stimulation (TMS), conducted by Ada Ikeako, M.D. Dr. Lisanby is Professor of Clinical Psychiatry and serves as Chief of the Division of Brain Stimulation and Therapeutic Modulation, Columbia University and New York State Psychiatric Institute. Dr. Lisanby is also Chair of the American Psychiatric Association Task Force on ECT; the President of the International Society for Transcranial Stimulation; and Past President and Fellow of the Association for Convulsive Therapy. She has authored and co-authored more than 150 published works, including research articles and books, on TMS, ECT, depression, and related topics. Dr. Ikeako is a fourth-year psychiatry resident at Columbia University, Harlem Hospital Center; Chair of the Residents and Fellows Committee (Members-in-Training) of the New York State Psychiatric Association; and the Editor for this issue.

Dr. Ikeako: What is transcranial magnetic stimulation (TMS)?

Dr. Lisanby: TMS is a noninvasive way of stimulating the brain. It represents a unique way of probing brain behavior relationships and is one among a growing number of novel device-based therapeutic interventions in psychiatry. It is the most recently approved device-based treatment (NeuroStar TMS Therapy system [Neuronetics, Inc., Malvern, Pa.] approved by the Food and Drug Administration [FDA] in October 2008) and offers the excitement of a novel therapeutic approach for psychiatric illnesses.

Dr. Ikeako: How does it differ from ECT or deep brain stimulation?

Dr. Lisanby: TMS and deep brain stimulation are subconvulsive [treatments] that share in common focal stimulation of the brain using electrical fields. However, TMS is noninvasive, superficial, and achieves stimulation magnetically through lateral regional areas of the cortex. Deep brain stimulation induces stimulation directly [and] electrically into deeper brain targets. ECT also stimulates the brain electrically, but [it] induces a seizure.

Dr. Ikeako: What are the indications for TMS?

Dr. Lisanby: TMS is FDA approved for the treatment of unipolar depression in a patient [who] has failed to respond to a single antidepressant trial in the current episode. The FDA label is narrow in this fashion because it was based on studies that indicate that TMS is more beneficial in less refractory depression and is more likely to work when depression is less resistant and earlier in the course of illness

> "I am looking for a lot of men who have an infinite capacity to not know what can't be done."
> —Henry Ford

Dr. Ikeako: How is TMS implemented?

Dr. Lisanby: It is used in the outpatient setting. It is an office-based procedure that involves the administration of a targeted magnetic field over the left dorsolateral prefrontal cortex, one of the areas implicated in depression. Treatments last for about 40 minutes and are given daily over a period of 4 to 6 weeks.

Dr. Ikeako: What are the side effects or risks associated with TMS?

Dr. Lisanby: TMS carries a risk of seizure; therefore it should be given in a medical setting by individuals trained in the recognition and treatment of seizures. When used within safety guidelines, it is generally safe and well tolerated.

Dr. Ikeako: What challenges do you face in the use of TMS?

Dr. Lisanby: The major challenge in this field is determining how TMS should best be added to treatment algorithms and how to augment response.

Cost Saving Innovation: The Electronic Medical Record

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In a 2006 data summary from the Centers for Disease Control and Prevention National Center for Health Statistics (1), less than 10% of physicians in the United States reported utilizing a complete electronic medical record system, with the following four basic functions deemed minimally necessary for a comprehensive system: computerized orders for prescriptions, computerized orders for physical examinations, computerized reporting of examination results, and computerized physician notes.

> "A penny saved is a penny earned."
> —Benjamin Franklin

In the field of psychiatry, few psychiatrists currently utilize an electronic medical record system (2). In creating comprehensive systems, coded terminology defined in DSM-IV and ICD is crucial to the structuring of data for interchange and storage. This specialized coding has presented challenges in the implementation and use of these systems. In addition, the different ways in which psychiatrists document the care and status of their patients may present some discord in an effort to establish a complete system. For example, treating patients in group therapy often makes post-visit documentation burdensome. Also, the nature of the therapeutic alliance in psychiatry usually mandates eye contact with a patient during a visit, in which case, a physician documenting notes electronically during a therapy session may prove to be distracting, and waiting until later to document notes in order to prioritize a good doctor-patient alliance would distort the timeline of the record. Psychiatrists must also deal with the fact that the portions of their patients' medical records regarding mental illness need to be kept private, although physicians of other specialties are permitted to view prescription information (2).

Earlier this year, the Obama Administration set aside funds in stimulus money for electronic medical record programs, with the goal of freeing healthcare workers from a paper-based system by 2014. The potential cost savings from these programs has been postulated to be billions of dollars. Stimulus funds will be used to reward those who have already installed an electronic medical record system and provide money to hospitals and physicians who implement a system. The first round of grants is being funded by the American Recovery and Reinvestment Act of 2009 and will be made available in 2010. However, a number of issues have yet to be resolved. Future payments to healthcare providers will depend on their showing "meaningful use" of electronic records, which has thus far not been defined (3). State governments would also penalize those who fail to upgrade systems.

The benefits of electronic medical records include a decrease in medication errors, with checks of medication dosage and drug interaction analysis, as well as decreased transcription errors. Electronic systems can help physicians in the evaluation of treatment effectiveness and aid in the management of consumer relations as well as detection of fraud and abuse (4). Also, access to health records from multiple sites can occur simultaneously.

Barriers to electronic systems include the fact that they are difficult to construct because existing electronic data sources are not integrated and often contain various levels of granularity, coding, and structure. In addition, upfront costs for hardware and software and training and recertification of healthcare workers have hampered the widespread use of these electronic records. Moreover, security, ethical, and privacy concerns must be addressed.

Possible solutions to barriers include education and training in the use of electronic medical record systems, focus on technical and interoperability standards as well as clear rules and guidelines in governing the secure and ethical exchange of patient information, and appropriate management of organizational change through healthy dialogue and bidirectional communication.

Dr. Ikeako thanks Kevin Cotterell, M.D., Director of the Department of Psychiatry at Harlem Hospital Center, for mentorship on the article topic.

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Interview with Bradley Peterson, M.D.

Ada Ikeako, M.D.
Department of Psychiatry, Columbia University, Harlem Hospital Center

The following is an interview with Bradley Peterson, M.D., on "new developments in autism research," conducted by Ada Ikeako, M.D. Dr. Peterson is Chair of the Department of Child and Adolescent Psychiatry at Columbia University and New York State Psychiatric Institute and Chair of the American Academy of Child and Adolescent Psychiatry (AACAP) New Research Poster Subcommittee of the Program Committee. He is also Professor of Psychiatry and a Founding Director of the Magnetic Resonance Imaging Research Unit at Columbia University; Assistant Editor of The Journal of the American Academy of Child and Adolescent Psychiatry*; and the recipient of numerous awards, including an AACAP Charter Leadership Award, Society of Biological Psychiatry Dista Fellowship Award, AACAP Presidential Scholar Award for Research, and AACAP Robinson Cunningham Award for best original research paper. Dr. Ikeako is a fourth-year psychiatry resident at Columbia University, Harlem Hospital Center; Chair of the Residents and Fellows Committee (Members-in-Training) of the New York State Psychiatric Association; and the Editor for this issue.*

Dr. Ikeako: What is new in autism research?

Dr. Peterson: There have been several recent advances in the study of autism. One is a major push in the field of genetics within the United States, as well as worldwide, to understand the genetic basis of autism. This field has accelerated in the last 5 years, and we now find that genes account for more than 12% of cases of autism that exist worldwide. This was not previously known.

Dr. Ikeako: What are the roles of these genes in the etiology of autism?

Dr. Peterson: These genes produce autism through single gene mutations, each one accounting for only a small percentage of cases. These advances in identifying the genetic origins of autism will likely continue, brick-by-brick, gene-by-gene, as more and more genes are identified progressively over time. We don't know yet what percentage of cases of autism ultimately will be accounted for by these single gene mutations, but we do know that each of these isolated genes has a major effect [and] are rare. Whether more common genetic variations…account for any portion of cases [of] autism is unknown, but if they do, they…likely produce autism in an additive fashion in which genes A+B+C—possibly in combination with the additive effects of one or more environmental factors (D+E+F)—together produce autism. This is a theoretical possibility at present that needs to be tested in very large data sets involving thousands of individuals.

Dr. Ikeako: How do these gene mutations cause autism?

Dr. Peterson: Most of the genes discovered thus far that produce autism-related disorders have in common a role in the migration of neurons or the formation of synapses during brain development. These are the two processes necessary to prepare a brain to learn. The neural basis of learning is at the synapse, and anything that disrupts the formation of synapses or that disturbs the migration of neurons that [are] a prerequisite for the formation of synapses will potentially impair learning and memory. Impairments in one or more of the multiple learning and memory systems in the brain may contribute to the development of autism, with the particular learning systems involved dictating the specific symptom profile and individual phenotype that a given person with autism displays.

Dr. Ikeako: Can these disturbances in learning and memory that you have described be seen on imaging studies?

Dr. Peterson: Imaging studies suggest that the brain regions that are abnormal in persons with autism are the same as those that support various forms of learning. There are relatively independent neural systems [that] when affected in varying combinations may produce…different combinations of symptoms across different individuals.

Dr. Ikeako: What are some of these learning and memory systems?

Dr. Peterson: These include the amygdala, which is responsible primarily for emotional learning, and the hippocampus, which supports declarative memory for conscious factual knowledge. They also include the cerebellum, which supports conditioned motor learning, and the basal ganglia, which subserves stimulus-response learning and memory for repetitive thoughts and movements.

Dr. Ikeako: Is there some link between genetic and, maybe, environmental factors implicated in the etiology of autism?

Dr. Peterson: Yes, identifying the genes that cause autism enables us to create transgenic animal models for autism. These animal models permit us to study the molecular and cellular effects or consequences of those genes. They also allow us to study more effectively the interactions of genes with environmental influences in causing autism or in determining disease severity. We know the interactions of genes with environment is important in the pathogenesis of autism, but the nature and extent of that interaction is under study.

Dr. Ikeako: Is there any new breakthrough in treatment?

Dr. Peterson: By identifying these mutated genes and their molecular consequences, new molecular therapies are being developed. There are promising new leads in therapy…identified in animal models for autism-related disorders that are now being studied for their effectiveness in humans.

"Nothing in life is to be feared. It is only to be understood."—Marie Curie

A Day in the Life of a Research Fellow: Training to Become an Innovator

Ragy R. Girgis, M.D.
Department of Psychiatry, College of Physicians and Surgeons, Columbia University and New York State Psychiatric Institute

I am currently a first-year fellow in schizophrenia research, having just finished my general adult psychiatry residency. I am using this fellowship specifically to learn the techniques of clinical trials and positron emission tomography (PET) in schizophrenia treatment and research, with my ultimate objective being to use these methodologies to develop novel medications. Typically, every morning begins when I check my e-mail and log onto the manuscript submission website of the journal to which my mentors and I recently submitted a secondary analysis of a clinical trial in schizophrenia. This was a project that I began during residency. While my focus during residency was on becoming a proficient clinician, I had developed an interest in psychiatric research during medical school and knew that I wanted to incorporate some research into my residency training. Fortunately, I met my current mentors who took an interest in my research training and were highly experienced as mentors. They offered me important projects on which I could work during my residency without impinging upon my clinical duties. These types of projects often take the form of secondary data analyses (1).

> **"If I have seen further it is by standing on the shoulders of giants." —Isaac Newton**

All of the first-year fellows attend a statistics class one morning each week, which is where I am off to next. This is a highly educational and important part of our curriculum as research trainees and is one of several once-weekly classes we will have throughout the year.

I go straight to the PET suite, from class, to place the arterial line for our PET scan today. A skill I never believed that I would use beyond internship, arterial line placement adds a welcome diversity to my day. Following this are a few brief meetings with potential comparison subjects to screen for PET research and another trip to the PET suite to administer the radiotracer for the scan.

After eating a quick lunch with a co-fellow and talking about our experiences as research fellows, I am off to my favorite activity of fellowship: meeting with my mentors and several other senior faculty members to review some recently acquired data. The data are from the first phase of a clinical trial we have begun of a novel treatment to promote cognitive enhancement in schizophrenia. This study is a proof-of-concept, efficacy clinical trial, which means that while this particular experimental medication may never reach the market, the results from the study will contribute greatly to our understanding of the theoretical framework on which this medication was based and potentially lead to other medications that can eventually be used to treat schizophrenia. This study incorporates my interests in both PET imaging and clinical trials with experimental therapeutics and serves as the foundation for my research training during my fellowship. As the most junior attendee at the meeting, I am contributing to the discussion in my role as fellow and also learning a great deal about interpreting data, the details of the science behind our intervention, choosing a rational study design, and proper communication with regulatory agencies and the Institutional Review Board, as well as a number of other issues. Our discussions about how to design a trial that will capture the effects, if any, of this medication on cognition in schizophrenia reveal to me the complexity, challenge, and thrill of innovation.

After our meeting, I spend some time doing analyses on recently acquired data and then finish the day seeing a few patients who are participating in our clinical trials.

Early involvement in research is an important part of encouraging physicians to go into research (1). Further, physician researchers need at least 2 years to establish an independent and successful research career (2). It may be particularly important to allow trainees early exposure to research given the numerous reasons for which physicians may not be able to participate, including educational debt and lack of adequate mentorship. The Institute of Medicine (3) further identified these potential obstacles to psychiatrists entering research careers, particularly patient-oriented careers, as well as the importance of clinical innovation. This led to the development of several task forces created with the goal of developing and implementing steps by which to increase the psychiatric researcher workforce. Fully funded research fellowships are one means by which these goals are being met.

I end the day the same way that I began it: checking the manuscript submission website as well as my e-mail messages. I receive an intriguing e-mail message requesting that I write about a typical day as a research fellow. I think about how I will begin and begin to type: "I am currently a first-year fellow in schizophrenia research…"

Dr. Girgis is a first-year fellow in schizophrenia research at Columbia University. Address correspondence to Dr. Girgis at rg2290@columbia.edu (e-mail).

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Resident's Guide to Clinical Psychiatry: A Book Review

M. Nadeem Mazhar, M.D., F.R.C.P.C., M.R.C.Psych.

Resident's Guide to Clinical Psychiatry is a valuable addition to the books that we psychiatry residents can carry around. This book contains most of the essential, practical information that an intern requires. I appreciated the suggested history and physical style, with inclusion of a section on the psychiatric review of systems. However, the suggested histories and physicals could have been improved by also including a physical review of systems. The mental status examination presented could have been better clarified, but the tabulated neurological examination (p. 10) is concise, practical, and easy to read. The sections on seclusion and restraint orders (p. 24), privacy, confidentiality and informed consent (p. 26), and patient termination (p. 28) contain useful information as well. Residents on consultation liaison rotations are likely to find the section on assessing competency and decision making (p. 186) pertinent and practical to very common consultation issues.

The chapter on psychotropic-induced dermatological crises in psychiatric emergency situations is particularly impressive. However, neuroleptic malignant syndrome, one of the most serious psychotropic-induced emergencies, is not mentioned in this particular chapter. This syndrome is later described in the chapter on pharmacotherapy as a side effect of antipsychotic medication. Since neuroleptic malignant syndrome is such a serious condition, it would have been better to have included it in the chapter on psychiatric emergencies, with a more detailed description.

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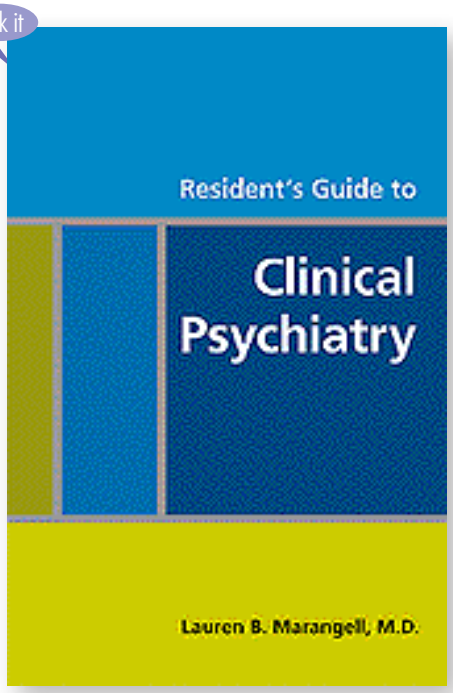

Resident's Guide to Clinical Psychiatry, *by Lauren B. Marangell, M.D. Arlington, Va., American Psychiatric Publishing, 2009, 410 pp., $44.95.*

The book's description of issues related to child psychiatry is remarkable. The chapter on developmental milestones is a bonus for a book of this size. The section on pharmacotherapy in treating attention deficit hyperactivity disorder is adequate for a child psychiatry fellow.

The chapter on pharmacotherapy, while useful overall, does not mention long-acting injection risperidone among the injectable long-acting antipsychotics. It would be worthwhile to include this treatment in a subsequent edition of the book.

Overall, I highly recommend this book for psychiatry residents starting their training.

Dr. Mazhar is a fourth-year psychiatry resident and former Chief resident in the Department of Psychiatry, Southern Illinois University School of Medicine, Springfield, Ill.