

CROSSROADS

THE OFFICIAL NEWSLETTER OF THE PREMED SCENE



SPECIALTY SPOTLIGHT

NUCLEAR MEDICINE

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Dear medical newsletter readers,

Wishing all of you the happiest July! I hope your summer month has been going smoothly and has been filled with ice cream, beach trips, and relaxation. Featured in this article are some of the most recent and interesting advances in the world of medical research. First up, Adeb Mukul focuses this month's Specialty Spotlight on the field of nuclear medicine. Her next article addresses the ethical issues behind kidney donations. Next, Evonna Chisom talks about an interesting HIV treatment option. After, Siri Nikku focuses on the varying racial disparities in treatment of mental health. Finally, Ilana Saidov talks about how AI can be implemented in the field of neuro-ophthalmology.

There is so much new research to learn about this month! Please enjoy reading The Premed Scene's July 2022 Medical Newsletter! Till next month.

Aprile Bertano

SPECIALTY SPOTLIGHT: ☢ NUCLEAR MEDICINE ☢

Adeba Mukul

Reading the title of “nuclear medicine” conjures up images of hazmat suits, flashing warning signs, and futuristic tales of horror. In reality, nuclear medicine is an often overlooked specialty where physicians use radiopharmaceuticals (drugs that emit radioactivity) to diagnose and treat diseases like hyperthyroidism, thyroid cancer, solid tumors, hematologic malignancies, or painful bone metastases. Nuclear medicine radiologists, or nuclear radiologists, complete a four-year residency program after medical school and may also continue their education with one or more years of nuclear medicine training.

Under the umbrella of nuclear medicine professions fall nuclear pharmacists, nuclear medicine physicists, and nuclear medicine technologists. While all of these professions are imperative to the field of nuclear medicine, it is only nuclear radiologists that attend medical school. Nuclear medicine is a specialized subset of radiology, which is the diagnosing and treating of diseases with medical imaging procedures like x-rays, computed tomography (CT), magnetic resonance imaging (MRI), and ultrasounds. Nuclear radiologists use different techniques, when compared to radiologists. Radiologists use methods like radiography and nuclear radiologists utilize scintigraphy, positron emission tomography



(PET), isotopic imaging, and in-vitro procedures.

Interestingly enough, despite the daunting name, patients actually receive less radiation from nuclear medicine procedures than from x-rays. The field of nuclear medicine is one that is constantly evolving. New research has turned molecular imaging into a topic of interest. In the future, nuclear medicine might be the new x-ray - perhaps an injection of a radiopharmaceutical will be a part of a routine physical examination.

Works Cited:

<https://www.radiologyinfo.org/en/info/professionals-nuclear-medicine>

<https://www.acr.org/Practice-Management-Quality-Informatics/Practice-Toolkit/Patient-Resources/About-Radiology>

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WHO COMES FIRST? A NEW TAKE ON THE DONOR KIDNEY DEBATE

Adeba Mukul

For eligible patients with end-stage kidney disease (ESKD), preemptive kidney transplant with either a live donor kidney or a deceased donor (DD) kidney is associated with better results because it "avoids the morbidity and mortality associated with declining kidney function and the institution of dialysis." Because of this, DD organs often go to the preemptive waitlist, which is disproportionately made up of white, well-education individuals who have private insurance. However, patients who are already received dialysis are left in the lurch in terms of DD organs. There are several ethical concerns tangled up in this issue, but objectively speaking, there should be an assessment of the net positive of allowing the preemptive waitlist to receive DD organs first. Researchers at Dalhousie University in Halifax, Nova Scotia, Canada did exactly that.

By using data from the 2020 US Renal Data System, a medical decision analytical model was used to calculate patient survival among 4 patients with similar characteristics; two were preemptive waitlisters and two were dialysis patients (less than a year). They found that the net positive came out of patients who were on dialysis for 4+ years receiving a DD organ first and the ideal time to transplant a patient is *right* before they need dialysis (which is not always the case for those on the preemptive waitlist). The findings of this study provide an interesting look on the debate about kidney waitlists and raises another question - are preemptive waitlists really necessary and who exactly are they benefiting?

Works Cited:

Kiberd BA, Tennankore KK, Vinson AJ. Comparing the Net Benefits of Adult Deceased Donor Kidney Transplantation for a Patient on the Preemptive Waiting List vs a Patient Receiving Dialysis. *JAMA Netw Open.* 2022;5(7):e2223325. doi:10.1001/jamanetworkopen.2022.23325



VIABLE TREATMENT TO CURE H.I.V.?

By Evonna Chisom

Umbilical cord blood may have the potential to cure those suffering from metabolic diseases, immune deficiencies, and cancers. A recent transplant method involving umbilical cord blood opens up possibilities to cure people of diverse racial backgrounds, now made possible. The third person to be cured of HIV was a woman of mixed race who was given a cord blood transplant. HIV is a human immunodeficiency virus that attacks the body's immune system. HIV can lead to AIDS (acquired immunodeficiency syndrome) if not treated. There is currently no cure for this life-threatening condition, but this may change soon!

Core blood is from an umbilical cord, a source of stem cells; these cells can potentially treat diseases like cancer and have become more widely available in recent years. The most recent patient who had leukemia received cord blood to treat her cancer rather than the typical bone marrow transplant. Instead, the cord blood was from a partially matched donor, a close relative of the patient. Based on the researcher's findings, this new case's sex and racial background marked a significant step forward in developing a cure for HIV.

For instance, the fact she is of mixed race and a woman is essential scientifically and in terms of the community impact. HIV infects both men and women, though the progression occurs differently in the sexes. Worldwide, nearly 38 million people living with HIV. Powerful antiviral drugs can control HIV, but about 73 percent of them revive treatment. Bone marrow transplants aren't a realistic option for most patients, and the transplant is often invasive and risky.

Apart from the female patient, there have been known cases of an HIV cure among two men. The most significant difference was that the men had bone marrow transplants which caused harsh side effects on their immune systems. In contrast, the woman in the latest case has not suffered any ailments that previous cures left. For this reason, umbilical stem cells are appealing. It's unclear why cord blood works so well; possibilities range from the capability of adapting to a new environment, such as with newborns.

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RACIAL DISPARITIES IN MENTAL HEALTH TREATMENT FOR CHILDREN, ADOLESCENTS, AND ADULTS IN THE US

By: Siri Nikku

Mental health disorders and treatment for such have been a prevalent issue for children and young adults in the United States. However, there is a racial element that causes disparities in the amount of treatment and hospitalization. The statistics from this study came from national data from the 2006-2012 Medical Expenditure Panel Surveys (MEPS), which was conducted by the National Center for Health Statistics (NCHS).

Some psychiatric issues can lead to impaired judgment, leading to adolescents being incarcerated and suffering from substance abuse and/or mental illness. Minority adolescents have higher rates of being suspended from school, incarcerated, and arrested. Of the youth incarcerated, many of them suffer from mental illness, implying that not having proper mental health services could be correlated to them being incarcerated. Participants of different races/ethnicities and family incomes were observed to see any patterns.

One observation of the study was that many of the people of color (POC) and lower-income youth were not insured or had Medicaid and more than half of the POC youth were in households 200% below of the poverty line. On the other hand, non-minority youth were in all categories of income and most of them were privately insured. Looking at mental health visits, black and Latine kids, respectively, made 37% and 49% less visits to the psychiatrist and, respectively 47% and 58%, to mental health providers.

For young adults from ages 18 to 34, mental health visits were 68% lower for black people and 62% less for Hispanics than white individuals. Hispanic and black young adults had lower inpatient and emergency department use rates than white people as well.

POC and people with lower income have not been having as much visits for mental health treatment. There are various reasons for why being a minority child, youth, or adult has led to less mental health help such as cultural norms causing minority individuals to not seek formal care and primary care physicians not referring or recognizing the patients have mental health issues. There is also more punishment for children of color with black children having higher rates of expulsion, suspension, and detained more. There have been previous studies proving that treating children and adolescents from a young age and giving them proper mental health treatment leads to less incarceration rates for minority youth in particular.

Sources:

Marrast, L., Himmelstein, D. U., & Woolhandler, S. (2016). Racial and Ethnic Disparities in Mental Health Care for Children and Young Adults: A National Study. *International Journal of Health Services*, 46(4), 810–824.

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THE POWER OF ARTIFICIAL INTELLIGENCE IN NEURO-OPHTHALMOLOGY

By Ilana Saidov

The integration of artificial intelligence into neuro-ophthalmology has transformed the way physicians can diagnose and treat complex ocular cases. The specific applications of artificial intelligence include collecting and interpreting data that allow physicians to diagnose and treat their patients in a fast and accurate manner.

AI is used in multiple areas of improving ocular care such as "detecting structural and functional optic nerve abnormalities and ocular movement disorders". In addition, it has been used to analyze large datasets of fundus photography, optical coherence tomography (OCT), and automated perimetry. This technology serves as a major tool for detecting ocular conditions such as diabetic retinopathy, glaucoma, and macular degeneration.

Recently, AI has been used to detect disorders relating to eye movement. Eye movements are influenced by motor cranial nerves and cortical control. Any disruption to the motor pathway can cause a multitude of uses such as ocular misalignment, gaze abnormalities, and nystagmus. While these issues can be detected with various clinical tests, they require an ophthalmologist to have an array of specialized skills. In these cases, it is useful to utilize AI-Techniques that have been developed to model ocular motor data as well as detect strabismus and congenital nystagmus. It is imperative to note that the applications of AI techniques are not limited to only one disorder. In addition to eye movement disorder detection, AI can be used to explore optic nerve function, strabismus abnormalities, and glaucomatous.

Source: Leong YY, Vasseneix C, Finkelstein MT, Milea D, Najjar RP. Artificial Intelligence Meets Neuro-Ophthalmology. *Asia Pac J Ophthalmol* (Phila). 2022;11(2):111-125. doi:10.1097/APO.0000000000000512



Overall, AI offers an array of useful systems that automate complex diagnostic procedures for neuro-ophthalmic conditions. The use of AI has assisted ophthalmologists in monitoring diseases and creating personalized treatments from their ocular examinations. In the future, AI can be used in long-distance clinical investigations, promoting tele-neuro-ophthalmology as a feasible healthcare system.