TEXAS NEUROLOGICAL SOCIETY WINTER 2021

Broca's Area

The Voice of Texas Neurology

President's Message

Gary D. Clark, MD

I hope that everyone appreciates what a gem the Texas Neurological Society is.

We recently had an American Academy of Neurology facilitated call with the leadership of other state neurological organizations. Ky Camero, our incredible manager, presented the successful hybrid meeting that we had this summer, the impressive membership numbers, our two meetings annually, Broca's, TNS grants, our political advocacy, and the committed membership. Needless to say, TNS was the envy of every state organization that participated in that call.

Our summer meeting was the first hybrid (in person and virtual) meeting of our organization and by all measures was very successful (finances, educational program, and importantly in a pandemic, not a super spreader event). Our usual summer meeting has 100 people in attendance which we achieved for this meeting. In addition, we had 50 attendees by video live connection. Enthusiastic vendors were eager to meet with attendees. Thanks to their sponsorship, the additional 50 member attendees and a great educational program, the Texas Neurological Society had its best financial success for a summer meeting.

Our membership is 1000 neurologists, and while this is the largest state neurological society, only about 70% of Texas neurologists are members. We have academic, private practice, resident and emeritus members – the whole spectrum. We have challenges as neurologists; this is the best organization in the state to advocate for our profession, our patients, our colleagues and ourselves.

The Society is on a firm financial footing. Our meetings, while costly to produce (especially hybrid meetings), do have a margin, and this summer's hybrid meeting was our best financial margin we have had. I believe that the hybrid format is the meeting of the future, and we need to explore using the recorded content as online, on demand Continuing Medical Education material. As a society, we have reinvested in the future of neurology through grants, advocacy, education and lobbying. There were big wins for us in the past legislative session (preauthorization exemption for physicians with a proven track record and fairness for our physician scientists in the medical licensure process in Texas). Regarding the physician scientist licensure, the winter pediatric session will be a bit of a victory lap showcasing some of the MD, PhD talent in Texas, including some who have already been able to get a license because of the changes to the law that we advocated for.

Finally, while in an elevator during the summer meeting, a professional appearing woman noticed my name tag with the placard "President." She asked if I knew what the best position in an organization was. She said "Past President!" She appeared to have been in enough board rooms to know, so I have to trust her on this. But I must admit, this year has been incredible, and it is an honor to serve this great organization. Eddie Patton, our President-Elect, will begin his tenure during the February meeting. He will be helped by Ky Camero, the most capable manager of any organization that I have worked with in a leadership position; we are fortunate to have her.

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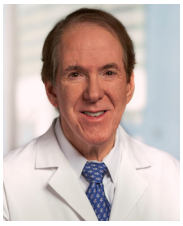

Editor's Notes

Randolph W. Evans, MD

I thank our officers and other contributors for their excellent submissions to this issue. We look forward to seeing you (hopefully in person but we'll have a hybrid meeting) at the TNS 25th Annual Winter Conference from February 4-6, 2022, at the Hyatt Regency Austin. Ann Bass, program director, Erin Furr-Stimming, committee chair, and the education committee have planned an excellent program.

BATTLE'S SIGN, STIGLER'S LAW, AND EVANS' LAW

Battle's sign is ecchymosis around the mastoid process due to a petrous temporal bone fracture which may take 1-3 days to develop.

William Henry Battle (1855-1936) was an English surgeon who described this finding in a lecture in 1890 which had been previously described by Sir Prescott Hewett as Battle credited (Tubbs RS, Shoja MM, Loukas M, et al. William Henry Battle and Battle's sign: mastoid ecchymosis as an indicator of basilar skull fracture. J Neurosurg. 2010 Jan;112(1):186-8. Battle extended the observation by describing the detailed anatomy of the hemorrhage. Battle was the first to report a laparotomy to relieve bowel obstruction caused by postoperative adhesions.

This is an example of Stigler's law of eponymy that no discovery in science is ever named for its primary originator proposed by statistician, Stephen Stigler, in 1980.

Think of Guillain- Barré or Wardrop-Ollivier-Landry-Guillain-Barré Strohl (Wijdicks EFM, Ropper AH in Koehler PJ, Bruyn GW, Pearce JMS (eds). Ch 34. The Guillain- Barré Syndrome. Neurological Eponyms, OUP, 2000).

This is also an example of what we might call Evans law of "was that really their name?" Two examples. Sir Henry Head (1861-1940) was an English neurologist best known for mapping dermatomes with Campbell from patients with zoster (Schott GD. Henry Head, herpes zoster and the graphic development of his 'scheme of the dermatomes in man'Journal of Neurology, Neurosurgery & Psychiatry 2017;88:789-793). He was editor of "Brain" for 15 years.

Lord Russell Brain (1895-1966) was another English neurologist and author of the standard textbook, "Brain's Diseases of the Nervous System," and editor of "Brain" for 12 years.

HENRY VIII'S TRAUMATIC BRAIN INJURIES

You remember Henry VIII (1491-1547), King of England (1509-1547) for his break with the Roman Catholic Church and his 6 wives. Historians have been perplexed by his later life changes starting perhaps in 1536 with cognitive impairment, explosive anger, problems with impulse control, and depression (Ikram MQ, Sajjad FH, Salardini A. The head that wears the crown: Henry VIII and traumatic brain injury. J Clin Neurosci. 2016 Jun;28:16-9). He had post-traumatic migrainous headaches starting in 1524 which became more frequent in 1531.

There have been a number of hypotheses for these changes including Cushing's syndrome, diabetes, hypothyroidism, syphilis, and McLeod syndrome.

In 1931, Chamberlain proposed head injuries as the cause (Chamberlin, Frederick Carleton. The private character of Henry the Eighth. John Lane, 1932) which is consistent the known clinical history (Galassi FM, Habicht ME, Rühli FJ. Henry VIII's head trauma. Lancet Neurol. 2016 May;15(6):552).

In 1542, Henry fell off his horse and was dazed when a jousting lance went into his open visor and broke into pieces. He developed recurrent headaches following.

In 1525, he may have been dazed or unconscious when he tried to vault a hedge with a pole that broke while hawking.

On January 24, 1536, his horse charged so quickly that he fell off his horse while jousting. The horse fell on top of him and he was unconscious for 2 hours. The tiltyard (jousting yard) was recently discovered at the long-gone Greenwich Palace (where he and his daughter Elizabeth I were born) (Geggel L. Jousting yard where Henry VIII nearly died just discovered 5 feet under. Live Science. Nov 5, 2020 (available here.) At that time, he was married to his second wife, Anne Boleyn. In April, he accused her of adultery and had her beheaded in May.

We know that the effects of mild traumatic brain injury (TBI) can be cumulative and that after a single episode of moderate TBI, about 35% of people will have permanent cognitive impairment and many will have affective disorders and changes in personality. Chronic traumatic encephalopathy is a possibility.

Henry was handsome and fit in his early 20s with a waist size of 32 inches and BMI of about 26 (Ashrafian H. Henry VIII's obesity following traumatic brain injury. Endocrine. 2012;42(1):218-9). He had significant weight gain after the 1536 TBI at age 44. His waist size was as follows: age 45, 37 and age 50, 57 inches. At age 56, his BMI was about 50. Ashrafian hypothesizes that this weight gain was due to post-traumatic growth hormone deficiency.

MUHAMMAD ALI AND POST-TRAUMATIC PARKINSON'S

For those of you who haven't seen it, I highly recommend Ken Burns' brilliant 4 part documentary, "Muhammad Ali," which covers his life and the zeitgeist (available on PBS streaming). Ali probably had post-traumatic Parkinson's diagnosed at age 42 (although the onset was years earlier judging by the change in his speech) and characterized by tremor, bradykinesia, and hypophonia (Krauss JK. Movement disorders secondary to craniocerebral trauma. Handb Clin Neurol. 2015;128:475-96). Knowing that the severity of post-traumatic Parkinson's correlates with the length of the boxing career and the number of bouts, it is painful to watch the many blows to the head he sustained as he continued boxing way past his prime.

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Business of Medicine

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TNS Legislative Update: Prior Authorization Reform

By Tom Holloway, TNS Lobbyist and Dr. Sara Austin, TNS Legislative Affairs Chair

During the recent legislative session, Texas lawmakers took aim at one of the most frustrating and time-consuming aspects of operating a modern medical practice: the prior authorization process.

According to a 2020 survey of Texas physicians, 85% said prior authorization was unnecessarily delaying access to care for their patients, 81% said it impeded the continuity of ongoing care, and 78% said it led patients to abandon their recommended course of treatment altogether. Too often, this burdensome and inefficient process is frustrating patients and physicians alike, ultimately resulting in countless hours of wasted staff time and diminished health outcomes for those who need treatment without delay.

In an attempt the improve and refocus the prior authorization process, Representative Greg Bonnen, MD (neurosurgeon) and Senator Dawn Buckingham, MD (ophthalmologist) authored House Bill 3459, also known as the "gold carding" bill. HB 3459 would allow physicians to earn a continuous exemption from prior authorization requirements on all state-regulated health plans by earning approvals on at least 90% of their preauthorizations for a given treatment or procedure over a six-month period.

The reasoning behind this "gold carding" legislation is straightforward enough: by exempting the most experienced and responsible physicians from prior authorization requirements on procedures for which they are commonly approved anyway, it allows patients to receive treatment more quickly and seamlessly while allowing health plans to focus their resources on providers with a less consistent track record.

HB 3459 faced vigorous opposition from the Texas Association of Health Plans (TAHP), who argued the bill would limit their ability to hold providers accountable and prevent them from controlling costs for unnecessary treatments. Despite efforts by the TAHP lobby team to weaken or kill the legislation, HB 3459 ultimately won broad, bipartisan approval in both the House and Senate before being signed into law by Governor Greg Abbott.

State-regulated health plans subject to HB 3459 include certain HMO and PPO plans purchased on the state exchange, exclusive-provider benefit plans, Employees Retirement System of Texas (ERS), and Teacher Retirement System of Texas (TRS), but notably does not include most employer-based multi-state health plans exempted from state regulation by federal law (the Employee Retirement Income Security Act of 1974 or ERISA). Additional legislation from the U.S. Congress would be required to apply the "gold carding" provisions to the remainder of commercial health plans.

The Texas Department of Insurance is currently engaged in the final rulemaking process to determine how to implement the new law before it goes into effect on January 1, 2022. TNS expects to publish additional guidance on how to take advantage of the new "gold carding" provisions as soon as they are made available.

Save the Date

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In Memory of

Walter Flynn Buell, MD

Dr. Buell was a Past President of TNS and Lifetime Achievement Award Winner, a longtime prominent San Antonio Neurologist.

Col. James Edward Garrison, III, MD

Dr. Garrison was a Past President of TNS and a longtime San Antonio neurologist.

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Resident Poster competition

TNS invites residents to participate in the Annual Poster Competition.

Prizes will be awarded for 1st, 2nd, and 3rd place in the amounts of $1000, $500 and $250, as well as certificates.

Application Procedures & General Rules:

TNS Membership: Neurology Residents and Fellows must be members of TNS (or submit an application)

Registration: All participants must register for the TNS 2022 Winter Conference by January 11, 2022.

Posters should include:

- **Title:** Simple title representing the key element(s) of the study, in very large font
- **Authors:** Write authors full names with middle initials in large font. Indicate each author's highest degree (e.g., Ph.D., M.D.). A comma should be used to separate authors.
- **Affiliations:** Complete names and locations of the institutions where the work was done.
- **Main body:** Use large text and legible figures to describe the work. Use standard scientific outline with headings for Background, Methods, Results and Discussion/Conclusions.
- **References:** References should be cited parenthetically in the text by author and year of publication, for example (Fisher et al., 2011). Limit of 3 references per poster.
- One presentation per resident per competition

TNS will print all posters at the cost of $25 per entry to be collected when registering for the conference.

Applications can be found on the TNS website.

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The True Quill About the Discovery of the L-DOPA Treatment of Parkinson's Disease

Bernard M. Patten, AB, MD, FACP, FRSM, FTNS, FAAN
Freelance Scholar

The year 1966 marked the acceptance for publication in the New England Journal of Medicine the landmark paper by Doctor George C. Cotzias on the modification of Parkinson's Disease by administration of aromatic amino acids. That paper got Cotzias the Lasker Award in 1969 and election to the National Academy of Science and proved what was considered a hopeless degenerative disease of the nervous system could be helped by giving the patient a brain chemical – in this case L-DOPA.

In 1963, two years before the actual discovery, George Cotzias asked Bernard Patten, a P&S student working as a visiting scientist in the laboratory, to record the happenings at the Medical Research Center, Brookhaven National Laboratory (BNL). Patten, a meticulous diarist, took notes of events as they happened and typed them up on the weekends creating a history of the ideas and events that led to the discovery of L-DOPA and permitting the correction of some common misconceptions about how the discovery was made

Correction one: Neither Cotzias nor anyone else at BNL knew at the time that brain dopamine levels were reduced in Parkinson's disease. That knowledge came after, not before, the clinical discovery of the DOPA effect. What was known was that the most important neuropathological finding in Parkinson's disease was the depigmentation of the substancia nigra. Therefore, treatments were addressed at restoring melanin pigments. Melanocyte stimulating hormone did not work. Phenylalanine did not work. Tyrosine did not work. But, DOPA did work.

Correction two: The National Institutes of Health did not support the research in any manner, shape, or form. Multiple grant applications from Cotzias had been voted down. The last one had been disapproved as unscientific. Support, instead, came from the Atomic Energy Commission, the State Department, and the then Vice President, Richard M. Nixon. If Chairman Mao of China had Parkinson's Disease, it was reasoned that if an effective treatment could be found, then it could be given to Mao and Sino-American relations might improve and the Moscow-Beijine Détente might be broken. In fact, Mao was patient seven treated by Cotzias. Mao responded to the treatment and Sino-American relations improved so much President Nixon was able, after the 1970 Sino-American rapprochement, to make an historic visit to China in 1972.

Here follows a report of the 1963 State Department's briefing of the Brookhaven scientists about Mao's health:

Chang, the State Department man, entered the conference room through the swinging double doors on the south, followed by the boss himself wheeled by Betty Cotzias. She parked the great Greek in the center aisle and locked the brakes. Cotzias was unable to walk due to weakness of his legs from a herniated disc.

With a nod from Cotzias, Chang went to the sandalwood podium and began his lecture. He introduced himself as the bastard son of a Jesuit missionary and a native Chinese woman from Canton. He said his father acknowledged him when the Jesuits, after the revolution, were kicked out of China. Thus, Chang became an American citizen. His father taught Chinese at Fordham, but he used his mother's name to spare the Jesuits embarrassment.

"Above the waist, I'm Chinese, below I'm American," he said.

If that was a joke, no one seemed to get it.

Chang pointed to a map of China on the first slide. He said, "China has the oldest continuously successful civilization on this planet. The name comes from the Chin' dynasty, 800 BC. The Chinese themselves do not call their country China. They call it the central kingdom of Chung Gwo. Sometimes they mean central as in the most important country on earth. Sometimes they mean central as in the middle, suggesting their kingdom is situated between heaven and the underworld. Most times they refer to both these things.

"The idea that governs the Central Kingdom is that the collective is much more important than any individual. Western concepts of individual rights never evolved in China. For good reason, too. The northern plain often turns into a dust bowl. If people didn't stick together, they wouldn't survive during those periods. The leader of China governs with what is called 'the mandate of heaven.' He is believed to hold power from the sky God, Tien, who is also the God of agriculture. The main square in the center of Beijing is named Tiananmen after this God. When an upstart conquered the power, it was believed he had received the mandate from Tien. Thus, every ruler has an absolute right to govern simply because, by ancient operational definition, he is in control.

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"All of which brings me to the real purpose of this talk, which is to tell you about China's present leader, Mao. After a short biography, I will show a film and ask your critical medical appraisal. We want you to make a diagnosis."

Next slide. "Mao was born December 26, 1893, before the airplane or the 'motorized kite,' as they call it in China. His father was a well-to-do farmer and rice merchant. His mother was an illiterate peasant. Mao attended Peking University, China's leading intellectual center, but he is not an intellectual--far from it. In 1915 he abandoned western liberalism for Marxism-Leninism. Evidently, he felt freedom to the people would be a cause of political disorganization. Most Chinese leaders feel that way.

"Mao often talks nonsense. Here's a poem he wrote this year, for instance: 'If the Moon Goddess never marries, who can tie her down?' Or how about this? 'Let me ask you,' Mao said in an effort to make everything problematic during a briefing with the Russians, 'when Marx was young, did he ever read Marx's work?'"

"Sounds like he had a *tant pis* attitude to life," said Cotzias. "What's he got planned for China?"

"Mao is planning something for China but we don't know what it is, and we doubt that he knows what it is, either. Edgar Snow, visiting Peking in 1960, asked Mao what his long-term plans were. 'I don't know,' was Mao's lame, but honest, reply. 'You're being too cautious,' Snow came back. 'It's not caution,' Mao insisted. 'I just don't know; I don't have the experience.'

"We do have a hint, a literary hint. Mao has finished reading *Dream of the Red Chamber* for the fifth time. Have any of you ever read this book?"

Cotzias raised his hand and called out, "Yes, I have."

"Which character do you like in this novel?" asked Chang.

"None," said Cotzias.

"*Dream of the Red Chamber* by Tsao Hsueh Chin and Kao Ngois is a masterful Chinese classic well worth reading.

"In America, it is also known as *A Dream of Red Mansions*. It is a book filled with many interesting characters. Why not take a look at it?" Chang seemed to make direct eye contact with Cotzias.

Chang pointed his index finger at Cotzias. "By your answer to my one simple question, I knew you had never read the book. I knew you had lied. I have to keep evaluating fake data, false information. It's my job."

Cotzias turned red but made no answer. But why had Cotzias lied about something as trivial as reading the book?

Chang continued, "Dealing with you Westerners is easy. The Chinese, on the other hand, are smarter than Westerners, and they think they are cleverer. Dealing with them is hard. The Chinese are masters at deceit. But even more difficult is dealing with them when they don't know what they are doing. I'm supposed to tell people in the State Department what Mao will do in China when Mao himself doesn't know what he wants to do. For this I need your medical help. We are ready for the film. Roll it, please."

While the film got up to speed and the lights dimmed, Chang narrated. "So much for the facts. Let's talk about opinions. Our information about Mao comes from Joseph W. Stilwell, also known as Vinegar Joe, our U.S. attaché to Nanjing. He was the U.S. General that kept the Burma road away from the Japanese and of course he was commander of the 10th army in the Pacific 1945 to 1946.

"Vinegar Joe has been extremely accurate in his appraisal of Mao and in predicting what Mao would do. Vinegar doesn't think much of this great Chinese leader. He calls him Mouse Tongue."

"Vinegar Joe says Mao is a big, fat, effete, effeminate man with a small dick and an even smaller brain. Vinegar predicted the great disaster that Mao's agricultural policies during the great leap forward would have on the Chinese people. Well, he almost predicted it. Joe thought two to three million would die. The return to guesswork instead of science in agriculture was a little more costly. Twenty to thirty million Chinese died in the greatest famine ever engineered by human incompetence. Mao can hardly hide his errors of the Leap period. 'Haven't we bungled a lot in the last few years?' he said in 1962 to the Central Committee.

A color movie taken at odd angles by a jiggling hand appeared on the screen. There seated on a golden throne, the dragon throne of old, was a big, fat, barrel of a man, obese to an extreme.

It was Mao.

Directly in front of Mao stood a rectangular wood platform. A little girl approached Mao with a clutch of flowers. He didn't smile.

A voice was talking in a tonal Asian language. Hokkien? Cantonese? It could have been Mandarin, but the tones were off. Ugh! It was Mao mumbling. He was talking, but his face did not move. His face showed no expression.

Music sent young girls into a marvelous dance of grace and style and beauty that enthralled us to our deep heart's core. The Chinese girls started their finale. They seemed to be skating in lace, banners flying overhead, streamers faultlessly coordinated to those of the others and synchronous with the beat of the exotic music.

Mao tried to get out of the chair to approach the girls. Eventually, after he made a few tries, he lifted off the seat, but once standing, he suddenly accelerated forward in small short steps chasing his center of gravity. A bodyguard caught him and stabilized the situation. Otherwise, the great leader, the son of heaven, the man with the mandate of heaven, Tien's mandate, might have fallen flat on his face.

Then Mao walked. Or tried to. Mao didn't swing his arms. He walked stooped over. He tried to straighten up but couldn't. He kept getting further and further hunched over and finally gave up.

Abruptly, Mao lurched ahead chasing his center of gravity. With lithe agility, a girl leaped out of his way. Mao fell forward, flat on his face.

They got him up with difficulty. His expressionless face did not change. His body moved as if it were one solid block and not a coordinated assemblage of many individual parts willing and able to help the whole.

"Watch his right hand," Cotzias yelled.

The hand had a slight but definite three cycle per second tremor as if Mao were trying to roll a pill like those old-time physicians.

The film ended.

Chang turned on the lights, paused and asked the sixty-four thousand dollar question:

"So what's wrong with Mao?"

"He's a Park," Cotzias shouted out. "No question about it. He has the disease and he has it bad. We saw all the cardinal features. He had a mask-like face, hence what we call hypokinesia. He had a tremor. He had postural instability, and he was rigid. He turned *en bloc* and so forth. There is no question about the diagnosis. What do you think, Paul?"

"The diagnosis is obvious. Mao probably has only two more years before complete paralysis, before he turns into a hopeless immobile mess.

"Does he know he's sick?" medical student Patten asked.

"Good question! Yes, he knows he's sick. Recently he told André Malraux, the French minister of culture: 'China will live on; I myself am going to collapse. I will soon be seeing Marx.'"

"Despite the illness, his life style hasn't changed much except nurses hover around. He still smokes heavily, some Chinese brand of Virginia cigarette, which has stained his fingers and blackened his teeth. He drinks Chinese grape wine, not regularly like a real drinker, but every now and then. He hates flowers or decorations in his room. He eats the same few peppery Hunanese dishes, slurps his soup, belches after a hearty meal regardless of whether his table companion is Jiang Qing or Malraux. His home by the South and Central lakes is magnificent — it was called the Small Palace of the Fragrant Concubine under the dynasties — and he has a swimming pool to himself. He likes to swim."

"All Parks do," said Cotzias. "They swim much better than they walk. That's why he swam the Yellow River."

"Yangtze," Chang corrected Cotzias. "He swam the Yangtze to show his personal fitness."

"Has the Parkinson's disease affected him mentally?" Cotzias asked.

Chang looked puzzled. "He became blunt and subjective as many old men do. He took to remarking aloud on the appearance of people who came to visit him. Things like: 'All are young!' 'Very tall!' And he has developed an idea of invention. He thinks he has discovered a principle of history overlooked by Marx. He thinks he has discovered that history can move backwards as well as forwards. This last idea serves him well. In one stroke, he found a way to explain past setbacks and to justify new efforts to shake the People's Republic of China to its foundations. Had he not in the recent past been thwarted by the new bourgeoisie? Isn't that an example of history flowing backward? Those things aside, we detect no change in his mental function. He is just as stupid as ever. Should he have demonstrated changes?"

"Not usually," Cotzias affirmed. "Parkinson's disease leaves the mind intact. Other diseases, especially in their early phases, can look like Parkinson's disease and cause dementia. Parkinson's disease doesn't usually cause any significant mental change. That's my point. The diagnosis is secure."

Conclusion: George C. Cotzias used imagination, guts, and wits to bypass the peer review system to make a great discovery that made medical and political history. Chairman Mao famously wrote in his little Red Book, "All political power comes out of the muzzle of a gun." Cotzias proved him wrong. Political power can also come out of a medicine bottle.

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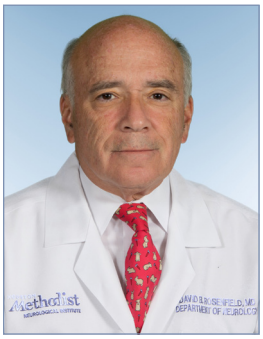
The Neurology of Eating Chicken

David B. Rosenfield, MD, Chair in Speech and Language in Neurology, Stanley H. Appel Department of Neurology, Neurological Institute, Houston Methodist Hospital, Professor, Weill Medical College of Cornell University



Surely, we all have much for which to be thankful during the Thanksgiving holiday, but did you bring up the following issue at your Thanksgiving table?

Why is the breast of the (domesticated) turkey white meat yet the drumstick/leg is dark meat? Similarly, why is the breast meat of chicken white meat and the leg is dark meat? Further, concordant with this query, why is the breast of a duck, dark meat?

If you talk too much about these issues at Thanksgiving, you might not be welcome at the next holiday session. However, if you simply pose the query, you might find that you have garnered your friends' and family's attention and they might even invite you to more functions.

Think about it! Most of us non-vegans and non-vegetarians do eat chicken. Indeed, although many religious observances decry eating pork and some cultures curtail eating cows, most religions and cultures have nothing against eating chicken.

Chickens are not too expensive to raise, provide good nutrients and, although most of us still don't know whether an egg has, did have or is supposed to have a baby chicken inside (e.g. that issue is for future discussion) the question regarding white meat versus dark meat has validity.

What is for current discussion is why it is that the breast and legs of chickens, turkeys and ducks have different meats. Fortunately, we neurologists can dissect (no pun intended) the reason.

First, a brief review. Simply put, muscle contains slow-twitch muscle fibers and fast-twitch muscle fibers, respectively known as Type 1 and Type 2. Type 1 fibers (slow-twitch) produce less tension and force during muscle contraction than do Type 2 fibers (fast-twitch).

When muscle contracts, the slow-twitch (Type 1) muscle fibers activate first. When there is a need for a sudden burst of muscle contraction, it is the fast-twitch (Type 2) fibers that primarily activate. Slow-twitch fibers use slow, steady energy whereas fast-twitch fibers use a lot of energy and do so quickly. And, slow-twitch fibers engage in low-intensity activities whereas fast-twitch fibers engage in activities that require large bursts of energy and rapid movement.

There are other differences between the two types of fibers. Muscle contraction time of Type 1 is long and muscle contraction time of Type 2 is short. Type 1 fibers do not fatigue as readily as do Type 2 fibers and the motor axons are smaller within Type 1 than within Type 2.

Some of the reasons for these differences relate to the meat of the fowls that we are discussing. The fact that the metabolic system of Type 1 is primarily oxidative and the metabolic system of Type 2 is glycolytic (anaerobic) relates to the fact that Type 1 uses minimal ATP and is loaded with many mitochondria (for the oxidative metabolism). Type 2 has a lot of ATP and few mitochondria.

One can conjoin the above with what the legs (drumsticks) versus breasts/wings do in these birds. Chickens pretty much don't engage in a lot flying but, rather, employ their leg muscles for movements of long duration as they roam around farmyards, seeking insects and scattered grain to devour. Their legs support them during these perambulations and provide a steady, upright contraction of muscles to support the bird.

When a chicken uses its wings, it is usually for balance or quickly to escape from some kind of threat. These required movements are rapid in onset, involve fast muscle contraction, are brief and not long lasting,

The chicken's leg muscles require an ongoing slow muscle contraction and a steady not too stringent source of energy: the wing/breast muscles require rapid, fast contraction, a lot of energy and quickly uses this energy for the fast muscle contractions.

The fuel for the slow muscle contraction of the legs is fat and requires oxygen, stored in myoglobin. The myoglobin is red and, therefore, the more myoglobin, the more red (e.g., darker meat) the muscle.

The wings, again consisting of fast contraction muscle fibers, don't require oxygen (e.g., don't require myoglobin) because they utilize glycogen (e.g., a carbohydrate) for their fuel. The absence of myoglobin in the wings and breast result in the meat being white.

In actuality, there is a mixture of the dark and white meat (e.g., mixture of slow contraction type 1 fibers and fast contraction type 2 fibers). The slow contraction muscles predominate in the leg, making the meat dark, and the fast contraction muscles predominate in the breast and wings, causing the muscles to be white.

What about the duck? The answer is that ducks use their wings much more than for the quick balancing acts that the chickens employ as they plod around barnyards or for their hopefully brief escapes from predators. The ducks need to fly long distances, covering thousands of miles during migrations as they traverse considerable distances, utilizing an ongoing steady energy source within their dark meat.

Thus, the answer to the question why the meats are different colors is: legs are primarily Type 1 fibers; breasts and wings of chickens are primarily Type 2 fibers; the wings of the duck are primarily Type 2.

Once again, we neurologists can intercalate just about everything into our knowledge of brain, muscles and nerve. So, the next time you eat with your companions (or by yourself), remember the neurobiology and neuroscience of what is on your plate.

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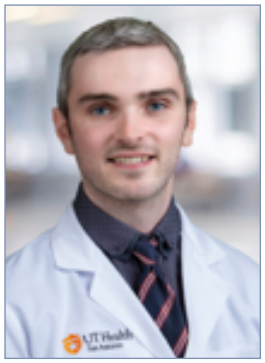
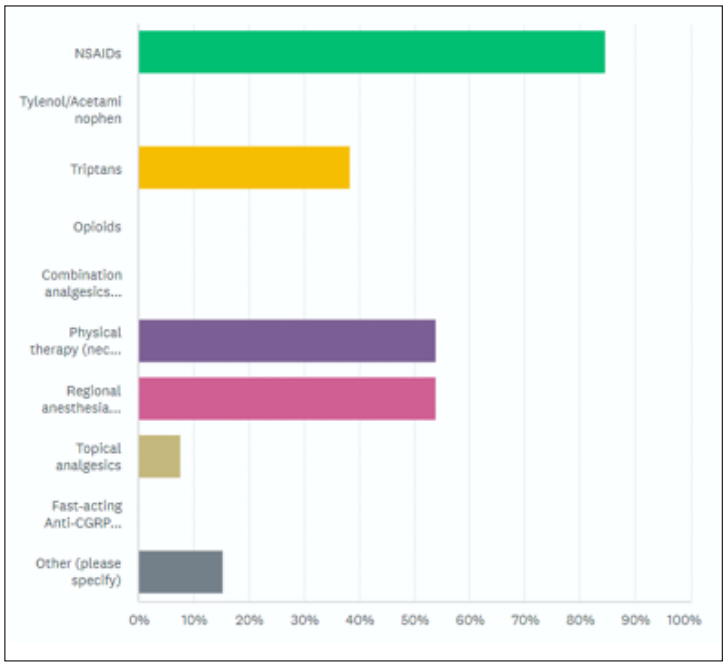
The consensus on concussion: A survey of Texas Neurologists

By Jonathan Paul Donnelly, MD, MRCP(UK), Department of Neurology, University of Texas Health Science Center San Antonio, Resident



There are several emergent subspecialties in Neurology nowadays, and it can be hard to keep up. There are even subspecialties within subspecialties, allowing for more and more niches to form within practices. One such relatively recent field is that of Sports neurology, which combines aspects of headache medicine, neuropsychology and neurorehabilitation with established sports medicine practices and guidelines to meet the growing need for assessment of neurological injuries separately to general sports medical evaluations. At the center of this new field is the assessment and management of concussion, which is receiving increasing media scrutiny due to the controversy around the cognitive and psychological effects seen in American football players. While numerous societies and organizations have created guidelines on the acute evaluation of concussion (American Academy of Neurology, Texas Sports Med, Concussions Ontario etc.), as well as some limited guidance on return to physical activity and field play, there is less clear consensus on the management of long-term sequelae of concussion (broadly referred to as post-concussive syndrome). During residency training, there is limited exposure to this patient population, as most are seen in community sports medicine or neurology clinics, and rarely end up in the emergency room outside of extreme cases of neurotrauma. To gain some more insight into this topic, I drafted a brief 14-question survey and asked local neurologists for their opinion on how common post-concussion symptoms and disorders should be managed. The survey included some brief demographic information, and questions on management of headache, vertigo, cognitive dysfunction, sleep disorders and mood disturbances.

There were 13 respondents to the survey, all of which manage patients in the outpatient setting, and in either a general neurology or headache medicine practice. Just over half worked primarily in an academic institution, while the remainder worked in the private sector. The frequency at which each respondent evaluated concussion varied significantly, with most reporting seeing concussion patients about once or twice per month, though one neurologist focusing on sports medicine sees up to 30 patients per workday. Most used the established AAN guidance for initial assessment of concussion, though some mentioned additional specific guidelines, such as the National College Athletics Association (NCAA).



Given that headache is the most common symptom associated with post-concussion syndrome, the responses regarding management were more homogenous than with other sequelae. The results are outlined in this chart:

Non-steroidal anti-inflammatory drugs were clearly the most popular choice (85%), followed by both physical therapy (neck/back stretches, range of motion etc) and regional nerve blocks (occipital nerve block, trigger point injections). One respondent wrote that it "depends on the headache symptoms", which indeed may divert the choice more towards migraine therapies if they meet the criteria. Interestingly, there appears to be limited use thus far of the newer anti-CGRP medications such as Ubrogepant and Rimegepant, though this may be because Triptans are still first line for younger patients without contra-indications.

Results regarding the use of prophylactic medication for post-concussive headaches was a little more varied:

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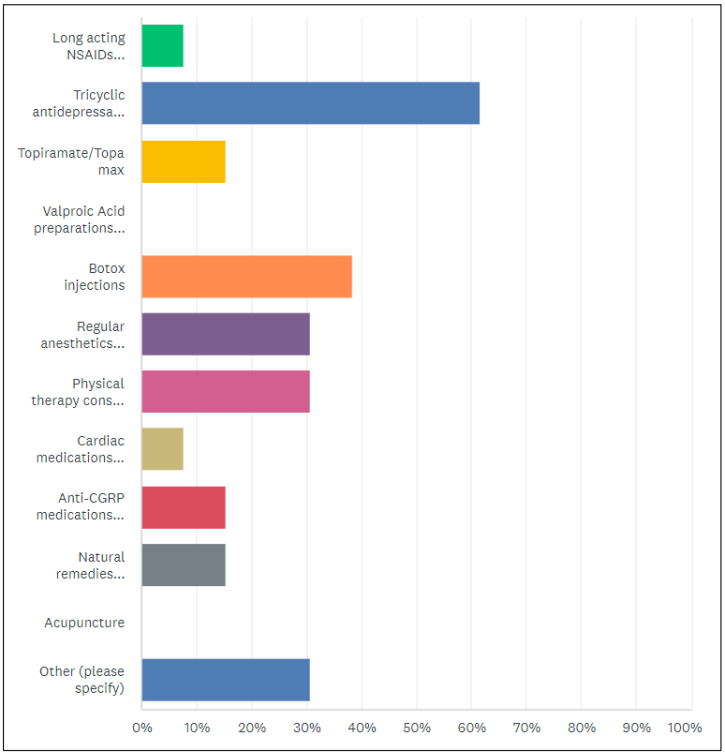
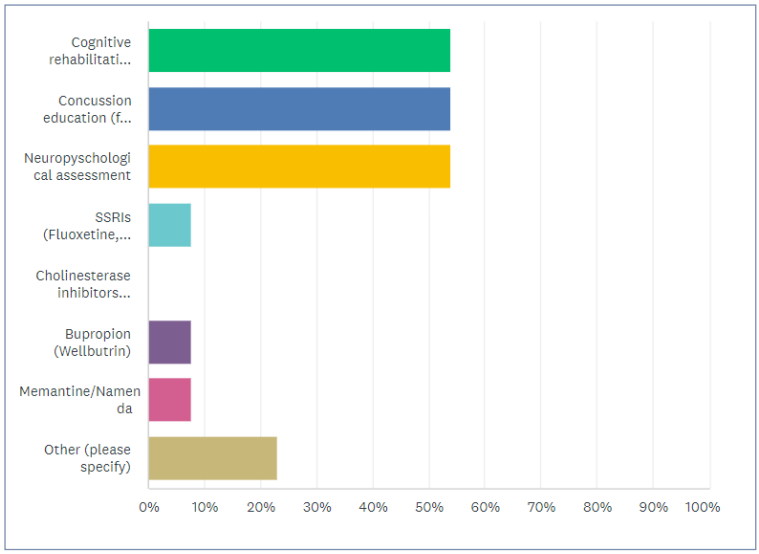


Tricyclic antidepressants remain a popular choice (62%), most likely due to their concomitant coverage of mood and sleep issues, though Botox, Physical therapy and regular nerve blocks were also frequently chosen. Part of this heterogeneity could be explained by the variation in how these patients present; post-concussive headaches can be classified depending on their predominant features, with either migraine-like or tension-like being most prevalent. Approaches such as TCAs, exercise and trigger point injections can potentially treat either of these, while some therapies such as Topiramate or Beta-blockers would be more targeted to migraine management. As to when prophylaxis should be started, 61% chose within 4-6 weeks, though some opted to wait 12 weeks or longer (15%).

The symptom most focused on by the media, cognitive dysfunction, also had relatively similar responses, with mainly non-pharmacologic measures being chosen:



Half of respondents chose a combination of rehabilitation, education, and neuropsychological assessment, with only a few choosing to start medications, at least as part of their initial evaluation. The evidence behind any of these approaches is lacking, and one of the main reasons behind this survey. Although there is some data suggesting that cognitive behavioral therapy may be beneficial for post-concussive syndrome, the evidence for use of psychotropics, or even rehabilitation, is less clear. The role of education, however, is paramount, as even simple interventions such as providing an information booklet to patients and families has been shown to improve recovery from concussion. Since patients may not have obvious outward signs of injury, their friends and families may not understand their symptoms, and they and the patient may feel that what they are experiencing is "crazy". Just learning that their symptoms are part of a well-described syndrome that many others have suffered, and that recovery is possible, can be enough to improve their course.

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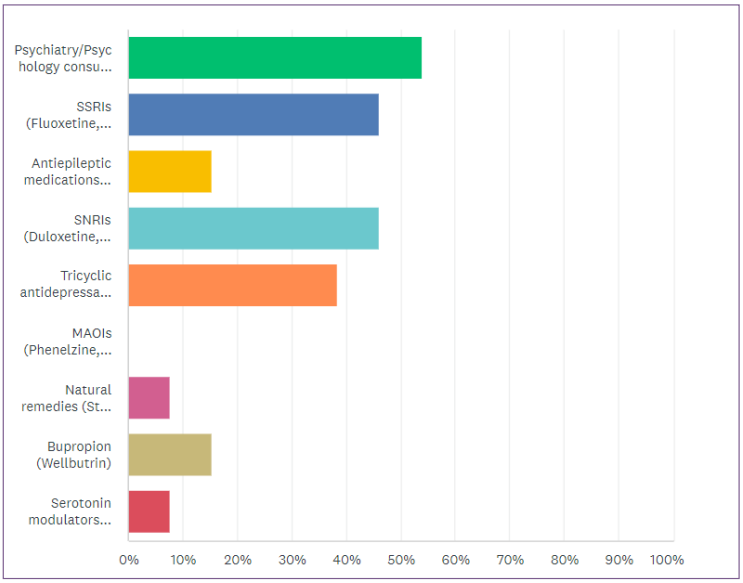
Mood disturbance, particularly depression, is also a frequent complication of concussion, and the management of this complication is not straightforward. Patients may present with major depression, anxiety, or even post-traumatic stress disorder, and this can be in combination with cognitive complaints that only exacerbate the issue. As expected, most responded that they manage with a combination of psychiatric help and medications:



Over half of respondents choose consultation with psychiatry or psychology, though the choice of medication varied. Like headache management, most neurologists would appear to use psychotropics that may help other associated conditions, e.g., TCAs and SNRIs for headache, Serotonin modulators (Mirtazapine, Trazodone) for sleep issues. Choice of medication, however, depends not only on concomitant symptoms, but also the characteristics of the patient's mood disorder, and this is where timely access to psychiatric assessment is key. Unfortunately, this is one area that respondents identified as a barrier to concussion management. Establishment of clear guidance and programs specialized in concussion management could be solutions to this issue, though these would require resources that many small communities may not have.

Although suicide risk assessment is suggested by some guidelines, only 23% of respondents answered that they "always" perform this. Some studies suggest that the risk is doubled in traumatic brain injury patients compared to the general population, so this may be an integral part of any future guideline, especially for practices without easy pathways to psychiatric evaluation.

For other symptom management, 77% of respondents chose Vestibular rehabilitation therapy for vertigo, with other treatments such as canalith repositioning maneuvers (31%), dopaminergic medications (31%), and home exercises (Brandt-Daroff etc, 23%) being other popular choices. For sleep disturbances, the overwhelming majority (85%) chose tricyclic antidepressants, most likely due to their broad action on other concussion symptoms, though natural remedies (Melatonin etc) were close behind (77%). Non-pharmacologic measures such as psychotherapy and light therapy were not popular, likely due to issues with access and cost (light therapy devices can cost up to $100). While stimulant use can be encountered more frequently in the inpatient rehabilitation setting, only one respondent reported use in the clinic, perhaps indicating that hypersomnolence is not as commonly encountered in non-hospitalized TBI patients.

The neurologists were also asked what they felt the biggest challenges were when managing post-concussion patients. In addition to the issues with psychiatric help mentioned prior, respondents also mentioned lack of clear evidence for both assessment and treatment efficacy. As sports neurology continues to grow as a specialty, clear guidelines referring to these issues could greatly assist neurologists and other sports physicians in providing consistent and effective care for these patients. Two respondents mentioned that they feel that patients can often receive conflicting advice in the acute setting, leading to problems with management later. As previously stated, the education regarding the importance of care after concussion and what patients and families should expect can have a huge impact on the course of this syndrome. Again, a standardized approach to how patients and families should be educated would be an easy and ultimately cost-effective remedy to this problem, and studies have demonstrated that simple measures are as effective as more advanced interventions.

This survey indicates that for the more common manifestations of post-concussion syndrome, particularly headache, cognitive disturbance and mood disorder, there is a relative consensus on how these should be managed, with the caveat that the management depends largely on the characteristics of each complaint. To that end, the need for assistance from other specialties and allied health professions is evident, though sadly this may be limited by available resources and patients' financial situation. A streamlined approach to management of these patients may not solve every issue, but it may serve to highlight the need for comprehensive assessment, multidisciplinary approach, and to remember that interventions such as education, counselling, and risk assessment, can have a much larger impact on a patient's prognosis than medications. Follow-up to this survey will be to draft a sample guideline and have local neurologists' comment on each step, and eventually construct a simplified approach that could be used in practice. The early effective management of concussion becoming significantly important, and neurologists involved in managing headache, cognitive disorders, and even specific sports-neurology problems will need to keep on top of the emerging treatment strategies. This survey demonstrates that there is already some agreement on what should be done, so the next logical step is to consolidate these opinions into a simplified, user-friendly algorithm that could benefit patients in need.

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Healing with Dance

Anna Tseng, MD

The Arts can unlock hidden connections in the brain to aid recovery. A dyskinetic patient stricken with Parkinson's can yet still play the Moonlight Sonata on the piano. Aphasia can be overcome by singing rather than merely speaking. Walking to music can improve gait apraxia.

Neurological disorders tend to have high chronicity leading to an increased burden of disease and a decrease in quality of life. Rehabilitative services are provided in an episodic fashion during periods of decline, but maintenance therapy is needed to cope with chronic disabling symptoms and prevent injury. The Arts can provide a non-traditional method to bridge the gap in between traditional rehabilitation therapy.

The Arts also provide a common thread in the human experience, with the ability to bring diverse people together. During the COVID pandemic, connecting with others has been particularly difficult, having a significantly negative impact upon cognitive function.

In July 2020, we embarked on a project to improve quality of life and reduce the burden of disease and fall risks in patients with neurological disorders, by implementing an interdisciplinary, nontraditional approach to patient care. Inspired by the collaboration between the Royal Ballet in London, England and the MS Society, Neurology Consultants of Dallas (NCD), Neurology Rehab of Dallas (NRD), and Chamberlain Ballet worked together to develop and understand the effects of music and dance intervention in conjunction with traditional therapies.

THE METHOD

There are many disease-specific programs already in existence. We chose instead to include all neurological conditions that lead to gait disturbance. Initially we matched our study group to a control group consisting of individuals with similar diagnoses and baseline scores. Participant Diagnoses included Parkinson's Disease, Multiple Sclerosis, Stroke, Limb Dystonia, and Myasthenia gravis. After the initial 8 weeks, we continued to collect data on dance participants only for another 8-week period, more so to track the patients' progress in class. Two of the dance participants completed the entire 16 weeks. There was a six-month gap between the 8-week periods due to limitations to the classes during a community surge in COVID cases.

During each week of the initial eight weeks, the control group attended their routine physical therapy sessions. Dance participants attended 2 one-hour ballet classes in addition to attending their routine PT sessions. The ballet classes were staffed by a physical therapist and led by a ballet teacher.

Measurement tools were used to study balance, gait and quality of life, including Berg's Balance Scale, Single Leg Stance (SLS), The Timed Up and Go (TUG) test, Dynamic Gait Index (DGI), and Parkinson's Disease Questionnaire (PDQ39). Measurements were taken at baseline, at week 4 and at week 8.

THE RESULTS

The data from the dance cohort and control cohort were averaged together and tracked over time to show the changes in scores in both groups overall. There was no discernible difference in balance outcomes in the first 8-week group comparing those who received PT (control cohort) and those receiving PT and dance instruction (dance cohort). Both groups showed steady improvement, with higher scores indicating better balance. In the second 8-week group, balance scores continued to show incremental improvement, with there being much more improvement in the first 4 weeks. A plateau effect seemed to occur in the final 4 weeks.

Gait progressively improved in control and dance groups in the first 8-week group. Gait scores showed little change but did trend towards continued improvement during the second 8-week group.

Individuals in the dance group exhibited lower quality of life scores at baseline compared to controls, but they rose incrementally more than the control group. The PDQ39 survey tool utilized contain questions pertaining to the physical and psychosocial aspects of patients' lives. However, the impact of dance could have different impact upon these two aspects. Consequently, in the second 8-week grouping, QOL was tested along physical and psychosocial parameters separately.

Results showed high variability amongst participants.

The COVID-19 pandemic significantly impacted the ability to recruit and gather consistent data.

- Fewer patients were willing to volunteer in the program
- Fewer participants were allowed simultaneously in class to maintain social distancing
- Patients self-quarantined intermittently due to outside COVID exposure and missed sessions
- Frequent physical therapy staff changes due to staff shortages led to increased chance of interrater variability

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Many participants had inconsistent attendance due to health issues, which further underscores the fact that in many neurological conditions, patients frequently experience day to day variability. In the first 8-week group, we were able to collect consistent data on only 6 participants and in the second 8-week group, only 4 participants. However, there have been more than 40 participants since the beginning of the program.

In summary, small numbers and inconsistent attendance led to variable results and inability to achieve statistical significance. However, gait and balance trended towards improvement and showed continued improvement in the second 8-week sessions. The dance classes incentivized patients to practice motor skills learned in traditional physical therapy. Dance stimulated other areas of the brain by engaging creativity and artistry resulting in more control over movements. Quoting one participant: "I don't feel unsteady when I am in dance class." A community spirit also developed in this group of participants, individuals who particularly experienced isolation during Covid.

NEXT STEPS

Encouraged by our data's positive trend and the positive feedback from our patient dancers, we continue to offer ballet classes as an adjunct to traditional medical interventions and therapies. For now, we have stopped gathering outcomes data. Remote patient monitoring (RPM) using wearable devices has become a burgeoning industry. Some devices have the ability to measure movement and stance. We are exploring utilizing RPM to overcome the difficulties in obtaining consistent data.

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Disparities in Optimizing Seizure Rescue in Houston Community Schools; A Brief Overview

Nafee Talukder, DO, UTHealth Neurosciences, McGovern Medical School

Roughly 470,000 children in the United States Suffer from active epilepsy, with Texas encompassing roughly 10% of these cases. Children with poorly controlled epilepsy are shown to have higher rates of mental health disorders, learning disabilities, and physical comorbidities when compared to those without. Additionally, when seizures persist and fail to self-abort they persist to status epilepticus which can lead to physical trauma, permanent neurologic injury, long-term morbidity, as well as costly emergency room and hospital bills. While not all seizures require administration of seizure rescue medications, in instances where these treatments can prevent significant harm, personnel who are comfortable in administering these treatments should ideally be present. In children, most events occur in the community, particularly in schools. And while Texas passed Sam's Law (HB 684) in July of 2019, requiring all Texas public school personnel in regular contact with students to receive seizure recognition and response training, the degree of varies drastically per school and in between communities.

The Epilepsy Foundation of Texas provides this training free of charge, and while in-person sessions can be requested, most are completed online. Lack of demonstrating or hands-on training in instances of brief or persistent seizures contributes to hesitancy, discomfort, and the reluctance of use; often with personnel opting to wait for medical response services instead. Hesitancy in use of seizure rescue agents also stems from the traditionally limited preparations available to patients. Rectal benzodiazepines can be socially embarrassing, particularly in public, and difficult to use for common bystanders without prior demonstration.

Oral preparations of benzodiazepines can only be given when awake due to risk for aspiration during generalized convulsions, limiting its use in status epilepticus; and in the hands of untrained personnel greatly increased risk for aspiration if improperly given during the seizure. New intranasal formulations of benzodiazepines for seizure rescue have recently been approved, however, awareness and accessibility remain limited.

Our project aims to assess the knowledge gap, training needs, and resource shortcomings in acute seizure rescue management by school nurses and personnel. Using this information, in conjunction with "The Neighborhood Atlas" through the NIH, we hope to provide insights into the role that geographic variability and social determinants play in the acute seizure burden in schools; taking the first step in acknowledging discrepancies, with the hopes to ultimately close these gaps.

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