AOE Analysis of AANP's Fall 2017 Membership Survey

A survey was sent to the membership base of the American Association of Neuropathologists (AANP) in the fall of 2017. This survey is used for planning of future annual meeting topics by providing a better understanding of current neuropathology practice characteristics. A total of 143 members provided responses to the 31 questions within the survey and the summary of these results are described below.

Clinical Assertion Statements

The survey asked members to rate 25 different clinical assertion questions using a 5-point Likert-type scale from 1=Disagree Completely to 5=Agree Completely. These questions were developed to determine a member's level of knowledge regarding eight separate topics in neuropathology. Data is presented as mean +/- standard deviation.

Figure 1 provides the results for the three questions evaluating knowledge in the area of **autopsy pathology**. The first and third statements in Figure 1 are true while statement two is false. Members selected responses in the desired direction for statements two and three. Statement one had a mean score in the neutral position which may indicate where additional education is appropriate:
- Traumatic axonal injury within the central nervous system results in axonal swellings containing all neurofilament subtypes. (True statement, mean score of 3.08)
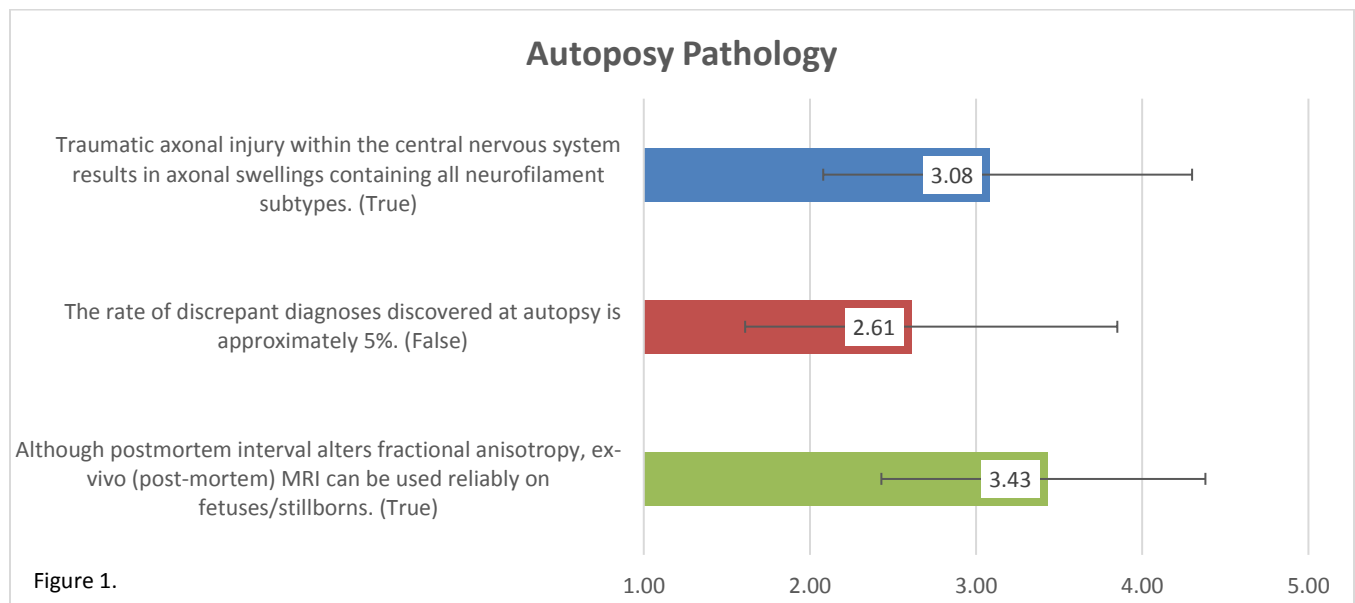

Figure 1.

Figure 2 provides the results for the three questions evaluating knowledge in the area of **neoplastic diseases**. All three statements in Figure 2 are true. Statements one and three had a mean score in the desired direction, and statement two had a mean score on the incorrect side of the scale indicating where additional education is appropriate, this includes:
- Anaplastic oligodendrogliomas can show ATRX loss. (True statement, mean score of 2.78)
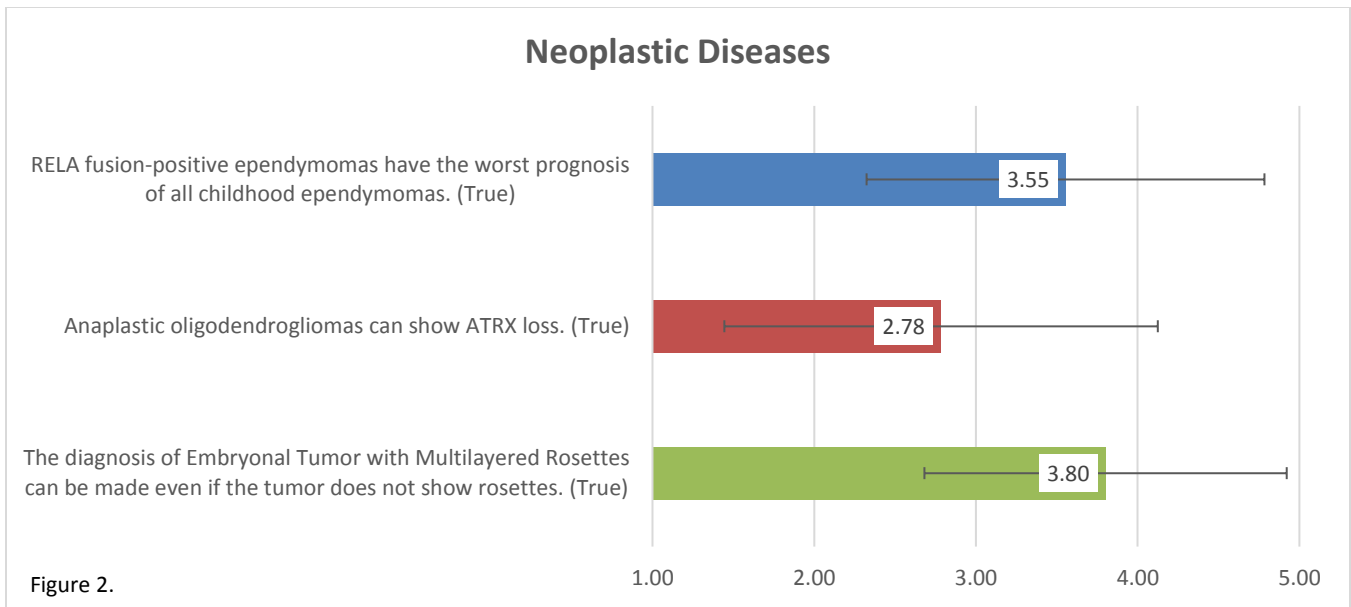
Neoplastic Diseases

RELA fusion-positive ependymomas have the worst prognosis of all childhood ependymomas. (True) — 3.55

Anaplastic oligodendrogliomas can show ATRX loss. (True) — 2.78

The diagnosis of Embryonal Tumor with Multilayered Rosettes can be made even if the tumor does not show rosettes. (True) — 3.80

1.00 2.00 3.00 4.00 5.00

Figure 2.

Figure 3 provides the results for the three questions evaluating knowledge in the area of **neurodegenerative diseases and age-associated brain changes**. The first and third statements in Figure 3 are true while the second statement is false. Members selected responses in the desired direction for all questions in the area of neurodegenerative diseases and age-associated brain changes.
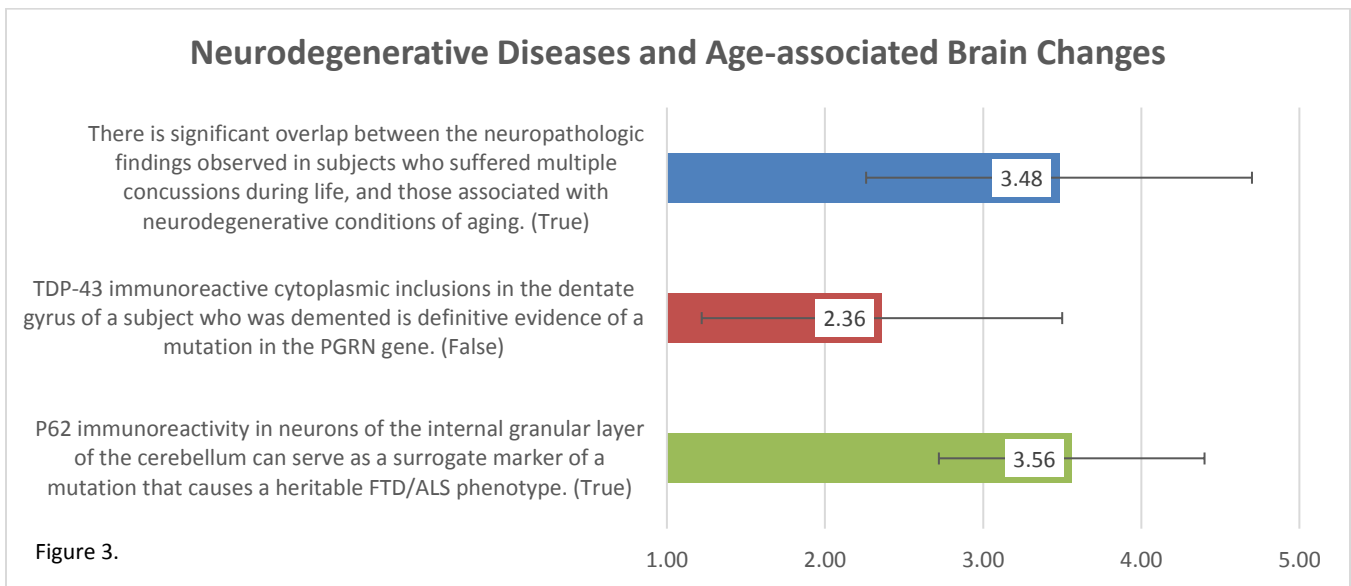
Neurodegenerative Diseases and Age-associated Brain Changes

There is significant overlap between the neuropathologic findings observed in subjects who suffered multiple concussions during life, and those associated with neurodegenerative conditions of aging. (True) — 3.48

TDP-43 immunoreactive cytoplasmic inclusions in the dentate gyrus of a subject who was demented is definitive evidence of a mutation in the PGRN gene. (False) — 2.36

P62 immunoreactivity in neurons of the internal granular layer of the cerebellum can serve as a surrogate marker of a mutation that causes a heritable FTD/ALS phenotype. (True) — 3.56

1.00 2.00 3.00 4.00 5.00

Figure 3.

Figure 4 provides the results for the three questions evaluating knowledge in the area of **forensic neuropathology**. Statements one and three are false while statement two is true. Statement two had a mean score on the incorrect side of the scale which indicates additional education is appropriate:

- A 65-year-old male alcoholic was found unresponsive on his bathroom floor. For a long-standing heavy alcohol abuse, most commonly, you will expect a disproportionate loss of the cerebral white matter. (True statement, mean score of 2.94)
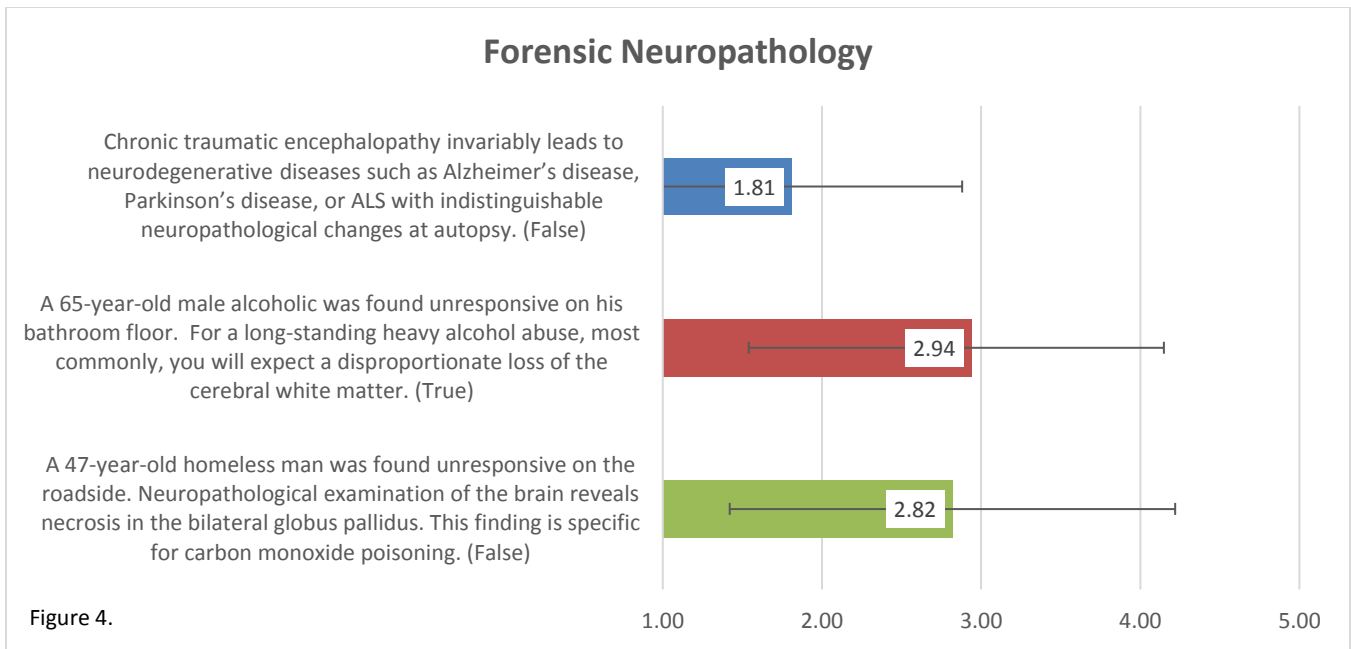
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Forensic Neuropathology

Chronic traumatic encephalopathy invariably leads to neurodegenerative diseases such as Alzheimer's disease, Parkinson's disease, or ALS with indistinguishable neuropathological changes at autopsy. (False) — **1.81**

A 65-year-old male alcoholic was found unresponsive on his bathroom floor. For a long-standing heavy alcohol abuse, most commonly, you will expect a disproportionate loss of the cerebral white matter. (True) — **2.94**

A 47-year-old homeless man was found unresponsive on the roadside. Neuropathological examination of the brain reveals necrosis in the bilateral globus pallidus. This finding is specific for carbon monoxide poisoning. (False) — **2.82**

Figure 4.

Scale: 1.00 — 2.00 — 3.00 — 4.00 — 5.00

Figure 5 provides the results for the three questions evaluating knowledge in the area of **neuromuscular diseases**. All three statements in Figure 5 are true. Statements two and three had a mean score in the desired direction, and statement one had a mean score on the incorrect side of the scale indicating where additional education is appropriate, this includes:

- Denervation changes in skeletal muscle include rimmed vacuoles. (True statement, mean score of 2.32)
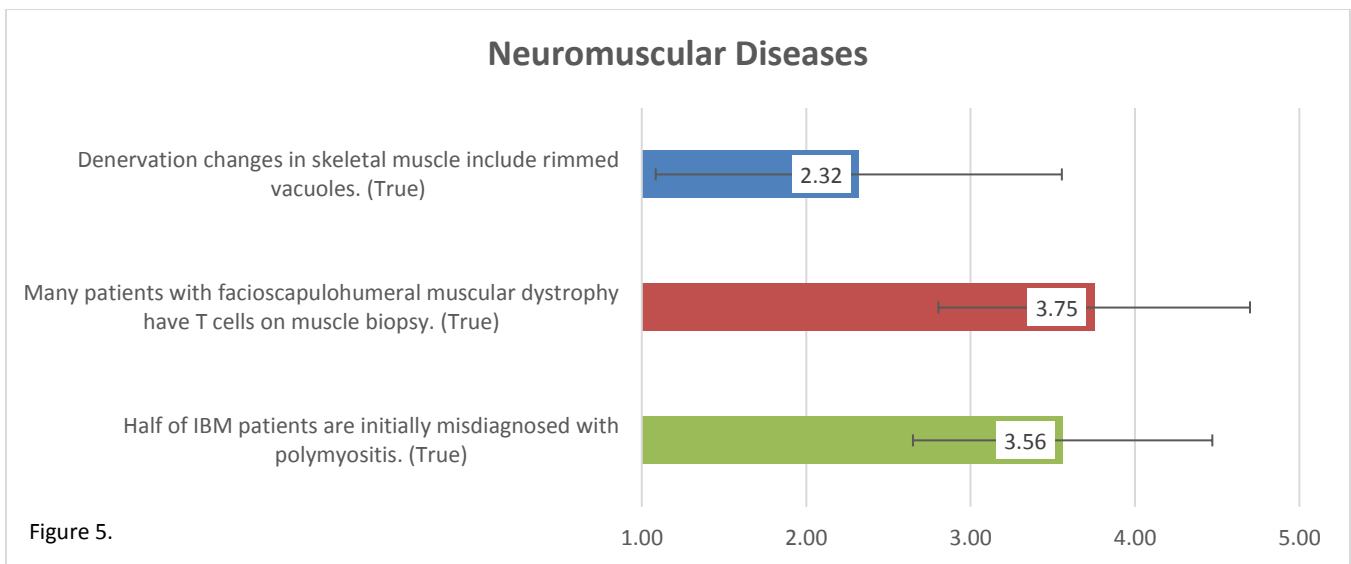
Neuromuscular Diseases

Denervation changes in skeletal muscle include rimmed vacuoles. (True) — **2.32**

Many patients with facioscapulohumeral muscular dystrophy have T cells on muscle biopsy. (True) — **3.75**

Half of IBM patients are initially misdiagnosed with polymyositis. (True) — **3.56**

Figure 5.

Scale: 1.00 — 2.00 — 3.00 — 4.00 — 5.00

Figure 6 provides the results for the four questions evaluating knowledge in the area of **infections of the central nervous system**. All four statements are true. Members selected responses in the desired direction for all questions in the area of infections of the central nervous system.
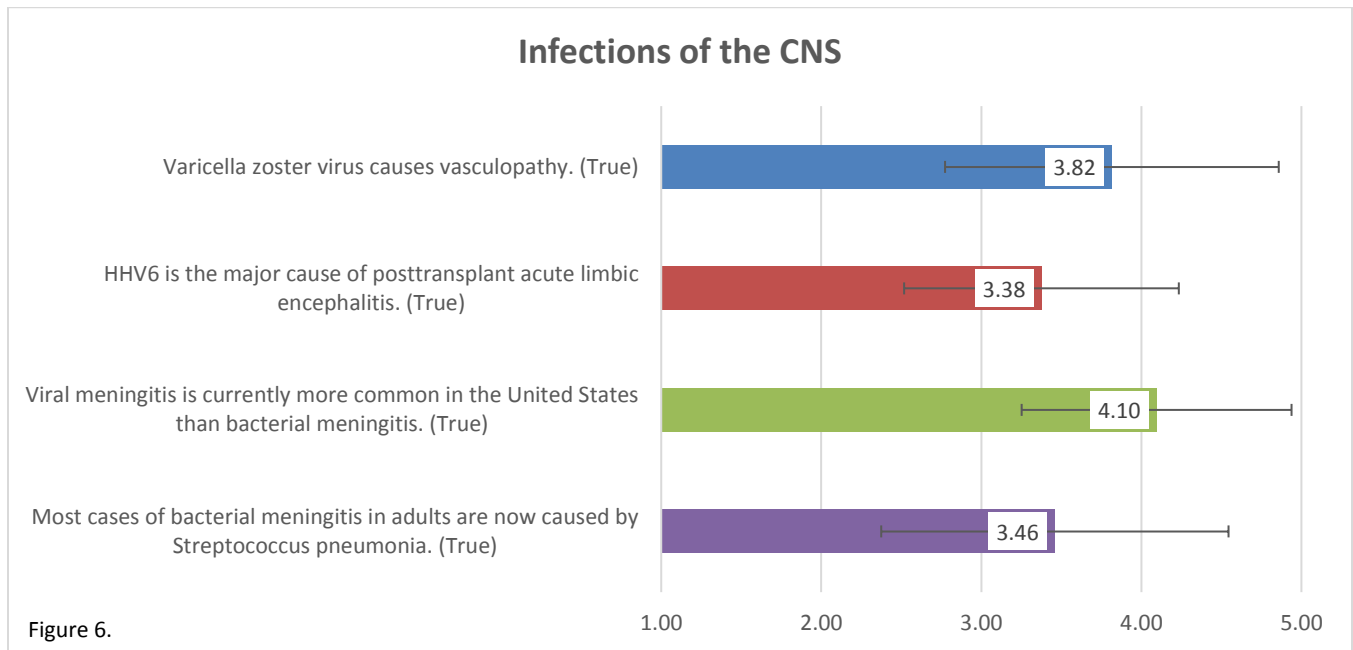
Infections of the CNS

Statement	Score
Varicella zoster virus causes vasculopathy. (True)	3.82
HHV6 is the major cause of posttransplant acute limbic encephalitis. (True)	3.38
Viral meningitis is currently more common in the United States than bacterial meningitis. (True)	4.10
Most cases of bacterial meningitis in adults are now caused by Streptococcus pneumonia. (True)	3.46

Figure 6.

Figure 7 provides the results for the three questions evaluating knowledge in the area of **clinical practice and healthcare quality**. Statement one and two are false while statement three is true. Statement one had a mean score on the incorrect side of the scale, indicating where additional education may be of value:

- Neurologists who have not completed a neuropathology fellowship can become certified to provide pathologic interpretation of muscle biopsies through the American Board of Psychiatry and Neurology. (False statement, mean score of 3.52)
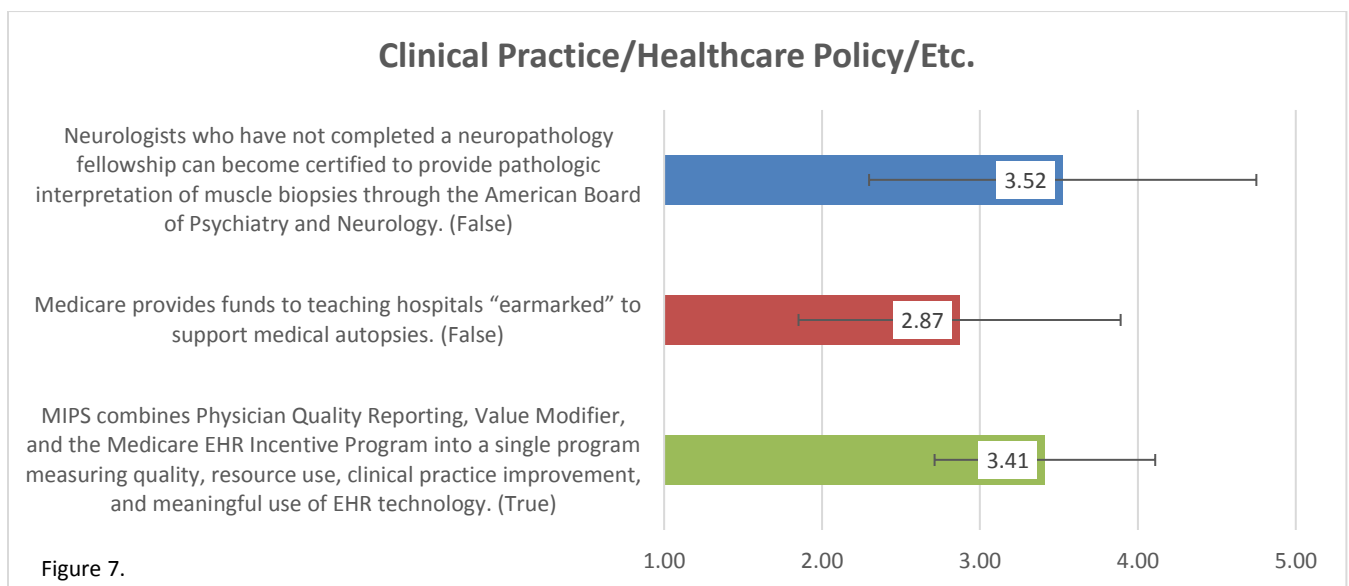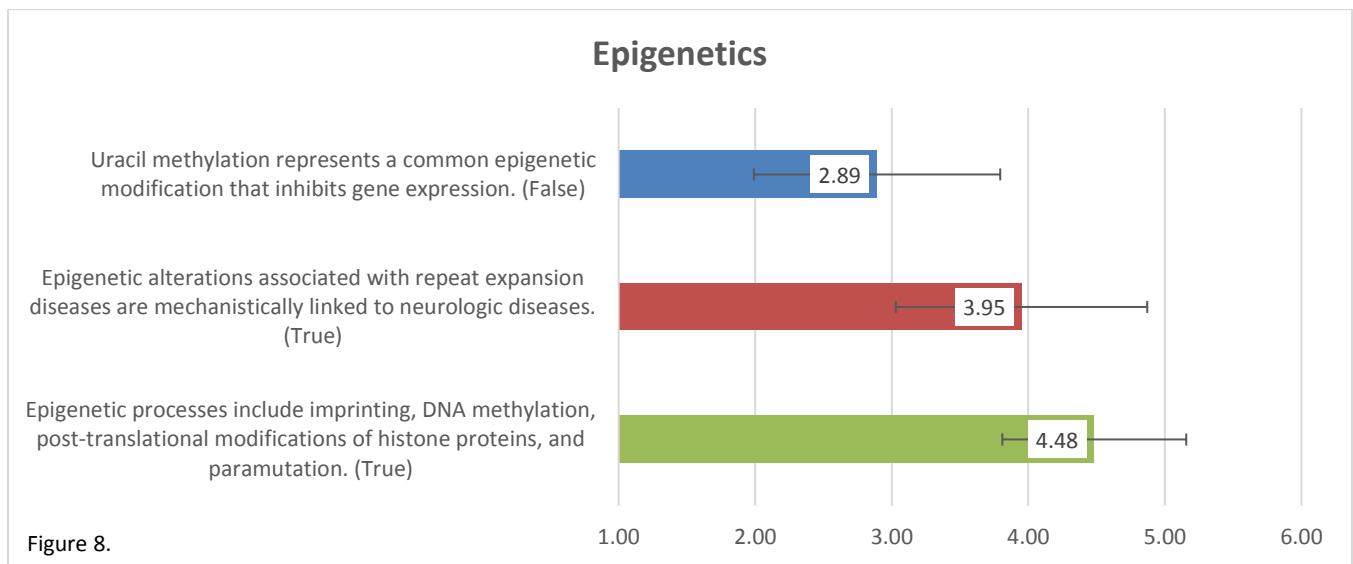
Clinical Practice/Healthcare Policy/Etc.

Statement	Score
Neurologists who have not completed a neuropathology fellowship can become certified to provide pathologic interpretation of muscle biopsies through the American Board of Psychiatry and Neurology. (False)	3.52
Medicare provides funds to teaching hospitals "earmarked" to support medical autopsies. (False)	2.87
MIPS combines Physician Quality Reporting, Value Modifier, and the Medicare EHR Incentive Program into a single program measuring quality, resource use, clinical practice improvement, and meaningful use of EHR technology. (True)	3.41

Figure 7.

Figure 8 provides the results for the three questions evaluating knowledge in the area of **epigenetics**. The first statement is false, while the second and third statements are true. Members selected responses in the desired direction for all questions in the area of epigenetics.


Epigenetics

Statement	Score
Uracil methylation represents a common epigenetic modification that inhibits gene expression. (False)	2.89
Epigenetic alterations associated with repeat expansion diseases are mechanistically linked to neurologic diseases. (True)	3.95
Epigenetic processes include imprinting, DNA methylation, post-translational modifications of histone proteins, and paramutation. (True)	4.48

Figure 8.

Conclusion:

Based on the analysis of the 2017 Membership Survey, there were many questions where responses were close to neutral (2.5 to 3.5) which provides several areas where there may be need for additional education. Moreover, several scores were on the opposite/wrong side of the scale, indicating that the following are areas of need for additional education:

- **Autopsy Pathology**: Traumatic axonal injury within the central nervous system results in axonal swellings containing all neurofilament subtypes. (True statement, mean score of 3.08)
- **Neoplastic Diseases**: Anaplastic oligodendrogliomas can show ATRX loss. (True statement, mean score of 2.78)
- **Forensic Neuropathology**: A 65-year-old male alcoholic was found unresponsive on his bathroom floor. For a long-standing heavy alcohol abuse, most commonly, you will expect a disproportionate loss of the cerebral white matter. (True statement, mean score of 2.94)
- **Neuromuscular Diseases**: Denervation changes in skeletal muscle include rimmed vacuoles. (True statement, mean score of 2.32)
- **Clinical Practice and Healthcare Quality**: Neurologists who have not completed a neuropathology fellowship can become certified to provide pathologic interpretation of muscle biopsies through the American Board of Psychiatry and Neurology. (False statement, mean score of 3.52)

Additional Survey Questions

In addition to providing data to analyze clinical assertion statements, the AANP membership provided insightful responses to assessment and methods utilized regarding molecular alterations in diffuse gliomas, send outs utilized for molecular testing, AANP Annual Meeting exhibitors and preferred social media platforms. The analysis of this data is found below.

Figure 9 provides the results of the question "Do you assess for molecular alterations in diffuse gliomas?"

Do you assess for molecular alterations in diffuse gliomas?

6%

94%

■ Yes ■ No

Figure 9.
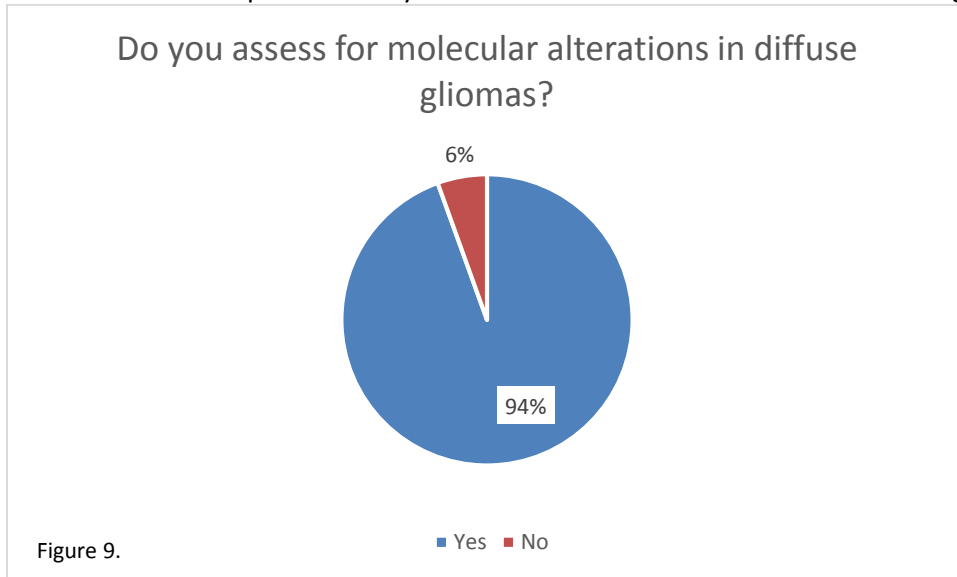
To further understand assessment for molecular alterations in diffuse gliomas, AANP members were asked to identify which molecular alterations are tested through an open-ended response. Responses included:
- IDH1/2 (79)
- ATRX (65)
- 1p19q (54)
- TP53 (48)
- BRAF (63)
- MGMT (61)
- Other responses included: H3K27M, H3K27ME3, EGFR, PTEN, FUSION, CARIS profiling, H3F3A, HIST1H1C, HIST1H3B, SETD2, pTERT, RELA, and FoundationOne molecular profiling

Additionally, through open-ended response, members were asked to identify what method(s) is utilized to assess molecular alterations on diffuse gliomas. Responses included:
- Immunohistochemistry (81)
- FISH (67)
- NGS (36)
- Sequencing/Pyrosequencing (29)
- Methylation (20)
- PCR (25)
- Send outs (21)
- Microarray (6)
- Other responses included: RNA-Seq, SNP array, Cytogenetics, OncoScan, Oncoplex, Fusion panel

Next, members responded to the open-ended question "What send outs do you need for molecular testing?" Responses included:

- IDH1/2 (5)
- ATRX (2)
- 1p19q (7)
- BRAF (15)
- MGMT (23)
- Other responses included: essentially everything, K27M and related mutations, HTERT, FGFR, other embryonal tumor markers, amplification of C19MC region on chromosome 19, FoundationOne, Myopathy panels, WES, pit-1, STAT6, NGS

Members indicated through open-ended response that they would like to see the following exhibitors at the AANP Annual Meeting:

- Antibody vendors (3)
- Book/Publisher Companies (18)
- Microscope vendors (5) – specifically Leica, Olympus and Nikon
- No preference (18)
- Other responses included: specialty labs (FoundationOne Medicine), molecular testing, digital camera vendors, NGS and IHC machine vendors

The final question asked members to state their social media preferences and uses through an open-ended response. The responses include:

- Facebook (26)
- Twitter (13)
- Instagram (6)
- LinkedIn (3)
- Doximity (2)
- E-mail (4)
- Do not use (33)