

Aurelio (Al) Muzaurieta, BA, RVT, R NCS T
Allied Healthcare Provider
Neurophysiology, Neurosonology, and Intraoperative Monitoring

Background Summary:

Mr. Al Muzaurieta is the president and technical director and James G.T. Nealis, MD, is the medical director (license #HCC 4403) of Neurodiagnostic Technologies. Mr. Muzaurieta provides neurodiagnostic and peripheral vascular ultrasound services directly under the supervision of Dr. Nealis, a board certified neurologist.

Mr. Muzaurieta holds a Bachelors degree (honors) from the University of Miami, College of Arts and Sciences, awarded in 1980. Thereafter, he completed graduate-level training in the Business Administration (MBA) Program at the University of Miami's School of Business. After college, he served as a faculty member, dean, and president at several colleges and universities in New York and Florida. His initial technical education in neurodiagnostics was completed at the Neurodiagnostic Training Center of Tampa, Florida.

In 1990, he co-founded Neurodiagnostic Technologies with Dr. David F. Scales. Over the years, several convenient lab locations in the greater Jacksonville area have been successfully opened.

Mr. Muzaurieta has been granted allied healthcare provider hospital privileges at Memorial, Baptist, Orange Park, and Shands.

Specialized Training:

- **Intraoperative Monitoring** at Duke University Medical Center (Erwin Program) in Durham, North Carolina.
- **Evoked Potentials** in Clinical Neurophysiology at Harvard Medical School (Chiappa Program) in Cambridge, Massachusetts.
- **Electroencephalography** at the University of Michigan Medical Center (Head Program) in Ann Arbor, Michigan.
- **Electromyography and Electroencephalography in Clinical Practice** at Mayo Clinic School of Continuing Medical Education in Jacksonville, Florida.
- **Neurovascular** (carotid and transcranial) and **Peripheral Vascular** Doppler/ultrasound imaging at the Bowman Grey School of Medicine of Wake Forrest University (Center for Medical Ultrasound Program) in Winston-Salem, North Carolina.
- **Echocardiography** (adult) at Thomas Jefferson University's Ultrasound Institute in Philadelphia, Pennsylvania.

Board Certifications (Allied Health):

Sonography (RVT): Passed: American Registry of Diagnostic Medical Sonography three-part exam – Ultrasound Physics and Instrumentation, Physical Principles and Instrumentation, and Vascular Technology. ARDMS #57127

Electroneurodiagnostics (R NCS T): Passed: American Association of Electrodiagnostic Technologists three-part exam – written, technical, and oral. AAET Certification #462

Professional Memberships:

- American Clinical Neurophysiology Society
- American Society of Neurophysiological Monitoring
- American Society of Electroneurodiagnostic Technologists (#2667)
- American Association of Electrodiagnostic Technologists (#462)
- Society of Diagnostic Medical Sonographers
- Society for Vascular Ultrasound (#5243)
- Florida Association of Physician Assistants (#2286)
- American Society of Echocardiography (#00035041)

Mr. Muzaurieta personally performs hundreds of neurodiagnostic and vascular studies at multiple locations throughout Jacksonville.

His laboratory assistant, Ms. Stephanie Dittaugh, MA, has been with Neurodiagnostic Technologies for over 10 years and provides experienced support during all studies. Our lab maintains a substantial reference library to help with less common studies.

AURELIO A. MUZAURIETA, NEUROPHYSIOLOGIST/SONOGRAPHER

Continuing Education Record:

- 2008 - Ninth Annual Cardiovascular & Medicine Retreat, Fl. Osteopathic Med. Assoc. - April
- Courses Required for Licensure
 - Uses & Abuses of Controlled Substances
 - Violence, Crime, and the Healthcare Worker
 - Florida Laws & Rules
 - Risk Management
 - Prevention of Medical Errors
 - Cardiovascular Disease
 - Sleep Apnea and Cardiovascular Disease
 - Automatic Implantable Cardio-defibrillators
 - Thromboprophylaxis in the Medical Patient
 - The Heart Transplant Patient—What Should a Primary Care Doctor Know?
 - The Latest on Diagnosis & Management of Pulmonary Embolism
 - Antiplatelet Therapy in the Cardiovascular Patient—What to Give and to Whom?
 - Congestive Heart Failure, State of the Art Management
 - Hypercoagulable Disease
 - Polycystic Ovarian Syndrome & Heart Disease
 - Non-Cardiac Chest Pains and the Treatment of GERD with Endoscopic Approaches
 - What a Primary Care Physician Should Know About a Post-CABG Patient
 - Complications of Myocardial Infarction—What Happened to My Patient
 - Pregnancy & Cardiovascular Disease
 - An Update on Carotid Disease—Surgery Versus Stenting
 - PAD, Limb Salvage—A New Phenomenon or Just Better Care?
 - TIAs, Migraines and Relationship with Patent Foramen Ovale/ASD and Treatment with Closure Device
 - Renal Artery Disease and What Primary Care Doctors Should Do
 - Diabetes and Cardiovascular Disease
 - Heart Valve Disease, Clinical Presentation and When to Operate
 - Hypertension and Cardiovascular Disease
 - Ponte Vedra Beach, FL (27 CMEs)
 - Society of Vascular Ultrasound (VSU) Vascular Ultrasound - April
 - Introductory Interpretation Course
 - Determine the Role and Relevance of Noninvasive Vascular Testing
 - Differentiate Between Normal and Abnormal Duplex and Physiologic Test Findings
 - Relate These Findings to Underlying Anatomic/Physiologic and Hemodynamic Changes Attributable to Vascular Disease
 - Understand and Utilize Recommended Interpretation Criteria with Understanding of the Varying Strengths and Limitations of Each Modality
 - Compose and Generate Formal Preliminary and Final Reports Relaying Important Clinical Elements
 - Recognize the Importance of Quality Assurance in the Vascular Laboratory
 - Cerebrovascular Testing Interpretation and Scanning Demonstrations
 - Arterial Physiologic Testing Interpretation and Performance Methods
 - Peripheral Arterial Duplex Scanning Interpretation and Performance Techniques
 - Abdominal and Aortic Scanning Interpretation and Techniques
 - Peripheral Venous Duplex Interpretation and Scanning Techniques
 - Orlando, FL (17.5 CMEs)

- 2007
- American Society of Electrodiagnostic Technologists (ASET) Annual Conference - July
 - Quality Care Disney Style
 - Nerve Conduction Studies
 - Quality Improvement for END Technology and Evidence-Based Practices
 - Multi-Modality Intraoperative Neuromonitoring
 - Physiology of Sensory and Motor Pathways
 - Electrocorticography and Brain Mapping in the OR
 - Digital EEG Techniques
 - Spinal Cord Monitoring Technique
 - Competency Assessment for END Educators and Lab Managers
 - Orlando, FL (25 CMEs)
 - Jacksonville Orthopaedic Institute: Spring/Summer CME—Primary Care Update - May
 - Practice Builders - April
 - The Entrepreneurial Physician
 - Business and Marketing Program for the Medical Industry
 - Electromyography and Electroencephalography in Clinical Practice (II) - March
 - Mayo Clinic College of Medicine
 - Nerve Conduction Studies – Pitfalls and Technical Problems
 - Electromyography – Unusual Muscles and Appropriate Reporting
 - EMG Signal Analysis/Video
 - Carpal Tunnel Syndrome and Other Mononeuropathies of the Upper Limbs
 - Evaluation of Radiculopathies
 - Mononeuropathies of the Lower Limbs
 - Evaluation of Cranial Neuropathies
 - Neuromuscular Junction Disorders
 - Motor Neuron Disease
 - Muscle Disease
 - EEG Correlation, Adults
 - Amelia Island, FL (33.5 CMEs)
- 2006
- Exploring Opportunities in Balance - November
 - University of North Florida (7 CEUs)
 - Labs:
 - Cadwell: Nerve Conduction and Somatosensory Evoked Potential Testing Techniques (William M. Aldrich, PhD) - July
 - Ft. Lauderdale, FL (16 hours)
 - Electronystagmography Training Program - July
 - Preferred Provider Care
 - Secure Balance Training Program
 - Evaluating and Treating Dizzy Patients
 - Balance: Neuroanatomy and Neurophysiology
 - Video/ENG Techniques and Instrumentation
 - VNG/ENG Diagnostic Interpretation

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Continuing Education Record

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2005	-	Electromyography and Electroencephalography in Clinical Practice Mayo Clinic College of Medicine Nerve Conduction Studies Localization with Nerve Conduction Studies and EMG EMG Signal Analysis Brachial Plexopathy Evaluation of Peripheral Neuropathies Electromyography Workshop EEG in Coma, Infectious Disease, and Encephalopathies Using EEG in the Evaluation of Epilepsy Intraoperative EEG Ponte Vedra Beach, FL (37 CMEs)	-	March
2004	-	Florida Academy of Pain Medicine 2004 Annual Conference Miami, FL	-	June
	-	Type 2 Diabetes: Focus on Insulin Resistance and Hypertension Jacksonville, FL (4 CMEs)	-	May
	-	The Diet Revolution Jacksonville, FL (6 CMEs)	-	April
	-	FAPA Symposium Focusing on Primary Care Jacksonville, FL (4 CMEs)	-	March
2003	-	Joint Scientific Meeting—The 50th Anniversary of the AAEM San Francisco, CA (35 CMEs)	-	September
	-	Society for Vascular Ultrasound 2003 Scientific Conference Charlotte, NC (15 CMEs) Clinical Management of the Vascular Patient Impact of Cardiac Disorders on Arterial, Carotid, and Venous Function Advanced Topics – Vascular Ultrasound and Endovascular Repairs	-	July
	-	Vascular Ultrasound Interpretation Course—Advanced (SVU) Charlotte, NC (6.5 CMEs)	-	July
	-	Comprehensive Pain Management—Baptist Health Jacksonville, FL	-	March
	-	AACN 18th Annual Meeting & Review Course Boston, MA (28.75 CMEs)	-	February
2002	-	Northeast Florida Regional Fall Symposium 2002 Primary Care and Emergency Medicine Jacksonville, FL (6 CMEs)	-	October
	-	Entrapment Neuropathies – University of Florida/Shands Jacksonville Jacksonville, FL (1 CME)	-	January
2001	-	Vertebroplasty – University of Florida College of Medicine Gainesville, FL (1 CME)	-	June
	-	Northeast Regional Summer Symposium Primary Care Medicine Florida Academy of Physician Assistants Jacksonville, FL (9 CMEs)	-	June

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- Diabetes, Clinical Atherosclerosis, and Peripheral Vascular Disease
Jacksonville Area Spring Symposium Sponsored by
The Florida Academy of Physician Assistants (3 CMEs) - April
- 2000 - Echocardiography (Adult)
Ultrasound Institute – Thomas Jefferson University
Philadelphia, PA (31 CMEs) - February
- 1999 - The American Registry of Diagnostic Medical Sonographers
Board Certified (RVT)
- Vascular Physical Principals and Instrumentation Program
Education for Sonographic Professionals
Boston, MA (12 CMEs) - March
- Continuing Medical Education
Reevaluating Neuropathic Pain Treatment
Algorithms: Management of Diabetic Peripheral Neuropathy
Jacksonville, FL (1CME) - March
- 1998 - American Association of Electrodiagnostic Medicine/Technologist
Annual Meeting and Scientific Sessions
Orlando, FL - October
- Ultrasound Physics, Instrumentation, and Vascular Technology
Education for Sonographic Professionals of Woodland, Texas
Orlando, FL (24 CMEs) - August
- Society of Vascular Technology Annual Educational Conference
Atlanta, GA - August
- Vascular Ultrasonography – Academy Medical Systems, Inc.
Orlando, FL (12 CMEs) - June
- 1997 - Society of Diagnostic Medical Sonographers Annual Education Conference
Nashville, TN - September
- Attended course work including musculoskeletal ultrasound,
advanced arterial hemodynamics and physiology, intraoperative
ultrasound, prostate and scrotal ultrasound. In addition, reviewed
basic abdominal ultrasound techniques. (18 CEU)
- Philippine Medical Society Conference
Jacksonville, FL - September
- Continuing Education Regarding Current Concepts in
Medical Therapy for Family Practice (1 CEU)
- Biosound – Advanced Vascular Duplex (with Color) Imaging
Indianapolis, IN - January
- Florida Society of Electrodiagnostic Technologists Annual
Educational Conference
Daytona, FL - January

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|------|---|---|---|-----------|
| 1996 | - | Society of Vascular Technology
Vascular Curriculum
Track I (18.25 CMEs)
Track II (12 CMEs) | - | December |
| | - | Seminar in Peripheral Vascular Disease
Sponsored by Baptist Medical Center Department of Continuing
Medical Education
Jacksonville, FL | - | October |
| | - | American Society of Neurophysiological Monitoring (ASNM)
Annual Surgical Monitoring Educational Conference
St. Louis, MO (16 CEU) | - | May |
| | - | Biosound – Professor: William S. Karkow, MD
Anatomy, Physiology, and Pathophysiology of Lower Extremity Veins,
Vein Mapping, and Diagnosis of Venous Thrombosis
Indianapolis, IN | - | March |
| 1995 | - | Chicago Institute of Neurosurgery and Neuroresearch
Neuroanatomy Workshop, Neurophysiology Program, and
Evoked Potential Review Course
Chicago, IL | - | October |
| | - | Neurovascular Ultrasound
Peripheral Vascular Ultrasound
Center for Medical Ultrasound, Bowman Grey School of Medicine
Winston-Salem, NC | - | September |
| 1994 | - | Florida Society of Electroneurodiagnostic Technologists (FSET)
Annual Educational Workshop
Ft. Lauderdale, FL | - | July |
| | - | American Society of Neurophysiological Monitoring (ASNM)
Annual Surgical Specialties Conference
Chicago, IL | - | May |
| 1993 | - | American Association of Electrodiagnostic Medicine (AAEM)/
American Association of Electrodiagnostic Technologists (AAET)
Annual Educational Conference
New Orleans, LA | - | October |
| | - | American Society of Electroneurodiagnostic Technologists (ASET)
EEG Basics
Orlando, FL | - | September |
| | - | Florida Society of Electroneurodiagnostic Technologists (FSET)
Annual Conference | - | June |
| 1992 | - | American Association of Electrodiagnostic Medicine (AAEM)/
American Association of Electrodiagnostic Technologists (AAET)
Annual Conference
Charleston, SC | - | October |

AURELIO A. MUZAURIETA, NEUROPHYSIOLOGIST/SONOGRAPHER

Allied Health Privileges for Mr. Muzaurieta:

- Memorial Hospital Jacksonville
- Baptist Medical Center
- Wolfson Children's Hospital
- Orange Park Medical Center
- Shands – Jacksonville

Board Certifications/Examinations Passed:

- Vascular Technologist (RVT) – Passed 3-part exam, registered with ARDMS #57127.
- Electroneurodiagnostic Technologist (R ED T) – Passed 3-part exam, registered with AAET #462.

Professional Liability Insurance:

American International Group (AIG)
Underwritten by: Granite State Insurance Company, Policy #5490355
Administrative Offices: 70 Pine Street, New York City, New York 10270

AURELIO A. MUZAURIETA, NEUROPHYSIOLOGIST/SONOGRAPHER

Employment Summary

1990 to Present

President and Chief Neurophysiologist, Neurodiagnostic Technologies, Inc.

1987 to 1989

Dean, St. Thomas University, Miami, FL

1985 to 1987

President, Briarcliffe College, Miami Campus, Florida
Business and Allied Health

President, Elinor Smith School, Coral Gables, FL
Secretarial Studies and Computer

President, Ward Stone College, Miami, FL
Allied Health and Business

1980 to 1985

Vice President and Faculty Member, Stenotype Institute, New York City and Long Island, New York
Director and Faculty Member, Betz College of Tampa

1977 to 1989

Faculty Member (Adjunct or while serving in the administration)

1978 to 1980

Ryder System, Miami, FL
Financial and Accounting Analyst

1981

MBA—Graduate School of Business, University of Miami, Florida

1980

BA—College of Arts and Sciences, University of Miami, Florida

1970 to 1981

Professional/semiprofessional percussionist. Participated in University of Miami band and orchestra programs.

Personal

Born: July 1, 1957, in Miami, Florida.

Bilingual in English and Spanish.

Residence: 2221 Segovia Avenue, Jacksonville, Florida.

Spouse: Lisa M. Muzaurieta, RN, MBA, Director, HCA/Supply Chain—Memorial Hospital

Five children:

Albert – University of Michigan graduate

Kristina – University of Florida graduate

Aurelio – At Bolles

Alex – At San Jose Episcopal Day School

Maria – At San Jose Episcopal Day School

INTRAOPERATIVE/ICU MONITORING SERVICES

**Aurelio (Al) Muzaurieta, B.A., R.V.T., R. NCS T.
Neurophysiology Lab Supervisor
Intraoperative Monitoring Specialist**

Concept:

Surgical monitoring protocols are designed based on individualized assessments of the neural structures at risk; therefore, no single protocol can be considered optimal. Careful multi-modality monitoring from various structures is most effective when tailored to a patient's specific clinical condition and the surgical plan. Modalities available include:

SSEP	-	Somatosensory Evoked Potentials
NMEP	-	Neurogenic Motor Evoked Potentials
BAEP	-	Brainstem Auditory Evoked Potentials
VEP	-	Visual Evoked Potential
EEG	-	Electroencephalograph/Compressed Spectral Array EEG
ECOG	-	Electrocorticography
EMG	-	Electromyography
NCS	-	Intraoperative Nerve Conduction Study
TCD	-	Transcranial Doppler (2 MHz)
ICD	-	Intracranial Doppler (16 to 20 MHz)

Intraoperative monitoring should be performed in cases where there is significant risk of neurological complication and in which the surgeon or anesthesiologist would be able to respond to prevent or minimize a postoperative neural deficit. The procedures that are listed below are generally monitored based on this philosophy.

TYPE OF PROCEDURE

TYPE OF MONITOR

A. Craniotomy/Posterior Fossa Procedures/CPA:

1) Acoustic neuroma resection	BAEP/EMG*/SSEP for larger tumors (2 cm or more)
2) Microvascular decompression of cranial, especially trigeminal (V) and facial (VII), nerves.	EMG/BAEP
3) Other cerebellopontine angle (CPA) tumor resections/brainstem lesions.	BAEP/EMG*
4) Basilar artery aneurysm.	BAEP/EEG/TCD/ICD
5) Posterior fossa arteriovenous malformations/ aneurysms (except basilar).	BAEP/EEG/TCD/ICD
6) Intrinsic brainstem tumors/vascular lesions involving brainstem.	BAEP/SSEP/TCD
7) Arnold-Chiari malformation	BAEP
8) Occipital tumor	VEP
9) Transsphenoidal resection	VEP

*Note: EMG can be active or passive. Active stimulation is utilized to objectively identify specific nerves and to differentiate neural tissue from tumor for improved resection. These techniques utilize an intracranial surgical nerve stimulator in the operative field. ICD uses a hand-held micro Doppler which is sterile.

INTRAOPERATIVE/ICU MONITORING SERVICES

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Neurophysiology Lab Supervisor
Intraoperative Monitoring Specialist

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B. Surgical Procedures Appropriate for Cranial Nerve Preservation

- | | | |
|----|--|---------|
| 1) | Anterior Skull Base Procedures | |
| | - Cavernous sinus lesions | EMG |
| | - Prepontine tumors | EMG |
| | - Petrous apex lesions | EMG |
| 2) | Lower Cranial Base Tumors | EMG |
| 3) | Repair of aneurysms of posterior circulation | |
| | - Foramen magnum | EMG/TCD |
| | - Jugular foramen | EMG/TCD |
| | - Lower clivus | EMG/TCD |
| | - Hypoglossal canal | EMG/TCD |

C. Surgical Applications for Monitoring the Facial Nerve VII

- | | | |
|---|---|-----|
| - | Vestibular schwannoma | EMG |
| - | Facial neuroma removal | EMG |
| - | Skull base tumor removal – mid, posterior | EMG |
| - | Vestibular nerve section | EMG |
| - | Facial nerve decompression | EMG |
| - | Revision mastoidectomy | EMG |
| - | Congenital atresia | EMG |
| - | Parotid gland tumor removal | EMG |
| - | Facial trauma repair | EMG |

D. Procedures Impacting Cerebral Blood Flow (Ischemia/Hypotension)

- | | | |
|----|---|------------------------------|
| 1) | Carotid Endarterectomy – Complex | EEG/SSEP*/TCD |
| 2) | Aneurysm Surgery/Aneurysm Clipping | EEG*/SSEP/TCD/20 MHZ Doppler |
| | a) PCA | |
| | b) MCA | |
| | c) ICA bifurcation | |
| | d) Ophthalmic | |
| | e) Basilar tip | |
| | f) Anterior choroidal | |
| | g) Cavernous carotid | |
| 3) | Induced EEG burst suppression or hypotension | EEG/SSEP*/TCD |
| 4) | Embolus detection during cardiopulmonary bypass | TCD |
| 5) | Arteriovenous malformations | TCD/20 MHZ Doppler |

*Optional, depending on structures at risk.

E. Functional Cortical Localization

- | | | |
|----|---|----------|
| 1) | Identification of cortical landmarks | EEG/EcoG |
| 2) | Localization of “eloquent” cortex | EEG/EcoG |
| 3) | Identification of epileptogenic regions | EEG/EcoG |

Note: Cortical localization techniques are still in the developmental stages.

INTRAOPERATIVE/ICU MONITORING SERVICES

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Neurophysiology Lab Supervisor
Intraoperative Monitoring Specialist**

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F. Spinal Procedures

- | | |
|--|---|
| 1) Resection of spinal cord tumors | NMEP/SSEP/Ultrasound |
| 2) Localization of spinal cord tumors and intra-medullary cyst prior to opening dura to plan a direct surgical approach and drain cyst | Ultrasound |
| 3) Multi-level anterior cervical discectomy/fusion/instrumentation/wires or posterior fusion | SSEP/NMEP |
| 4) Multi-level cervical/lumbar decompressive laminectomy with fusion/instrumentation/interbody graft | SSEP/NMEP |
| 5) Transoral odontoidectomy | SSEP |
| 6) Scoliosis correction | SSEP/NMEP |
| 7) Spinal fractures with cord compression | SSEP/NMEP |
| 8) Pedicle screw placement | NMEP/EMG with stimulation of cancellous bone, TAP, and screw to rule out breach |
| 9) Corpectomy | NMEP/SSEP |
| 10) Dorsal root entry zone lesion | SSEP |
| 11) Spinal cord untethering | SSEP |

Note: Neurogenic Motor Evoked Potentials (NMEP) are performed via translaminal stimulation with recording from epidural electrode.

G. Nerve Repair

- | | |
|--|--------------|
| 1) Anastomosis | NCS/EMG |
| 2) Localization of conduction block, rule out additional sub-clinical lesions | NCS/EMG |
| 3) Monitor live neurotonic discharges to minimize peripheral nerve trauma during dissection and manipulation | EMG |
| 4) Brachial plexus explorations and repairs | SSEP/NCS/EMG |

H. Urological Procedures Impacting Prostate Neural Plexus

- | | |
|-------------------------------------|-----|
| 1) Radical retropubic prostatectomy | EMG |
| 2) Prostate cryosurgery | EMG |

I. ICU Neurological Monitoring

- | | |
|--|--------------|
| 1) Head trauma (BAEP used as a serial monitor to titrate care to preserve neural function) | BAEP/TCD |
| 2) Predicting outcome in comatose patients | EEG/BAEP/TCD |
| 3) Brain death determination | EEG/BAEP/TCD |
| 4) Monitoring and detection of vasospasm post subarachnoid hemorrhage | TCD |