CLINICAL RESEARCH UPDATE

Jeanie Luciano MS, RN, CNRN, CRNP, FAHA, SCRN
Martha Power MSN, RN, FAHA, SCRN
Sharon Heaton MA, BSN, RN EMT-P
DISCLOSURES

NONE

OBJECTIVE

IDENTIFY POTENTIAL RESEARCH OPPORTUNITIES FOR YOUR PRACTICE
TARGET: STROKE PHASE III

THE PRIMARY GOALS FOR TARGET: STROKE PHASE III ARE:

ACHIEVE DOOR-TO-NEEDLE TIMES WITHIN 60 MINUTES IN 85 PERCENT OR MORE OF ACUTE ISCHEMIC STROKE PATIENTS TREATED WITH IV THROMBOLYTICS.

ACHIEVE DOOR-TO-DEVICE TIMES (ARRIVAL TO FIRST PASS WITH THROMBECTOMY DEVICE) WITHIN 90 MINUTES FOR DIRECT ARRIVING PATIENTS AND WITHIN 60 MINUTES FOR TRANSFER PATIENTS IN 50 PERCENT OR MORE OF ACUTE ISCHEMIC STROKE PATIENTS TREATED WITH ENDOVASCULAR THERAPY.

STARTING IN 2020, HOSPITALS WILL HAVE THE OPPORTUNITY TO BE RECOGNIZED WITH A NEW TARGET: STROKE HONOR ROLL LEVEL. THE HONOR ROLL LEVELS WILL INCLUDE: TARGET: STROKE HONOR ROLL, TARGET: STROKE HONOR ROLL-ELITE, TARGET: STROKE HONOR ROLL-ELITE PLUS, TARGET: STROKE HONOR ROLL ADVANCE THERAPY.

WEBINAR APRIL 29TH 1-2PM

TELESTROKE

PREHOSPITAL ACUTE STROKE CARE

• NEW ERA IN ACUTE STROKE CARE
  • New treatment option
  • Expansion of treatment time window
  • Tissue-based selection
  • New hospital designations
  • New prehospital stroke severity tools
  • MSUs

• INTEGRATION OF THE OLD WITH THE NEW
  • Time is brain
  • IV thrombolysis first if eligible
  • Stroke Survival Chain - EMS are key players
TELESTROKE

Telestroke as a tool for Interfacility Endovascular Transfers

Lawrence R. Wechsler, M.D.
Chairman, Department of Neurology
University of Pittsburgh Medical School

Telestroke Triage of Acute Stroke

Selection for EVT
- Time
  - LSW < 6 hrs
  - LSW < 24 hrs
- Wakeup or unknown
- NIHSS
- CT / CTA / CTP
- HDMCA
- ASPECTS
- RAPID
- Consent

Comprehensive Stroke Center

Transfers for EVT in Telestroke Network

- Transfers for EVT in an academic telestroke network 2011-2015
- 1 hub, 40 spokes
- Longer transfer times associated with lower probability of EVT
- 27% of eligible transferred pts underwent EVT

Ragesh kard et al. Stroke 2018

Transfers for EVT in UPMC Telestroke Network 2017-2018

1 Hub, 39 spokes
1760 Teleconsults
402 Transfers
99 EVT (25%)
Telestroke and EVT

- Thrombectomy volume increasing after positive trials
- Identification of eligible patients key to appropriate triage
- Telestroke facilitates triage from PSCs and MSUs

Telemedicine across the Continuum of Care

<table>
<thead>
<tr>
<th>Telestroke</th>
<th>Teleneurology</th>
<th>Telerehab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prehospital</td>
<td>Acute Stroke</td>
<td>Hospital Care</td>
</tr>
</tbody>
</table>

[Images of medical equipment and medical professionals]
Conclusions

- This observational study, with adjustment for key prognostic features, estimates that out of every 1000 patients treated with MSU rather than conventional ED thrombolysis, 176 will have a less disabled final outcome, including 79 more who would be disability-free.

Conclusions

- Pre-hospital thrombolysis on MSU shortened the time to thrombolytic treatment compared to conventional EMS care.
- MSU care was associated with improved functional outcomes in patients with acute ischemic stroke.
ENCHANTED

Main results - BP intensity arm
ISC Hawaii - 7 February 2019

Craig Anderson MD PhD
Tom Robinson MD

For the ENCHANTED Investigators/coordinates, 110 hospitals, 15 countries


ENCHANTED

- aim to answer research questions to improve outcomes in thrombolysed acute ischemic stroke

- Compared to standard-dose (0.9 mg/kg) 
  is low-dose (0.6 mg/kg) i.v. rtPA (alteplase)
  'non-inferior' clinical outcome (mRS ;
  safer - lower risk of major sICH?

- Controversy of BP control – potential benefits ↓ICH vs ↑Ischemia
- Compared to guideline recommended BP control (<180mmHg SBP target after rtPA), is BP lowering (<140mmHg SBP target):
  superior - clinical outcomes (mRS ordinal shift) at 90-days
  safer - lower risk of serious intracranial hemorrhage

Published 2016
ENCHANTED

Study Outline
Protocol & analysis plan – both published in *Int J Stroke*

- **Design**: Prosp. central randomized, open, blinded outcome (PROBE)
- **Patients**: alteplase-eligible/treated acute ischemic stroke <4.5hr of onset; SBP ≥150mmHg; treatment <6 hrs of stroke onset
- **Intervention** - intensive (SBP <130-140mmHg; <1hr + 72hrs), local agents; 
guideline – (SBP <180mmHg); background best practice + EVT
- **Primary outcome** – shift comparison mRS scores at 90 days
- **Safety outcomes** – any intracranial hemorrhage (key); other outcomes of 
symptomatic intracerebral hemorrhage (sICH) by standard criteria; all by 
central blind adjudication
- **Secondary efficacy outcomes** – Good recovery (mRS 0-1), other disability 
measures, health-related quality of life
- **Subgroups** - including interaction with rtPA dose
- **Quality control**: Central and site monitoring

ENCHANTED - major findings

In lysis-eligible patients with acute ischemic stroke, more intensive BP lowering (<140mmHg target):

- **Not shown to be superior** to guideline-recommended BP lowering (<180mmHg) for primary disability outcome
- **Consistency** of neutral findings in all pre-specified subgroups
- **Shown to be safe** with respect to mRS scores and SAEs
- **Evidence** for lower risk of intracranial hemorrhage (including intracerebral hemorrhage)
Clinical implications

Role of more intensive BP lowering than recommended in guidelines (systolic <180mmHg) in lysis-eligible AIS patients?
- No evidence to support a major change in the guidelines
- Treatment – safe, potential to reduce serious brain haemorrhage
- ENCHANTED not fully resolved uncertainty for optimal level / approach for BP control for recovery, and...
  - Further research - brain imaging database analyses to understand why reduction in risk of ICH did not translate into improved recovery
  - Further trial - BP lowering in LAO/EVT cases (ENCHANTED2 planned)

PRIMARY EFFICACY OUTCOME WAS FAVORABLE
FUNCTIONAL OUTCOMES DEFINED AS A MODIFIED RANKIN 0-1 AT 90 DAYS

FAVORABLE OUTCOME – NO DIFFERENCE
• 78.2 % in subjects who received IV alteplase
• 81.5 % in subjects who received aspirin
• Adjusted risk difference, -1.1%; 95% CI (not statistically significant)

SAFETY ENDPOINT: SYMPTOMATIC HEMORRHAGIC CONVERSION WITHIN 36 HOURS OF IV STUDY TREATMENT
• 3.2 % (5 subjects) in IV alteplase arm, 0% in aspirin arm
• Risk difference 3.3%; 95% CI, 0.8% – 7.4%

“IT’S THE DATA THAT WE’VE GOT, AND IT’S UNDERPOWERED, BUT IT CERTAINLY HAS SWAYED ME TOWARDS TYPICALLY NOT TREATING THESE PATIENTS,” DR. KHATRI TOLD TCTMD. IN DISCUSSIONS WITH HER COLLEAGUES, SHE ADDED, IT’S “GENERALLY BEEN THE CONSENSUS THAT WHEN YOU SEE THESE DATA, WHEN YOU SEE THAT THERE’S A REAL HEMORRHAGE RISK AND THERE ISN’T ANY SIGNAL OF BENEFIT, IT’S TOUGH TO JUSTIFY TREATING THEM.”

POOJA KHATRI MD  PRINCIPLE INVESTIGATOR  UNIVERSITY OF CINCINNATI, OH

“I’VE AGONIZED OVER THIS AT TIMES, AND I THINK THIS WILL MAKE ME MORE CONFIDENT IN MAKING THE DECISION NOT TO TREAT THESE PATIENTS. FOR THESE PATIENTS, TREATMENT WITH ASPIRIN ALONG WITH CLOSE MONITORING MAY BE AN APPROPRIATE COURSE OF ACTION.”

WILLIAM POWERS UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL


WHAT ABOUT LOW NIHSS BUT DISABLING SYMPTOMS?

THIS STUDY DOES NOT APPLY TO PATIENTS WITH DISABLING SYMPTOMS

AUTHORS STATE PATIENTS WITH LARGE VESSEL OCCLUSIONS REQUIRE FURTHER STUDY AS THEY MAY BE MORE LIKELY TO DETERIORATE
Hypothesis

Ischaemic stroke patients selected with significant penumbral mismatch at 4.5 - 9 hours post stroke onset, or following ‘Wake Up Stroke’, will have improved clinical outcomes when given intravenous tPA compared to placebo

Study Design

Phase III randomised, multicentre, double-blinded, stratified, placebo controlled trial (tPA 0.9mg/kg vs placebo) with imaging selection (CTP or MR Diffusion/Perfusion)

Stratified for time of randomisation after stroke
1. 4.5 – 6 hours
2. >6 – 9 hours
3. Wake Up Stroke

Sample size = 310 patients
**Perfusion Imaging Selection**

- **RAPID** automated CT perfusion or MR perfusion
- **Penumbral mismatch criteria**
  1. Hypoperfusion to core volume ratio > 1.2
  2. Perfusion lesion - core absolute difference > 10 ml
  3. Ischaemic core lesion volume ≤ 70 ml

---

**Early Cessation of Recruitment**

After the publication of the WAKE UP Study, the Steering committee sought a recommendation from the DSMB and a decision was made to cease recruitment on 6th June 2018.

In total there were **225 patients** recruited.

There were 112 patients received placebo and 113 patients received thrombolysis.
Conclusions

TPA treated patients presenting within 9 hours or with wake up stroke selected by automated perfusion imaging achieved a significantly higher rate of excellent functional outcome compared to placebo.

Per Protocol Analysis showed a similar primary outcome as the positive Intention To Treat Analysis result but under-powered due to loss of patients.

For secondary and other outcomes in per protocol analysis: there was superior reperfusion, recanalization and early neurological improvement compared to placebo.

There was an increase in the rate of sICH consistent with other thrombolytic trials, but this was not associated with increased mortality and did not negate the positive result of improved rate of excellent functional outcome.

EXTEND is the first positive thrombolysis trial in an extended time window using automated penumbral imaging.
COLLATERALS!

Results from the DEFUSE 3 Trial:
Good Leptomeningeal Collaterals Are Associated with Reduced Core Infarct Size but Not Improved Neurologic Outcome

Adam de Havenon, Michael Mlynash, May A. Kim-Tenser, Maarten Lansberg, Thalabe Leslie-Mazwi, Soren Christensen, Ryan McTaggart, Matthew Alexander, Greg Albers, Joseph Broderick, Michael Marks, Jeremy J. Heit

On behalf of the DEFUSE 3 Investigators

Conclusions

- Good collaterals:
  - Smaller baseline core volume, reduced core growth
  - Not associated with neurologic outcome, success of EVT, hemorrhagic complications, or death
  - No association between collaterals and many traditional demographic predictors of baseline collateral status
  - These unexpected findings require further study

TENECTEPLASE

TENecteplase (TNK) – potentially a superior stroke thrombolytic

TNKase Molecule: Three Targeted Substitutions

TENECTEPLASE

Summary – TNK for stroke

We know
- Easier to deliver - “drip and ship”
- Less risk of major brain haemorrhage
- Prior to thrombectomy, superior to alteplase
- In other lysis eligible patients at least non-inferior to alteplase

Current state of play
- In Australia 2 states have replaced alteplase with TNK for pre-thrombectomy lysis
- In India, generic TNK is licensed for stroke treatment
- There are at least two generic TNK being trialled in China for stroke

SHINE

The SHINE Trial

Intensive versus Standard Treatment of Hyperglycemia in Acute Ischemic Stroke

Karen Johnston, Askiel Bruno, Qi Pauls, Christiana Hall, Kevin Barrett, William Barsan, Amy Fansler, Katrina Van de Bruinhorst, Scott Janis, Valerie Durkalski-Mauldin, for the NETT and SHINE Investigators

Stroke Hyperglycemia Insulin Network Effort
Hypotheses

Efficacy
- Intensive glucose control to target range of 80-130 mg/dL with IV insulin infusion in hyperglycemic acute ischemic stroke patients within 12 hours of symptom onset will improve favorable outcome by absolute 7% as measured by mRS at 90 days after stroke.

Safety
- Intensive glucose control will be safe as measured by <4% increase in severe hypoglycemia (<40 mg/dL) compared to standard control in acute ischemic stroke patients treated up to 72 hours.

Design
- Prospective, multicenter, randomized, blinded
  - 70 US sites, maximum of 1400 patients
- Randomization balance for NIHSS & tPA
- Single blind treatment
- Double blind outcome assessment
- Treatment (up to 72 hours)
  - Intensive: Insulin drip – target 80-130 mg/dL
  - Standard: SQ insulin q6 hr – target <180 mg/dL
- 4 planned interim analyses (500, 700, 900, 1100)
Conclusions

- Successful & efficient completion of SHINE Trial
- Answered question of best glucose control for hyperglycemic AIS
- Intensive glucose control (80-130 mg/dL) does not improve 90 day functional outcome and increases risk of severe hypoglycemia
- SQ insulin with target <180 mg/dL is preferred

BACK TO BASICS: ADHERENCE WITH GUIDELINES FOR GLUCOSE AND TEMPERATURE CONTROL IN AN AMERICAN COMPREHENSIVE STROKE CENTER SAMPLE

OBSERVATIONAL STUDY AT 5 CSCS
235 ACUTE STROKE PTS (87% AIS, 13% ICH)
1669 CONSECUTIVE GLUCOSE MEASUREMENTS
3782 CONSECUTIVE TEMPERATURE MEASUREMENTS

POOR GLUCOSE CONTROL IN 33% OF PATIENTS (DEFINED AS > 180 MG/DL). MOST FREQUENT METHOD OF CONTROL WAS REGULAR INSULIN SLIDING SCALE WITHOUT BASAL DOSING

POOR TEMPERATURE CONTROL IN 10 % (DEFINED AS >38 DEGREES C) AND 39% DID NOT HAVE TEMPERATURE RECORDED IN THE ED

LOWER NIHSS AND WELL-CONTROLLED GLUCOSE WERE INDEPENDENT PREDICTORS OF FAVORABLE OUTCOME (MODIFIED RANKIN SCALE SCORE 0-2) IN REPERFUSION PATIENTS

Journal of Neuroscience Nursing: June 2018 - Volume 50 - Issue 3 - p 131–137
doi: 10.1097/JNN.0000000000000358
BACK TO BASICS

"GLUCOSE AND TEMPERATURE CONTROL MAY BE OVERLOOKED IN THIS ERA OF RAPID STROKE DIAGNOSIS AND TREATMENT. ACUTE STROKE NURSES ARE WELL POSITIONED TO ASSUME LEADERSHIP OF GLUCOSE AND TEMPERATURE MONITORING AND TREATMENT".

ANNE ALEXANDROV PHD, RN,-BC CCRN, ANVP NVRN-BC, FAAN

TELEREBHABILITATION IN THE HOME VS THERAPY IN CLINIC FOR PATIENTS WITH STROKE

Unmet need: delivery of large doses of rehab therapy

Motor deficits are a major contributor to post-stroke disability.

Animal studies with favorable plasticity use high rehab doses.
(600 repetitions of pellet retrieval/day, Nudo 1996)

In humans, higher rehab therapy doses may improve outcomes.

Unmet need: delivery of large doses of rehab therapy

Motor deficits are a major contributor to post-stroke disability.

Animal studies with favorable plasticity use high rehab doses.
(600 repetitions of pellet retrieval/day, Nudo 1996)

In humans, higher rehab therapy doses may improve outcomes.

Quantity of rehab therapy often low in humans, however:
(1) financial constraints
(2) patient can't travel to a rehab therapy provider
(3) shortage of rehabilitation care in some regions
(4) poor patient compliance with assignments
(5) limited dose during stroke rehabilitation
(mean of 32 arm repetitions/session, Lang 2009)

Telerehabilitation in the Home Versus Therapy In-Clinic for Patients With Stroke

124 subjects with stroke 4-36 weeks prior and arm motor deficits

Randomized at 11 US sites to intensive arm motor therapy
(a) traditional In-Clinic, versus
(b) in-home Telerehabilitation

Treatment
36 sessions (18 superv’d, 18 unsuperv’d), 70 min, over 6-8 wk
Intensity, duration, and frequency of therapy matched

Assessor-blind, randomized, non-inferiority design

clinicaltrials.gov NCT02360488
**TELEREHABILITATION**

Primary outcome measure: change in arm motor Fugl-Meyer score from baseline to 30 days post-therapy

Intent To Treat (all randomized subjects), multiple imputation for missing data

Secondary outcome measures:

[1] Gains in stroke knowledge
[2] Change in motivation over time

Analysis: If the non-inferiority margin (30% of ΔFM for In-Clinic group) falls outside the 95% CI for the difference in ΔFM between groups, then telerehabilitation would be considered non-inferior.

Sample size: Assumed In-Clinic group mean ΔFM of 6.85 points and SD=3.8, study needed 124 subjects for 85% power.

---

**TELEREHABILITATION**

**In-Clinic Group**

- **18 supervised treatment sessions** (70 minutes)
  - At the research center, with a therapist
- **18 unsupervised treatment sessions** (70 minutes)
  - In the home, using an individualized booklet

**Telerehabilitation**

- Study team delivered a telerehabilitation system to the home
- **18 supervised treatment sessions** (70 minutes)
  - In the home, 30 min therapist videoconference at start
- **18 unsupervised treatment sessions** (70 minutes)
  - In the home, using telerehab system (no therapist contact)

Games could be adjusted in relation to motor control, e.g., movement speed, timing, planning, range of motion, target size, cognitive demand, hemifield bias, bimanual, sustained, proximal vs. distal, and 1st person vs. 3rd person perspective
**Conclusions**

Arms improved, as Fugl-Meyer score gains (7.86-8.36 points) exceed minimal clinically important difference (4.25-7.25).

These arm motor gains were comparable for home-based telerehab as compared to in-clinic therapy.

Telerehab was also comparably efficacious at patient education.

In future studies, telerehabilitation might be
-- paired with a drug (experience-dependent plasticity)
-- used to obtain detailed remote measurements
-- used to treat other neurological domains (language, leg, etc.)
-- studied to improve access and lower cost of post-stroke rehab

---

**AHA/ASA CVSN STROKE ARTICLE OF THE YEAR**

Published online 2016 Nov 5. doi: 10.1093/geront/gnw135

Improving Stroke Caregiver Readiness for Transition From Inpatient Rehabilitation to Home

Barbara J Lutz, PhD, RN, CRRN, FAHA, FAAN,\(^1\)\(^2\) Mary Ellen Young, PhD,\(^3\) Kerry Rea Ceasy, PhD, ARNP,\(^2\) Crystal Marty, MSN, RN,\(^2\) Lydia Eisenbrandt, MA,\(^1\) Jarrett N Bruny, MPH,\(^2\) and Christa Cook, PhD, RN, MPH\(^2\)
INADEQUATE CARE GIVER PREPARATION CREATES A SECOND CRISIS FOR SURVIVORS AND THEIR FAMILY CAREGIVERS AS THEY TRANSITION HOME

THIS GROUNDED THEORY STUDY ANALYZED 81 INTERVIEWS FROM 40 CAREGIVERS CARING FOR 33 STROKE PATIENTS DURING INPATIENT REHABILITATION AND UP TO 6 MONTHS AFTER DISCHARGE

CAREGIVERS DESCRIBED CRITICAL AREAS WHERE THEY FELT UNPREPARED TO ASSUME THE CAREGIVER ROLE

THESE EXPERIENCES ILLUSTRATED THE GAP IN ASSESSING AND ADDRESSING CAREGIVER READINESS TO MEET THE CARE NEEDS OF THE STROKE SURVIVOR AS THEY TRANSITIONED HOME, RESULTING IN ISSUES POST-DISCHARGE

LUTZ AND COLLEAGUES RECOMMEND A 3 STEP PROCESS TO IMPROVE PREPARATION FOR DISCHARGE

3 STEP PROCESS FOR ASSESSING AND PREPARING THE FAMILY CAREGIVER FOR ASSUMING THE CARE GIVING ROLE

CONDUCTING A SYSTEMATIC RISK ASSESSMENT OF THE DYAD, WHICH INCLUDES ASSESSING THE PATIENT’S NEEDS AND THE CAREGIVER’S COMMITMENT AND CAPACITY TO ADDRESS THOSE NEEDS

IDENTIFYING AND PRIORITIZING GAPS BETWEEN THE CARE RECIPIENT’S NEEDS AND CAREGIVER’S READINESS

DEVELOPING A PLAN TO ADDRESS THE GAPS
“IN ORDER TO MINIMIZE CAREGIVER BURDEN AND IMPROVE OUTCOMES FOR STROKE PATIENTS AND THEIR FAMILY CAREGIVERS, WE MUST CONSIDER THE FAMILY UNIT AND INDIVIDUALIZE CARE PLANS TO ADDRESS THEIR SPECIFIC NEEDS. THE CRITICAL FIRST STEPS IN THIS PROCESS ARE TO CONDUCT A COMPREHENSIVE ASSESSMENT OF THE PATIENT’S NEEDS AND, EQUALLY IMPORTANT, THE CAREGIVER’S READINESS TO ASSUME THE CAREGIVING ROLE. THIS WILL ALLOW US TO IDENTIFY GAPS AND PRIORITIZE INTERVENTIONS THAT ARE APPROPRIATELY TAILORED TO THE NEEDS OF THE FAMILY TO ENSURE APPROPRIATE FAMILY-CENTERED CARE”

Barbara Lutz

NEW TECHNOLOGIES!

AlphaStroke
- EEG (electroencephalography) based technology
- “Place a few electrodes on easily accessible places on the head”
- About 1 minute of testing
  - Binary decision: stroke or no stroke
- Identifies asymmetry in EEG signals between the two sides of the brain
- Handheld (about the size of a smart phone)
NEW TECHNOLOGIES

BrainPulse

- Developed by Jan Medical Inc., Mountain View, CA
- Multiple indications: stroke, concussion, vasospasm, AVM, aneurysm
- Technology utilizes accelerometers
- About 4 minutes from start to result

Images courtesy of Jan Medical, Inc.

NEW TECHNOLOGIES

BrainPulse

Accelerometer Technology:
- Surge of blood enters the brain with each heartbeat
- This blood flow is not symmetric
  - Right ICA closer to left ventricle than left ICA
- Brain in "oscillations" with each heartbeat
- Accelerometers detect these oscillations
- Machine learning
- Patterns recognized, algorithms developed for specific brain pathologies
NEW TECHNOLOGIES

A non-invasive wireless neurological device

“Rapid assessment may lead to early intervention, better outcomes, and reduced hospital costs.”

Focus on triage of stroke patients

www.cerebrotechmedical.com

NEW TECHNOLOGIES

Infrascanner

Left and right frontal, temporal, parietal, and occipital areas

Absorbance of light at selected wavelengths is recorded

www.infrascanner.com

Reported applications: EDs, ICUs, Pre-hospital, Military, Field Hospitals, Sports Medicine, Remote Locations
NEW TECHNOLOGIES

**Lucid and NeuralBot**

Products developed by Neural Analytics, Inc., Los Angeles, CA Devices utilize transcranial doppler (ultrasound) technology
- The Lucid™ Robotic System (Lucid™ M1 Transcranial Doppler Ultrasound System® and NeuralBot™ System)
  - Integration of ultrasound, robotics, and machine learning
- Combining transcranial doppler with a headset containing robotics
- Doppler analyzed by Lucid system, visual and numerical output
- Machine learning based on data patterns

NEW TECHNOLOGIES

www.neuralanalytics.com
NEW TECHNOLOGIES!

Sense
- Developed by Sense Diagnostics, LLC, Cincinnati, OH
- Low powered electro-magnetic pulse, radiofrequency range
- Detects changes in the signal that may indicate:
  Acute hemorrhage, swelling, or seizure

Device consists of:
1) A 9 antenna array (72 data points per scan)
2) Driving electronics for the array
3) Spectrum analyzer coupled with a computer

NEW TECHNOLOGIES!

Sense
ED, ICU, OR, prehospital
- Continuous monitoring, such as in the ICU
- Information about neurological worsening

Image courtesy of Sense Diagnostics, LLC
NEW TECHNOLOGIES!

Strokefinder

Strokefinder MD100, Medfield Diagnostics, Göteborg, Sweden

- Microwave technology
  - Microwaves scatter in the matter
  - Antennas surround the brain
  - Mathematical processing, generation of diagram/picture

Microwave devices:
- Simpler components
- More complex signal processing

NEW TECHNOLOGIES!

Strokefinder

Applications include:
- Prehospital screening
- Stroke
- Traumatic Brain Injury

Microwave technology potentially promising for new, cost effective imaging devices

www.medfielddiagnostics.com

NEW TECHNOLOGIES!

Artificial Intelligence in Prehospital Stroke Detection Using Computer Vision Analysis

*Automation In Motion*

Mark McDonald, MD
AHA/ASA International Stroke Conference
February 6, 2019

THANK YOU

SHARON HEATON SHARON.HEATON@OSUMC.EDU
JEANIE LUCIANO JEANIE.LUCIANO@UPHS.UPENN.EDU
MARTHA POWER MPowerStroke@Gmail.com