Science Behind Battlefield Acupuncture

Presenter:

Kelly Armstrong, OTR/L, SIPT, MPP

Author, Lecturer, “Queen of Scars”

Detailed Autonomic Nervous System Analysis of Microcurrent Point Stimulation Applied to Battlefield Acupuncture (BFA) Protocol

Published March 2017: Medical Acupuncture

Study was aimed at revealing:

Whether Microcurrent Point stimulation (MPS) when applied to BFA protocol can modulate any variables within the autonomic nervous and endocrine systems for a N=8 patient sample.

What is Battlefield Acupuncture?

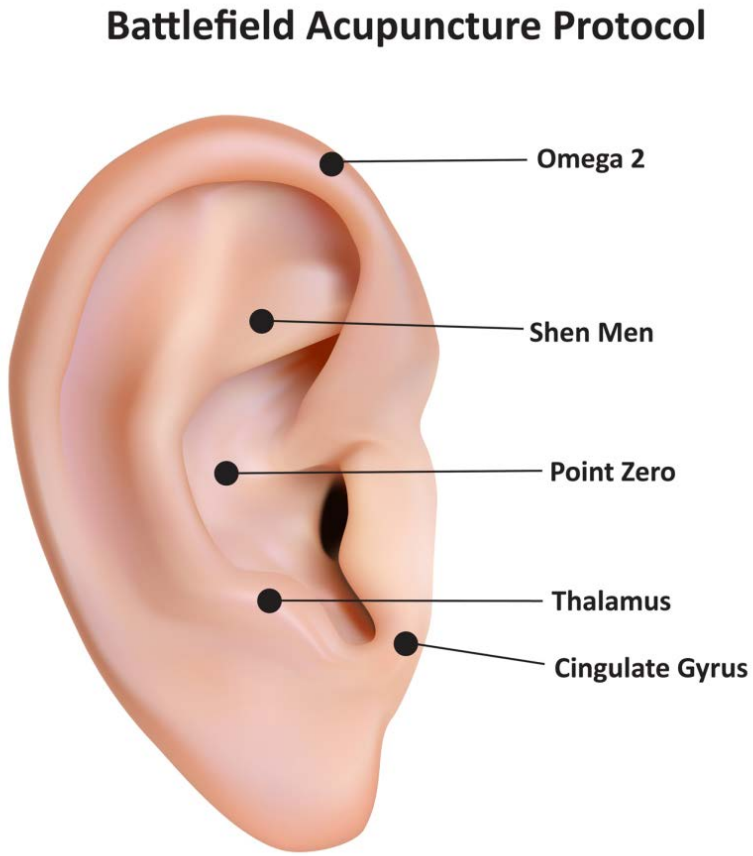
Battlefield Acupuncture [BFA]

Col. Dr. R Niemtzow of Andrews AFB,
as a standardized Protocol to provide a simple, easy to apply, non-pharmaceutical solution for the Military's pain management needs in the clinical and battlefield settings.

BFA is a version of Auriculotherapy (also **auricular therapy**, ear **acupuncture**, and auriculoacupuncture)… alternative medicine based on the idea that the ear is a micro system, which reflects the entire body, represented on the **auricle**, the outer portion of the ear.

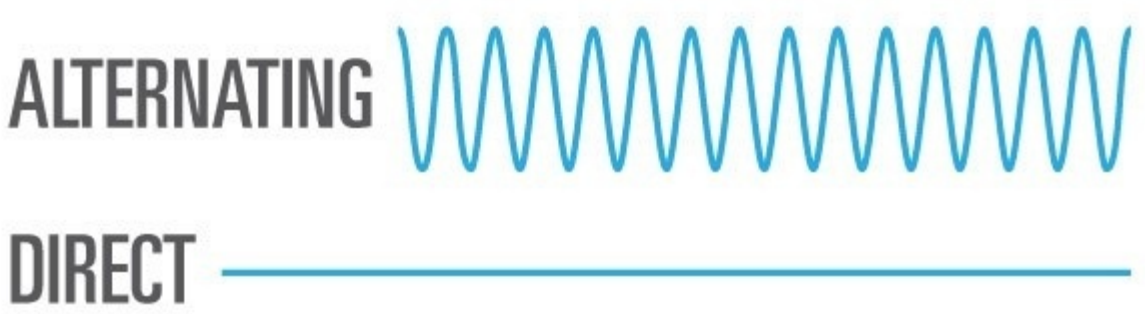
The protocol involves the applications of a stimulas to 5 key acupuncture ear (auricular) points that isolate the ANS & CNS's role in the chronic/acute pain cycle.

Dozens pubmed studies referencing BFA

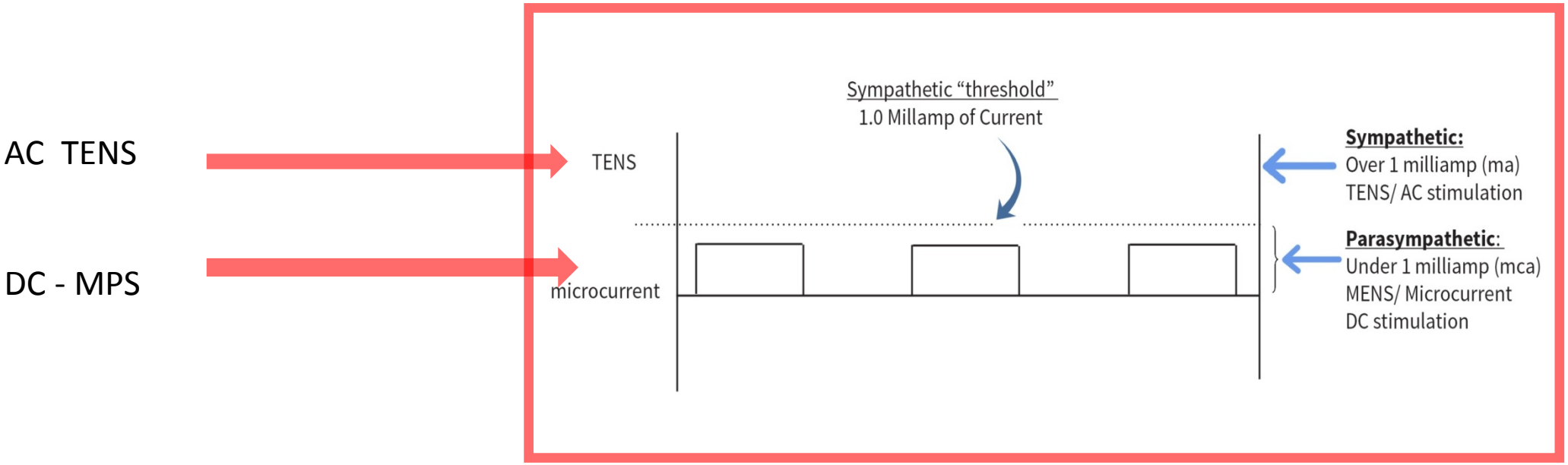


What is MPS Therapy?

- MPS is the application of concentrated **DC** microcurrent stimulation (<1ma) to *acupuncture and active trigger points*
- *MPS is different than widely applied* ***Electro-acupuncture (EA)***
- ***EA*** *is* the application of concentrated **AC** stimulation (>1ma) to *acupuncture-trigger points.* (**Standards for Reporting Electroacupuncture Parameters,** Medical Acupuncture. Oct 2016)
- It is theorized ***MPS and EA*** have different modulating effects on the autonomic nervous system and stress levels



MPS vs EA: Sympathetic vs Parasympathetic Influence



- AC Milliamp is sympathetically UP-regulating
- DC Microcurrent is sympathetically DOWN-regulating

*Weak stimuli heals, strong stimuli inhibits…. (**Arnold-Shultz Law, Cheung 1982, Armstrong 2017**)*

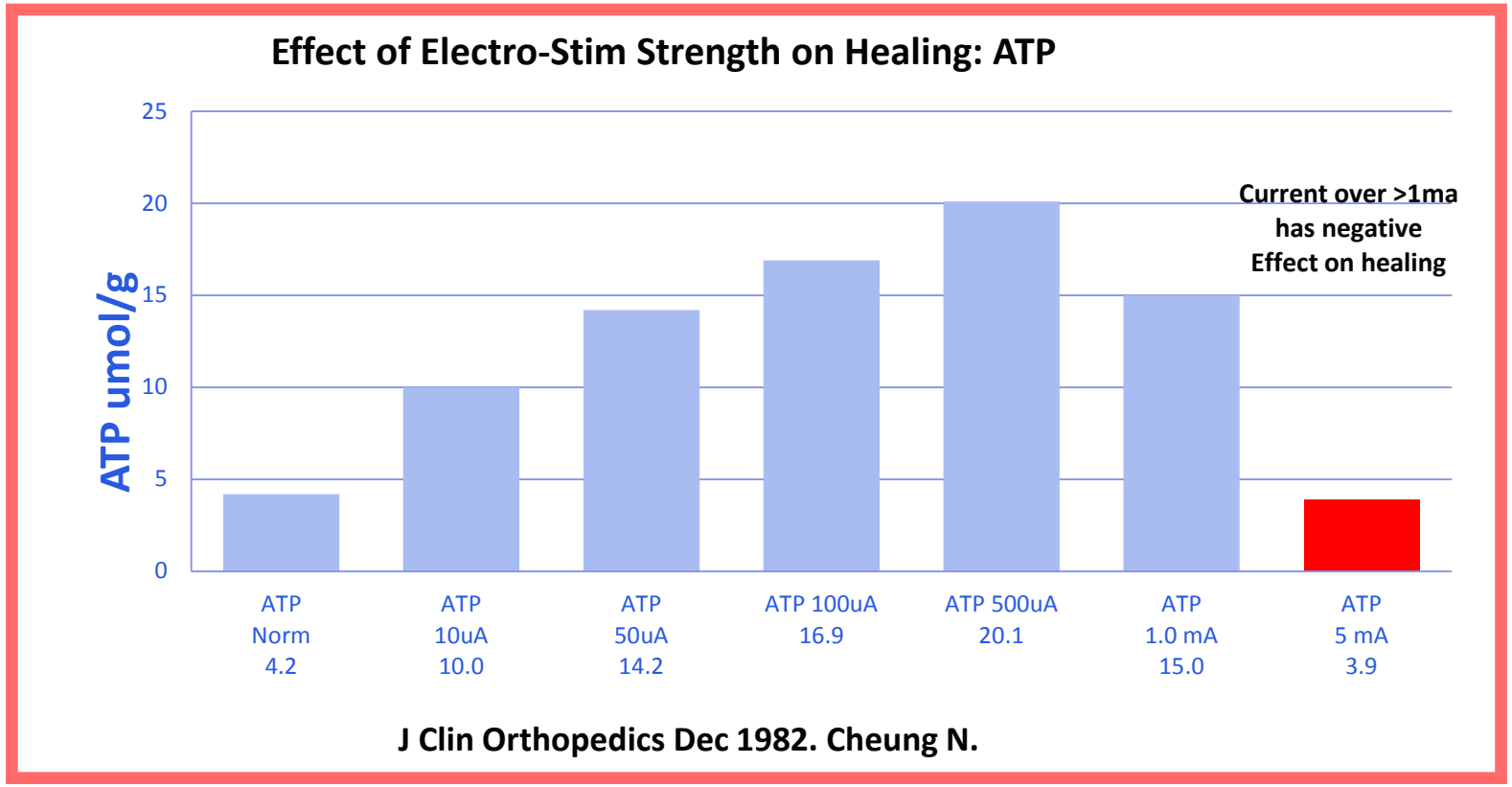
Effect of Electrical Current Strength on Healing

- This landmark study proved that different current levels (amplitude or strength) have vastly different effects on the healing process

- Microcurrent increase: ***ATP production, protein synthesis and metabolism***

- Any electro current (Ac or DC) applied over 1ma (1000uA) inhibits and shuts down the healing process.. Proving ***Arnold-Shultz Law***

- **AC TENS is always applied over 1ma**



Study Design

Patient Selection

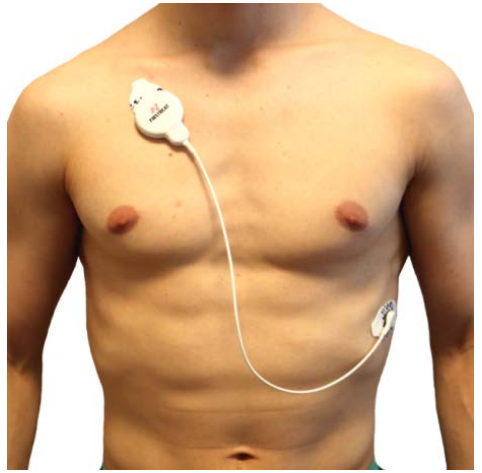
- **8 patients with a history of chronic pain**
- **Mean: Age 37.75 (SD 18.18),**
- **duration of pain 4.85 years (SD 6.13)**

Methods:

- Received MPS to 5 BFA points in each ear for 30 sec/pt **<=5 min**
- **Measurements: ECG, and Saliva Cortisol**

The Equipment to Scientifically Measure Stress

- **Autonomic nervous system (ANS)** markers measured pre-post with ANS1 Biosensor a sophisticated FDA-approved electrocardiogram (ECG) device that measures HRV sympathetic, parasympathetic, adrenergic, and cardiovagal functions.
- This *diagnostic device* is available only to Physicians.
- The device measures 27 physiological "markers", placing each patient measurement categorically into abnormal, borderline and “optimal “Goal columns.
- Three ***KEY*** health markers discussed are **STRESS, HRV and HF.**



Patient

Name: Doris [redacted]
Weight: 161 Lbs
Height: 5' 1" BMI: 30.4
DOB: 11/19/1936
Gender: Female

Physician

Name:
Address:
Referral:

Clinical Context

Physician's notes

	Markers	Goal	Borderline	Abnormal	Norms	Units	Marker of
ANS function	Total Power			174	>=780	ms2	Overall ANS activity
	SDANN			18	>=40	ms	Sympathetic activity
	RMSSD		25		>=35	ms	Parasympathetic activity
	Stress Index		305		<=180	%	Sympathetic activity
	HF			57	>=220	ms2	Parasympathetic activity
	LF/HF	1.7			<=2	Ratio	Balance sympathetic/parasympathetic
SMR	ESRNO		51		>=65	µSi	Microcirculation response
	ESR L		1.98		<= 2	Sec	C-Fiber velocity
	Peak C		79		>=90	µSi	C-Fiber function
CARTs	SPRV	-28			> -40	mmHg	Adrenergic response
	DPRS	4			<=5	mmHg	Adrenergic response
	SPRS	-14			<=10	mmHg	Adrenergic response
	Valsalva R.			1.09	>=1.14	Ratio	Cardiovagal response
	E/I R.			1.02	>=1.07	Ratio	Cardiovagal response
	K30/15 R.			1	>=1.03	Ratio	Cardiovagal response
Endothelial	AIPTG			0.95	<=0.45	%	Arterial stiffness
	-SDda			0.94	<=0.42	Ratio	Arterial stiffness
	PEPi/LVETi		0.36		<=0.35	Ratio	Arterial stiffness
	PTGi			16.0	>=40	Vs	Arterial marker
	PTGVLFi			103	<=33	ms2/µSi	Autonomic nerve marker
	PTGr			7.8	<=2.1	Ratio	Blood flow marker
Vital signs	Heart Rate	66			<=90	bpm	Heart rate average per minute
	SpO2		94		> 95	%	Oxygen saturation level
	Systolic P.B			235	<=140	mmHg	Systolic pressure while sitting
	Diastolic P.B	95			<=90	mmHg	Diastolic pressure while sitting
	Systolic P.S			249	<=140	mmHg	Systolic pressure while standing
	Diastolic P.S		91		<=90	mmHg	Diastolic pressure while standing

ANS= Autonomic Nervous System SMR= Sudomotor Response CARTs= Cardiac autonomic reflex tests

Patient

Name: Doris CS MPS 6C
Weight: 161 Lbs
Height: 5' 1" BMI: 30.4
DOB: 11/19/1936
Gender: Female

Physician

Name:
Address:
Referral:

Clinical Context

Physician's notes

	Markers	Goal	Borderline	Abnormal	Norms	Units	Marker of
ANS function	Total Power	1498			>=780	ms2	Overall ANS activity
	SDANN	48			>=40	ms	Sympathetic activity
	RMSSD	46			>=35	ms	Parasympathetic activity
	Stress Index	62			<=180	%	Sympathetic activity
	HF	267			>=220	ms2	Parasympathetic activity
	LF/HF	0.9			<=2	Ratio	Balance sympathetic/parasympathetic
SMR	ESRNO	76			>=65	µSi	Microcirculation response
	ESR L	1.48			<= 2	Sec	C-Fiber velocity
	Peak C	100			>=90	µSi	C-Fiber function
CARTs	SPRV	-21			> -40	mmHg	Adrenergic response
	DPRS	-1			<=5	mmHg	Adrenergic response
	SPRS	4			<=10	mmHg	Adrenergic response
	Valsalva R.		1.13		>=1.14	Ratio	Cardiovagal response
	E/I R.	1.38			>=1.07	Ratio	Cardiovagal response
	K30/15 R.	1.29			>=1.03	Ratio	Cardiovagal response
Endothelial	AIPTG	0.33			<=0.45	%	Arterial stiffness
	-SDda			0.81	<=0.42	Ratio	Arterial stiffness
	PEPi/LVETi		0.36		<=0.35	Ratio	Arterial stiffness
	PTGi	45.0			>=40	Vs	Arterial marker
	PTGVLFi	25			<=33	ms2/µSi	Autonomic nerve marker
	PTGr		2.4		<=2.1	Ratio	Blood flow marker
Vital signs	Heart Rate	74			<=90	bpm	Heart rate average per minute
	SpO2	97			> 95	%	Oxygen saturation level
	Systolic P.B			169	<=140	mmHg	Systolic pressure while sitting
	Diastolic P.B	82			<=90	mmHg	Diastolic pressure while sitting
	Systolic P.S			165	<=140	mmHg	Systolic pressure while standing
	Diastolic P.S	83			<=90	mmHg	Diastolic pressure while standing

ANS= Autonomic Nervous System SMR= Sudomotor Response CARTs= Cardiac autonomic reflex tests

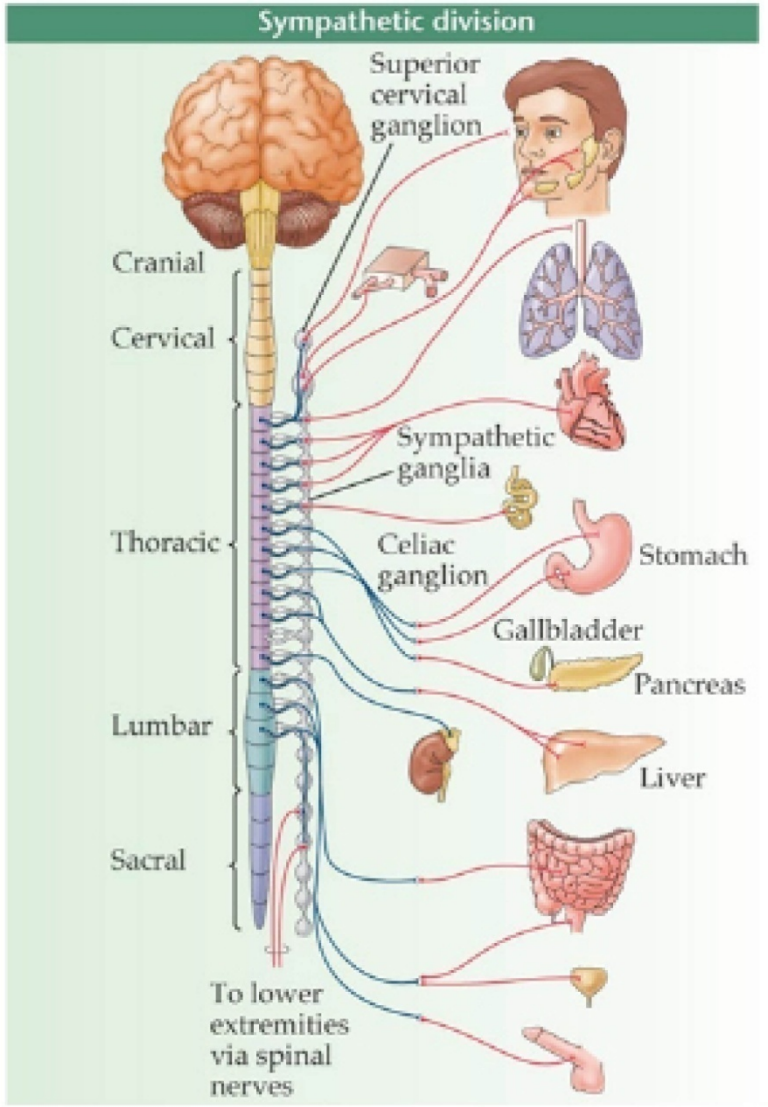
Study Results

"The autonomic nervous system response to Microcurrent Point Stimulation (MPS) applied to BFA protocol reflected a ***statistically significant (95%CI+) pre-post improvement in seven of the 29 nervous system markers collected."***

Health, Longevity & Your Nervous Systems

- It is widely accepted in science that imbalances of the parasympathetic (rest and healing, calming) and sympathetic (flight/fight/stress) branches of the autonomic nervous system (ANS) ***are directly linked to health, vitality & longevity. .***

- The sympathetic system is designed for short term survival creating a cascade of neurophysiological responses. However, “upregulation” or persistent tone in this system, called sympathetic Upregulation or STRESS, is **directly related to almost all disease patterns throughout the body.**



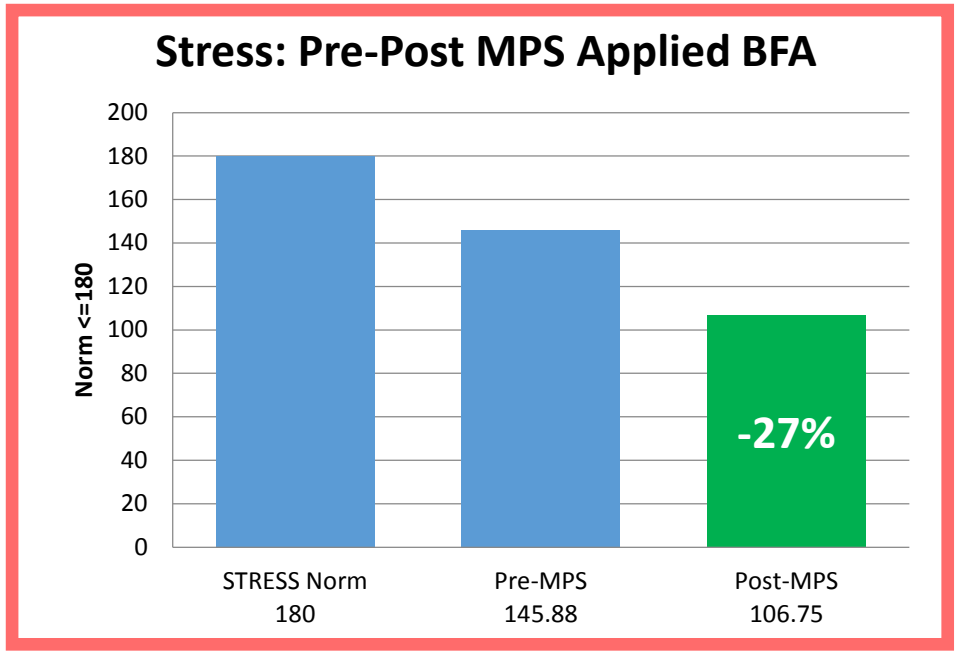
Health Consequences of Sympathetic UP-Regulation (Stress)

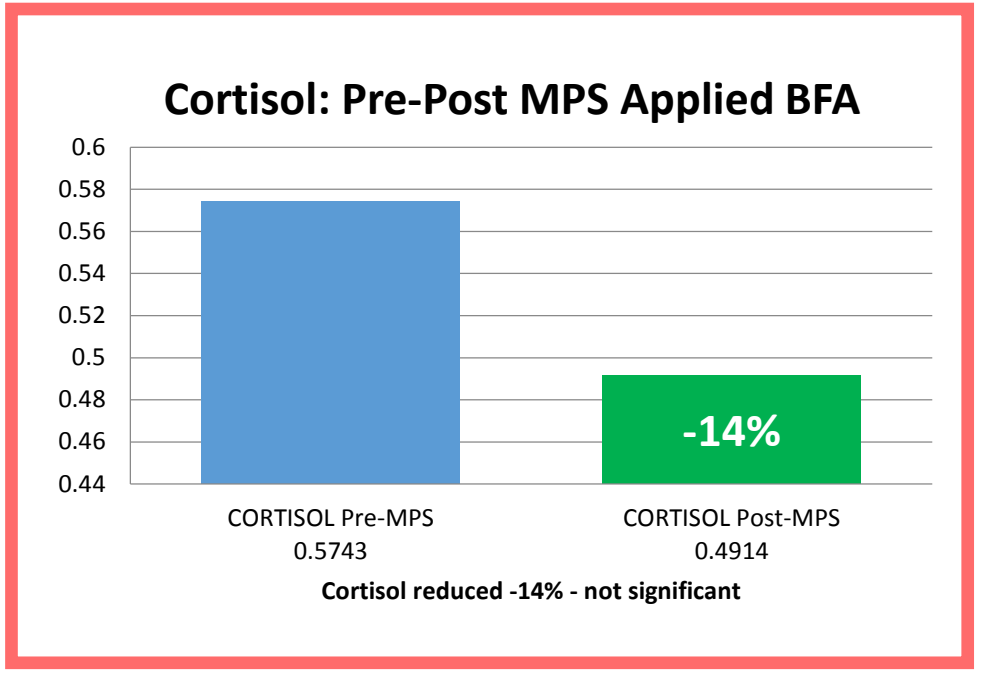
- ***ischemic heart disease*** *(Graham 2004),* ***chronic heart failure*** *(Leimbach 1986)*
- ***hypertension*** *(Grassi, 1998),* ***kidney disease*** *(Converse 1992),*
- ***type II diabetes*** *(Huggett 2003),* ***obesity*** *(Grassi et al., 2007****),***
- ***metabolic syndrome*** *(Grassi 2005),* ***obstructive sleep apnea*** *(Narkiewicz 1997)*
- ***pre-eclampsia*** *(Greenwood 2003),* ***depression*** *(Barton 2007),*
- ***ulcerative colitis*** *(Furlan 2006),* ***chronic heart failure*** *(Barretto 2008;)*
- ***end-stage renal disease*** *(Zoccali et al., 2002),* ***Autism*** *(Toichi 2003)*
- ***ADHD*** *(Borger 2000)* ***&*** ***all chronic pain syndromes*** *(Pereira 2010). ……..*
- *This is the short list……..*

Stress Index: Sympathetic Upregulation

Stress Index - Measures cardiac muscle oxygen demand related to heart work. Stress is also known ***as fight or flight***

MPS applied to BFA: Stress Outcomes





AUTONOMIC NERVOUS SYSTEM

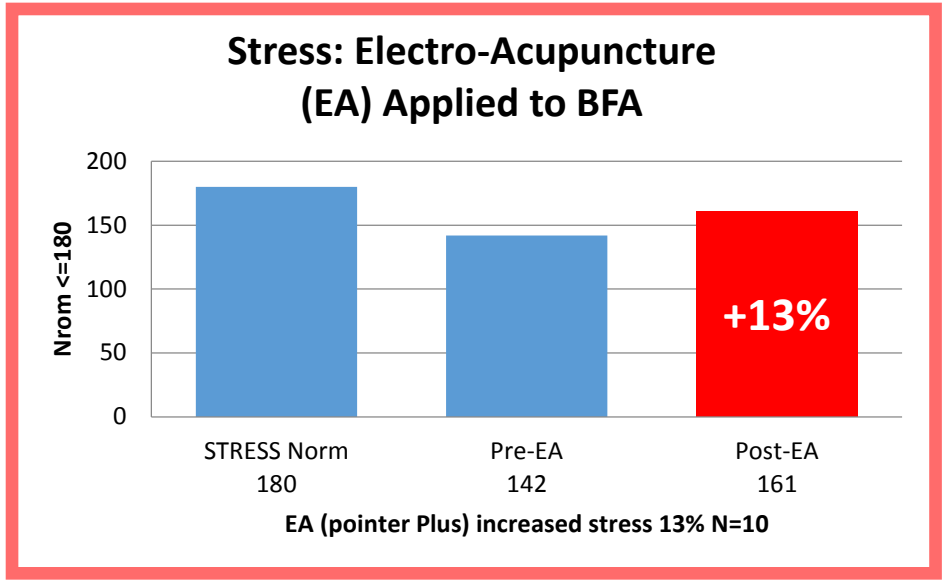
- Stress reduced by **27% - Sympathetic Activity**
- (statistically significant)

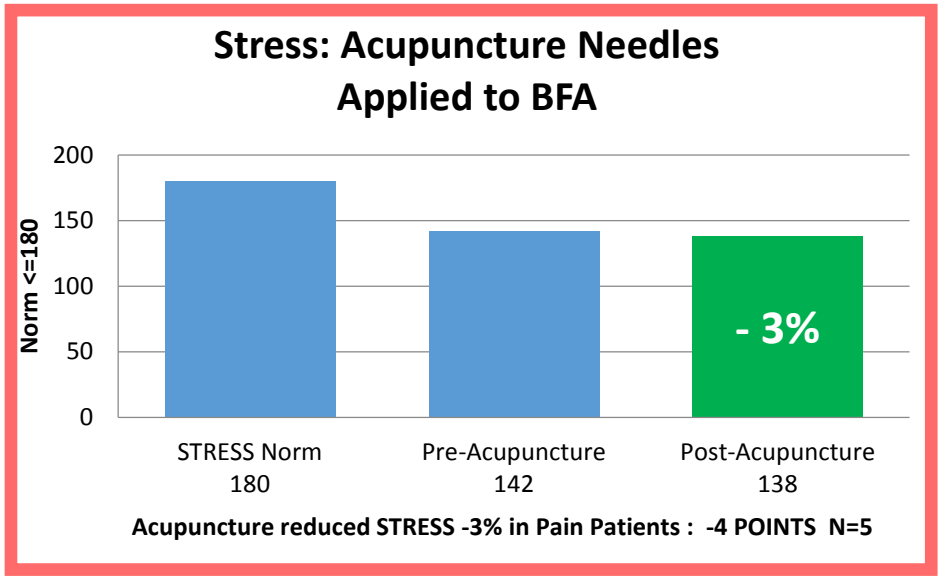
ENDOCRINE

- Salivary cortisol decreased by **14%** - **Sympathetic**

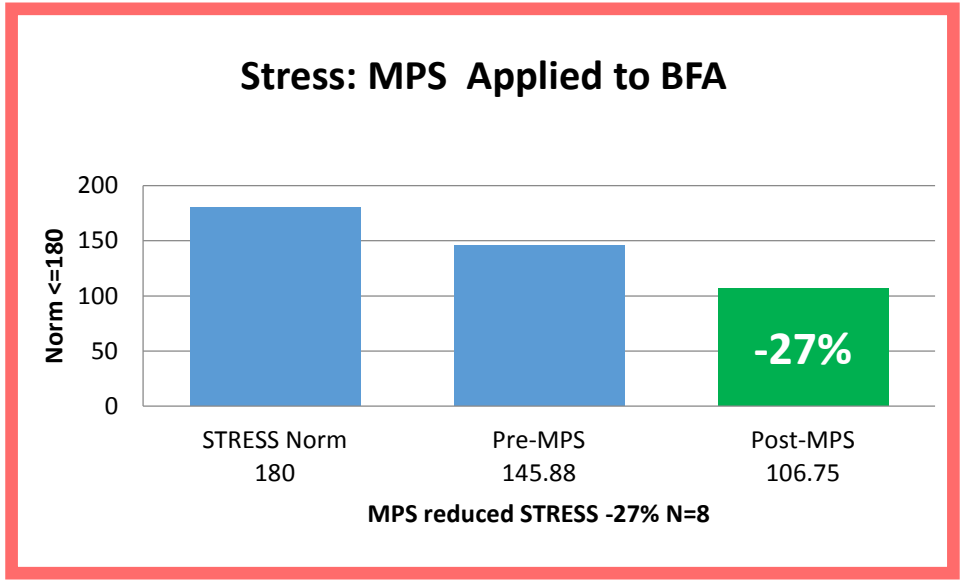
(was not statistically significant)

How Good is this Stress Response?





- AC Electro-acupuncture (EA) increased stress **+13%**
- Acupuncture marginally decreased stress **- 3% (30 min)**
- DC Microcurrent acupuncture decreased stress **-27%**



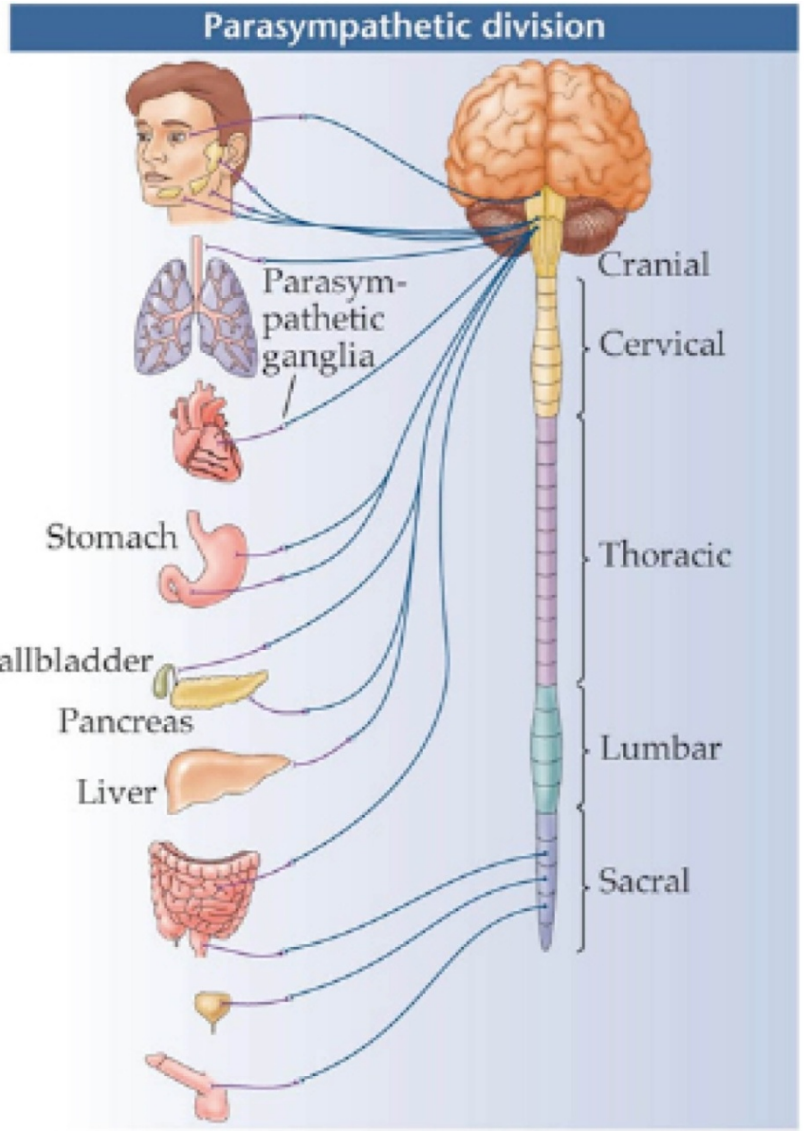
HF (Vagal Tone) - Parasympathetic Health

- The Vagus Nerve is the 10th of 12 paired cranial nerves and controls parasympathetic innervation of the heart and acts to lower the heart rate.

- Vagal tone (HF) is indicator of Parasympathetic activity

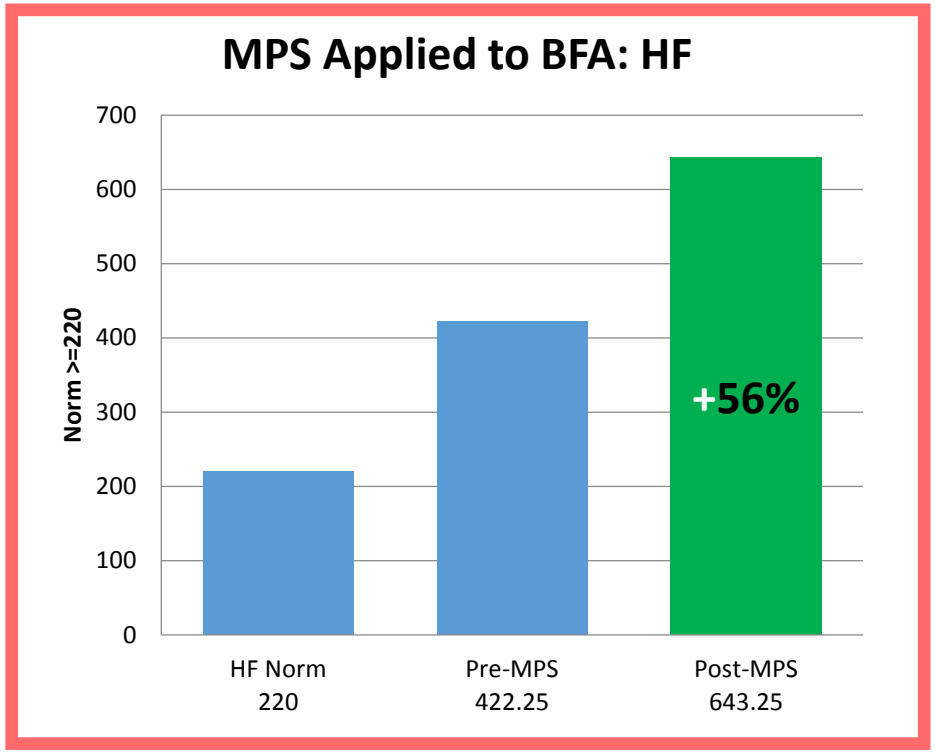
- **"Brakes" of your Autonomic nervous system**

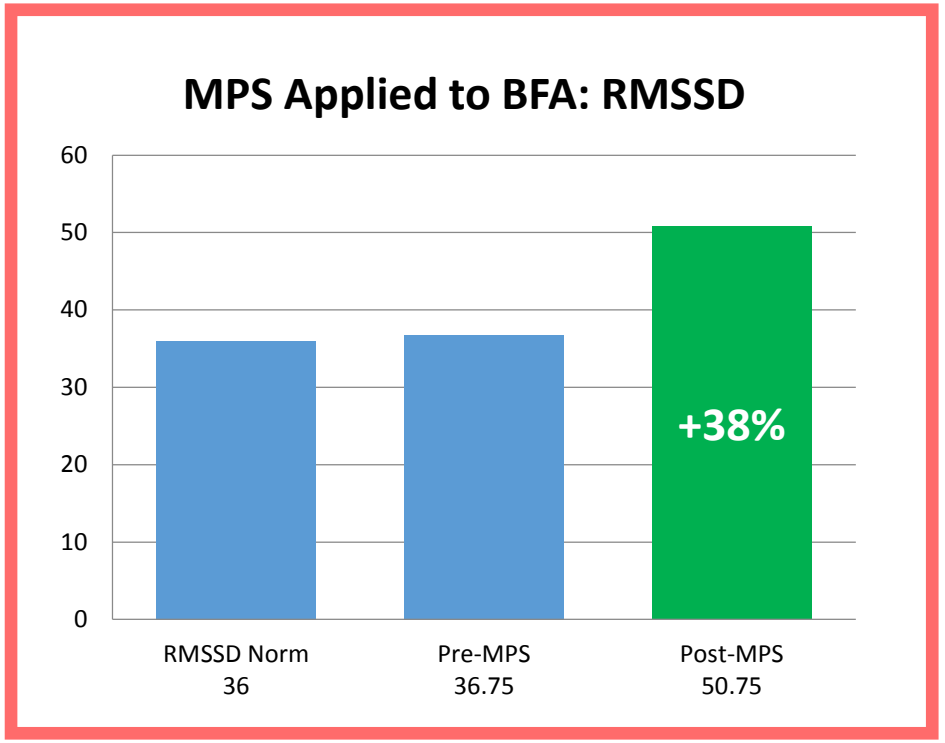
- HF is directly connected in literature ***to healing, muscle recovery, strength, and like HRV, overall health vitality***



Parasympathetic (Healing): HF & RMSSD

- HF-Vagal Tone increased by **26% - Parasympathetic Activity Marker**
- RMSSD increased by **38% Parasympathetic Activity Marker**

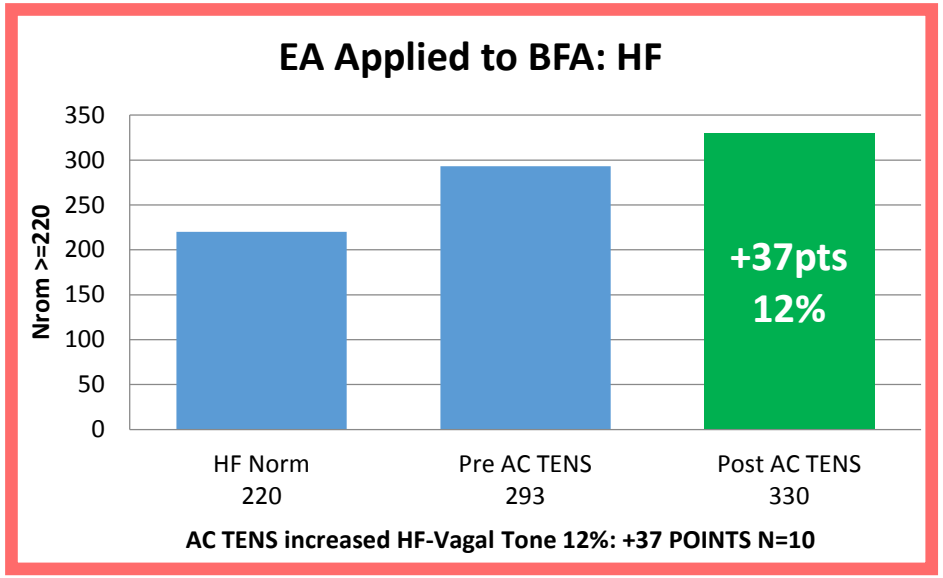


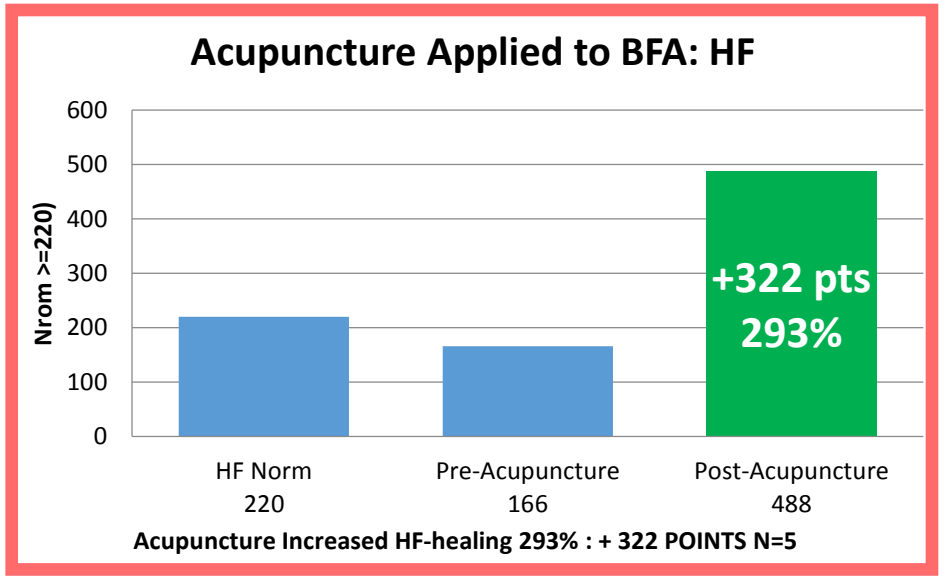


- Vagal tone (HF)—Vagal tone-high frequency;
- normal range >220 ms.

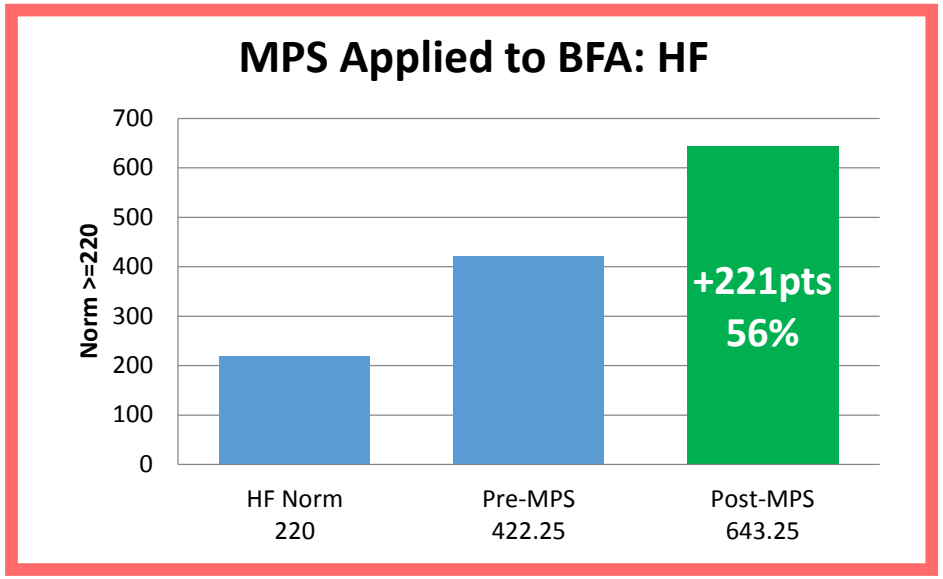
- RMSSD—Root mean square of successive normal sinus
- R–R interval difference; normal range: 35–65 ms.

Parasympathetic Response: Different Modalities Applied to BFA





- All three Modalities EA, Acupuncture and MPS provided positive parasympathetic responses



HRV

Overall Balance of Health

- HRV is the measurement of the balance between sympathetic-parasympathetic nervous sytsems

Heart Rate Variability (HRV) & Your Health

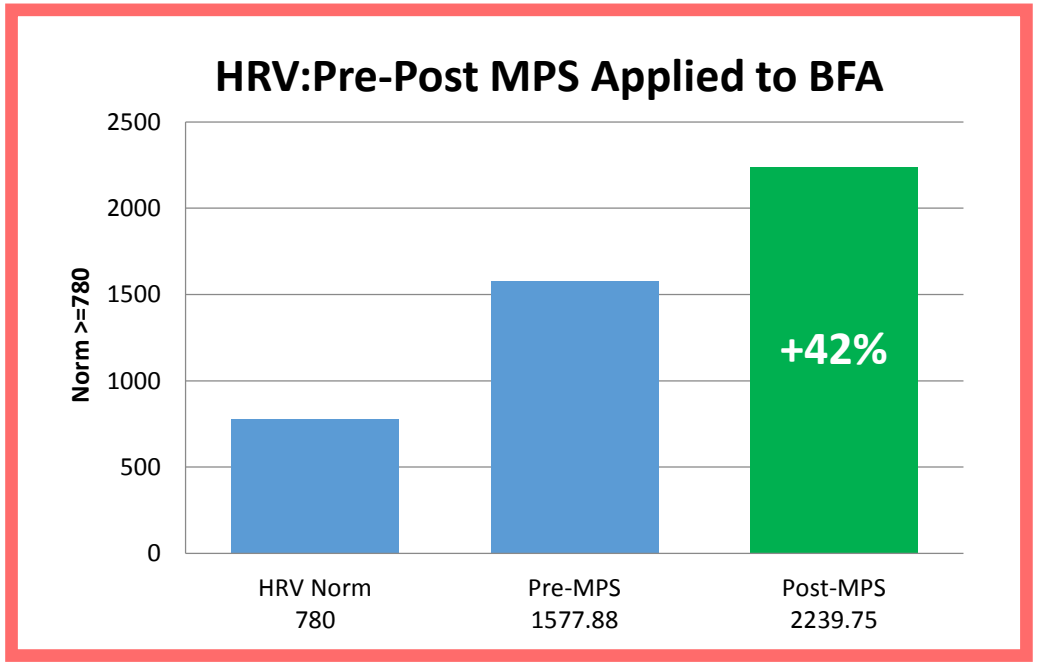
- HRV- heart rate variability is the **most important parameter for the exact assessment** of the functional vitality, of health and well-being.
- **Health, zest for life, well-being, immune** and functional vitality are in very close relationship with the regulatory processes in the system of basic regulation.
- Health & longevity depends directly on preservation of HRV–parasympathetic function.
- High numbers are good (>=780 ms)
  Low Numbers are bad (<=780 ms)

Low HRV Numbers are associated with:

- Depression *(Carney 1995)*
- PTSD *(Beristianos 2016)*
- Sudden Death *(Kataoka 2004)*
- Renal Failure *(Burger 2002)*
- Diabetes *(Wheeler 2002)*
- Coronary Heart Disease *(Carney 1995)*
- Refractory Concussions *(Thompson 2006)*
- Poor Cognition *(Therese 2012)*
- Lowered Health & Vitality *(Aubert 2003)*

HRV Improvement with MPS-BFA

•HRV or Total Power increased by **42% or 662 points!**



HRV—Total power or HRV; normal range >780 ms2

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How Significant is 662 HRV Point Increase?

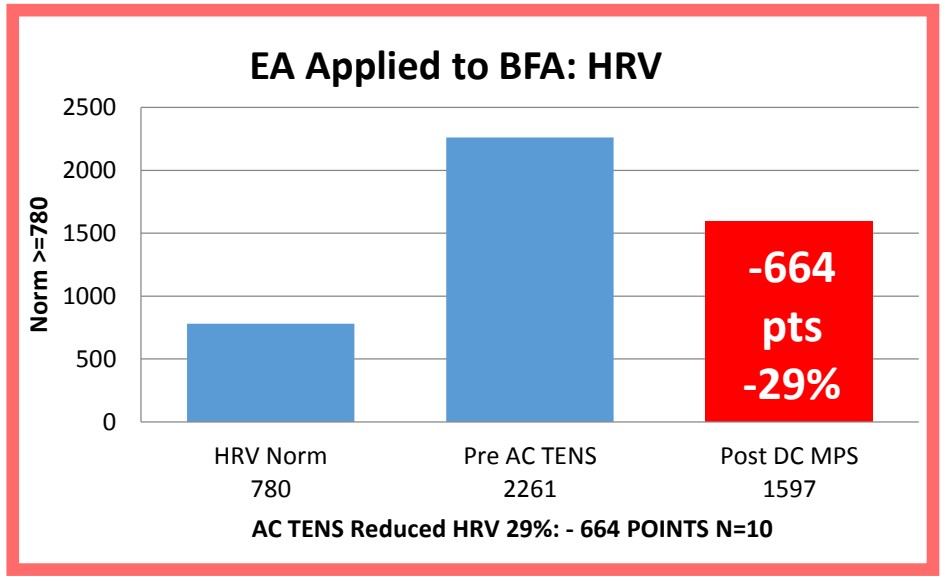
HRV Population Standards*

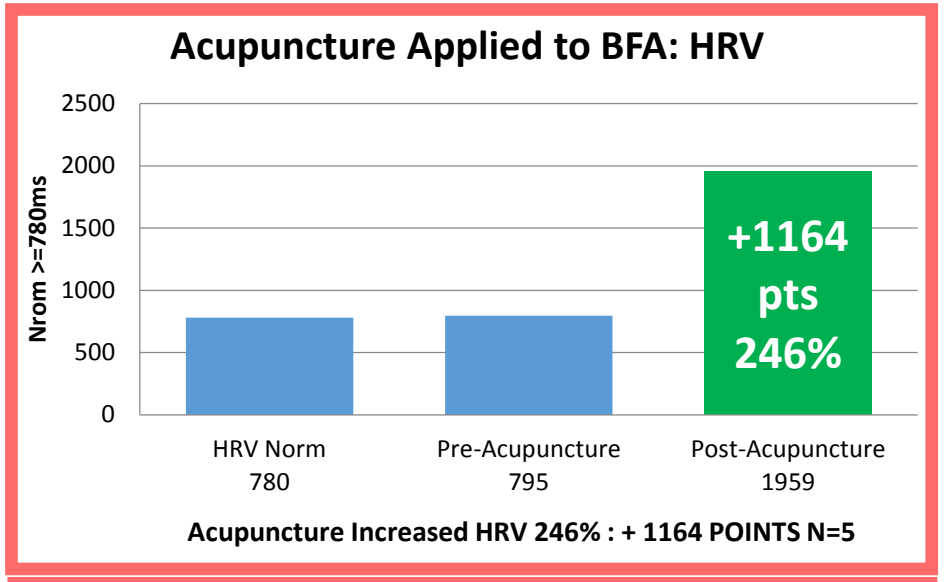
Age yrs: Male	HRV	HRV Point Drop*
9.4	2694	NA
17	2072	622
29	1171	901
48.3	563	608

662 point increase represents a huge increase in HRV

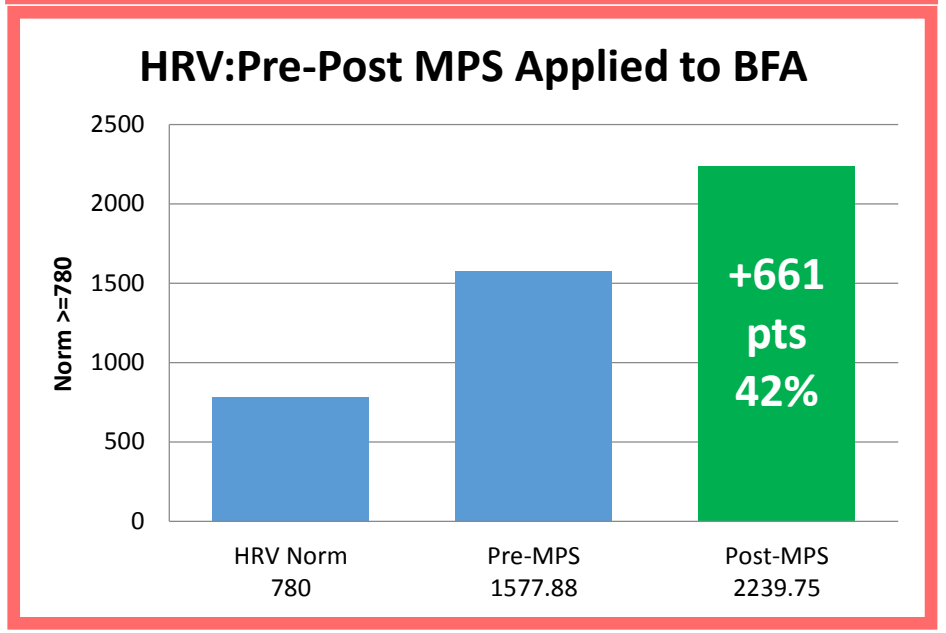
….. and is medically significant! ***(*HRVresearch.com)***

HRV Response: Different Modalities Applied to BFA





- EA produced negative HRV response, acupuncture and MA produced very positive HRV outcomes



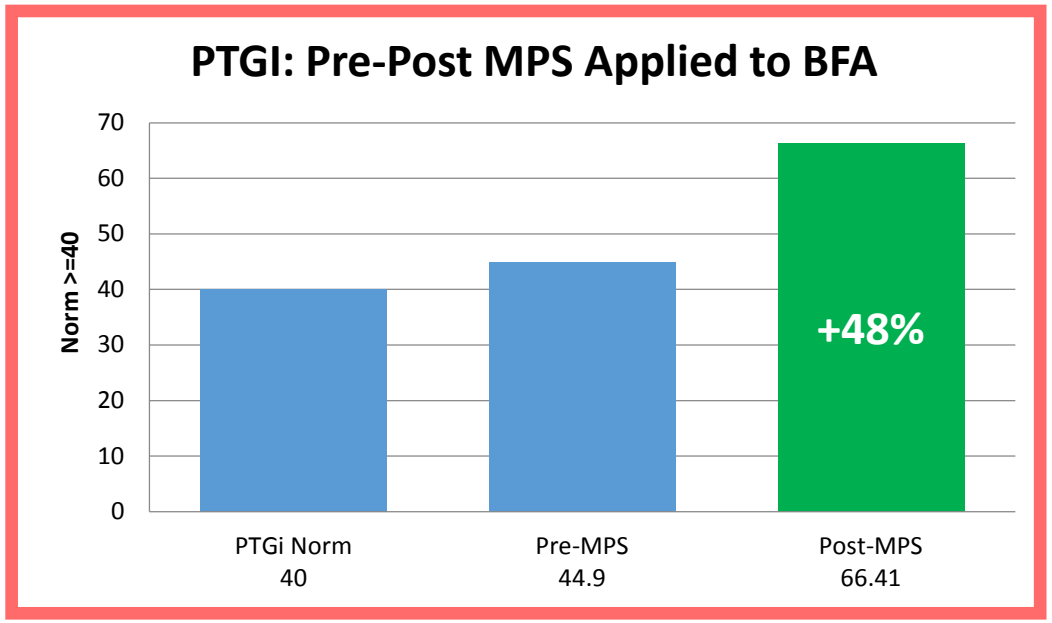
Cardiac Health & Arterial Blood flow

PTGi: Cardiac & Endothelial

- PTGi cardiac marker of endothelial function & arterial blood flow improved by **48%**

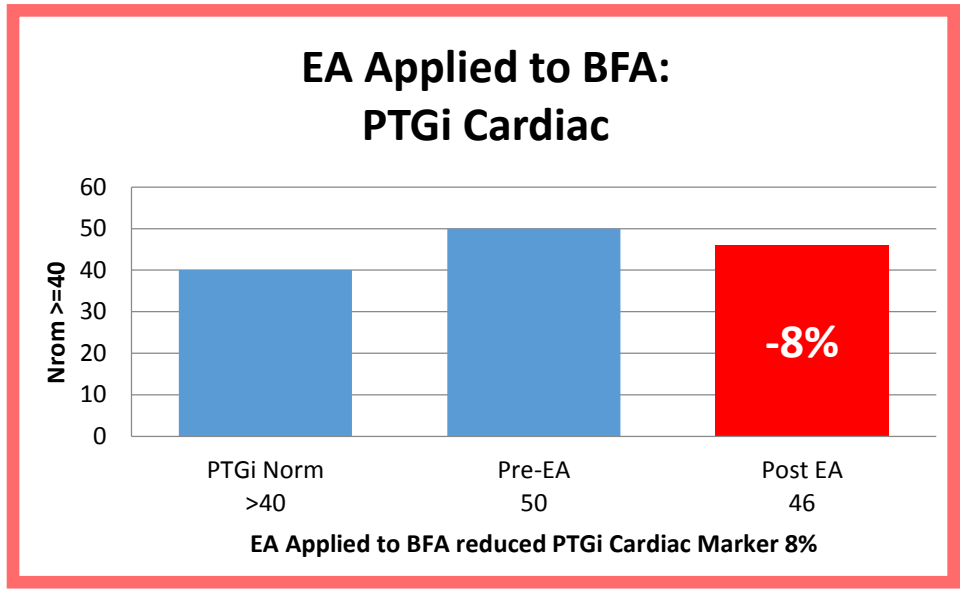
- ***BFA protocol provided the STRONGEST influence on endothelial blood flow and cardiac health functioning of all body areas tested!***

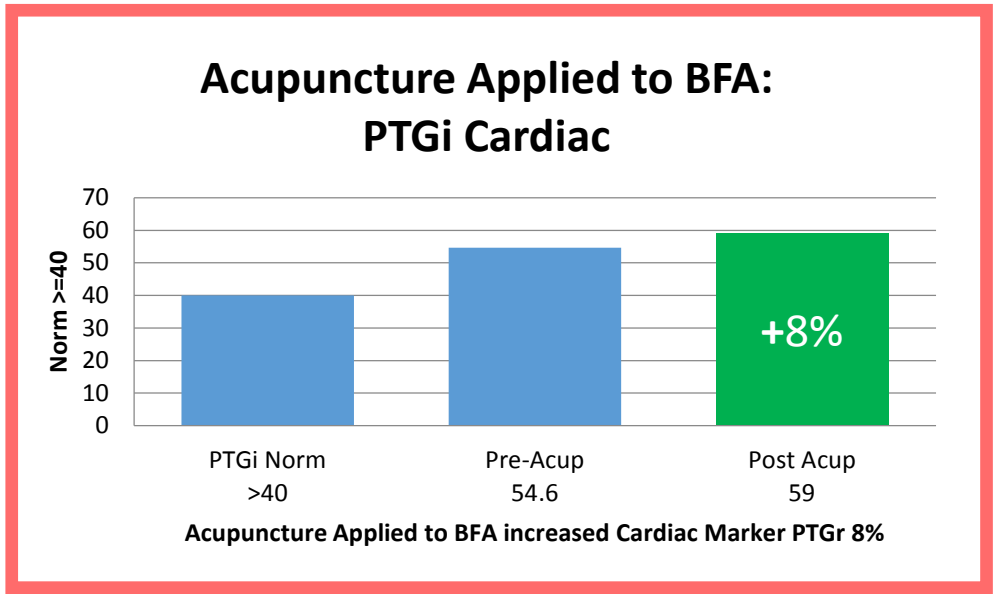
- *These outcomes have significant implications within cardiac rehabilitation*



PTGi—Photoplethysmography index of the spectral analysis components; normal range: >40 vs.

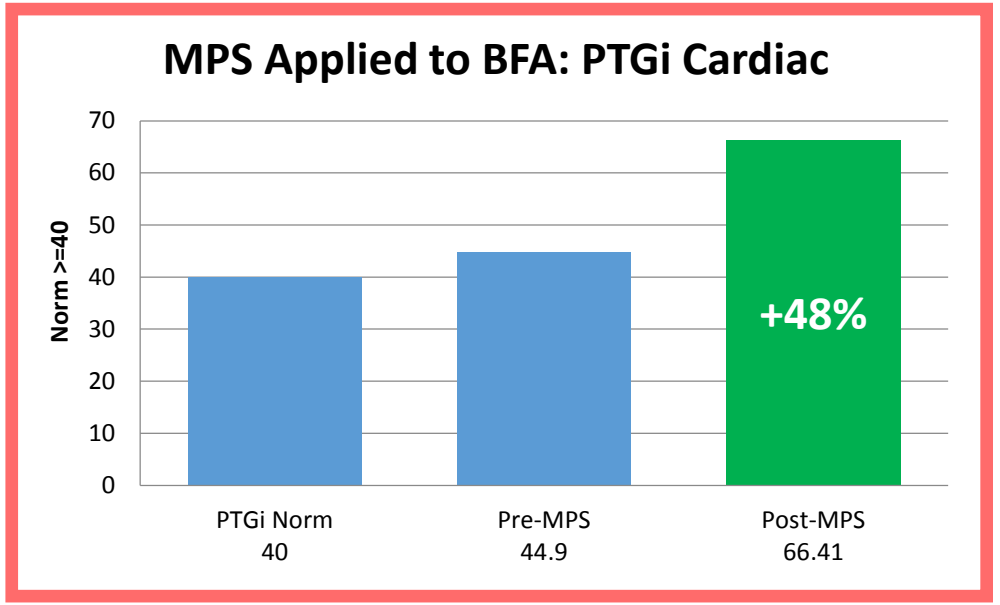
PTGi: Cardiac & Endothelial





EA produced negative HRV response, acupuncture produced moderate gains and MA produced positive Cardiac outcomes

PTGi—Photoplethysmography index of the spectral analysis components; normal range: >40 vs.



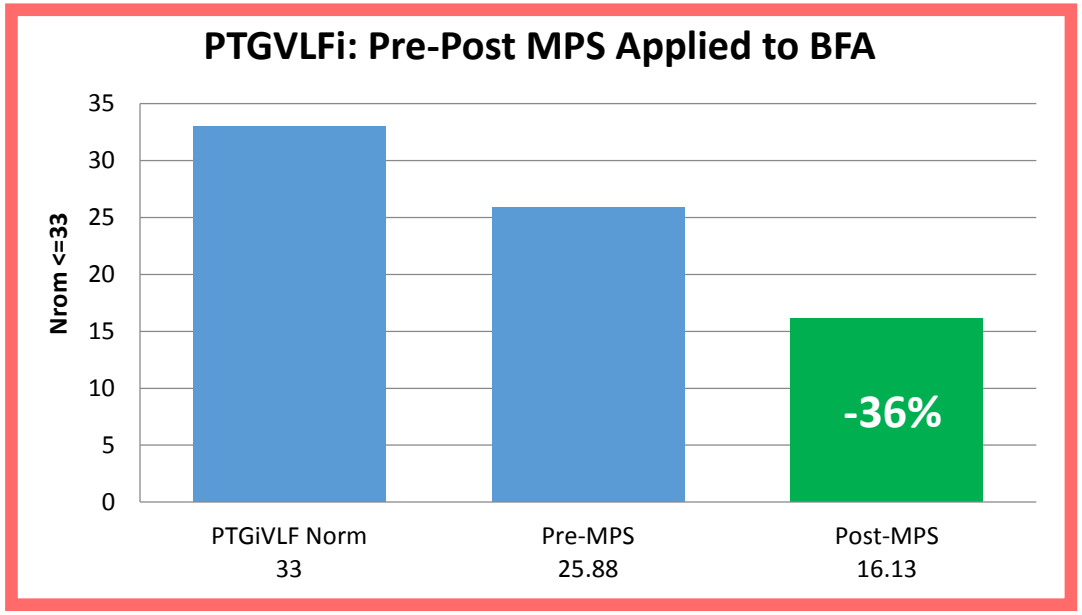
Diabetes & Diabetic Neuropathies

PTGVLFi: Diabetes & Microcirculation

•**Cardiac marker PTGVLFi** represent endothelial function & is a marker for glucose intolerance and microcirculation complications.

•Very high correlation with oral glucose tolerance test (OGTT) and PTGVLFi.

• High numbers (>=33) indicate a risk for Diabetes. **PTGVLFi had a reduction of 36%**



PTGVLFi—Photoplethysmography very low frequency index; normal range: <33 ms2/lSi

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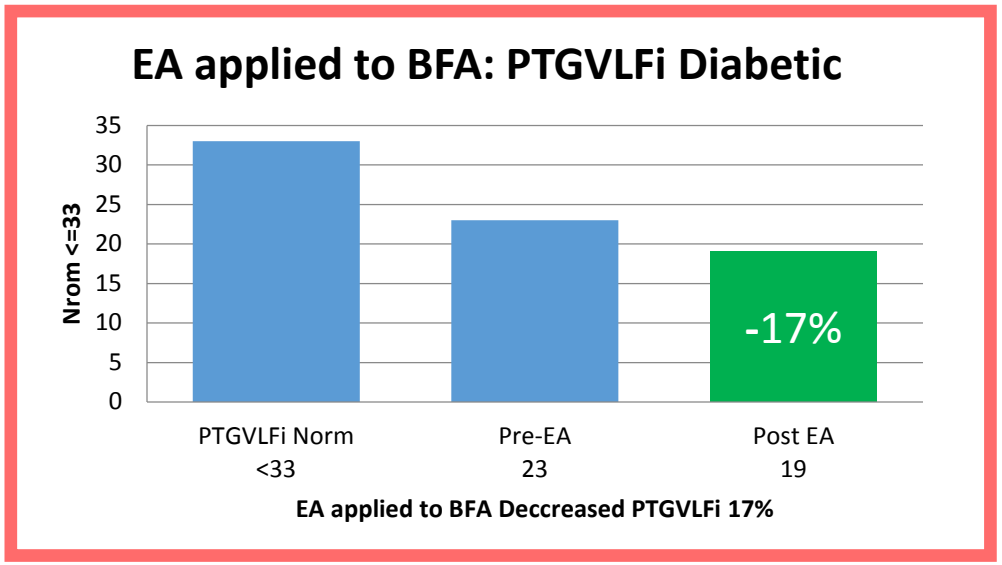
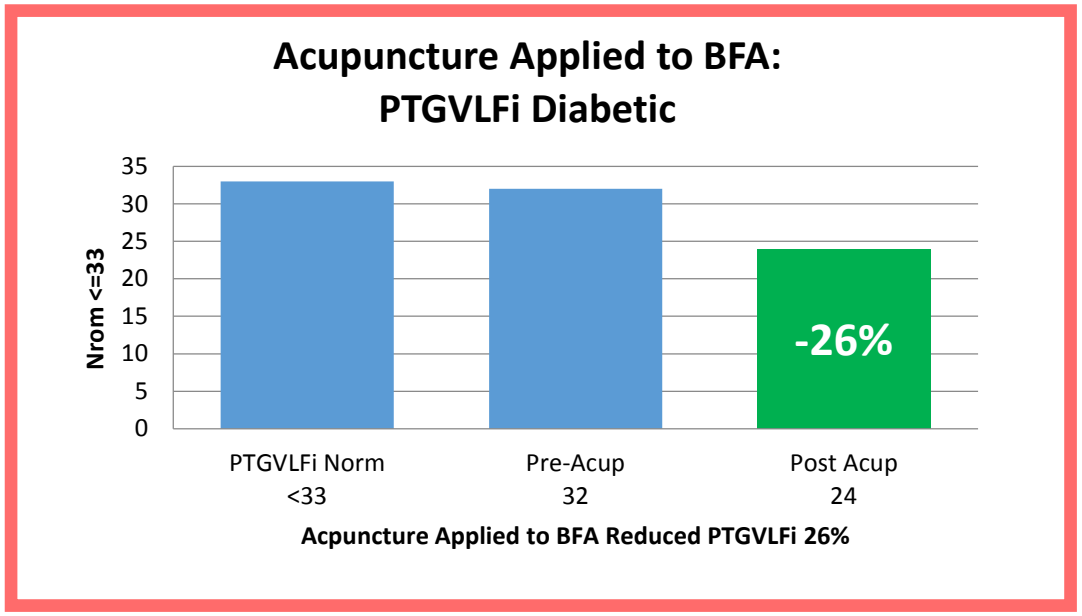
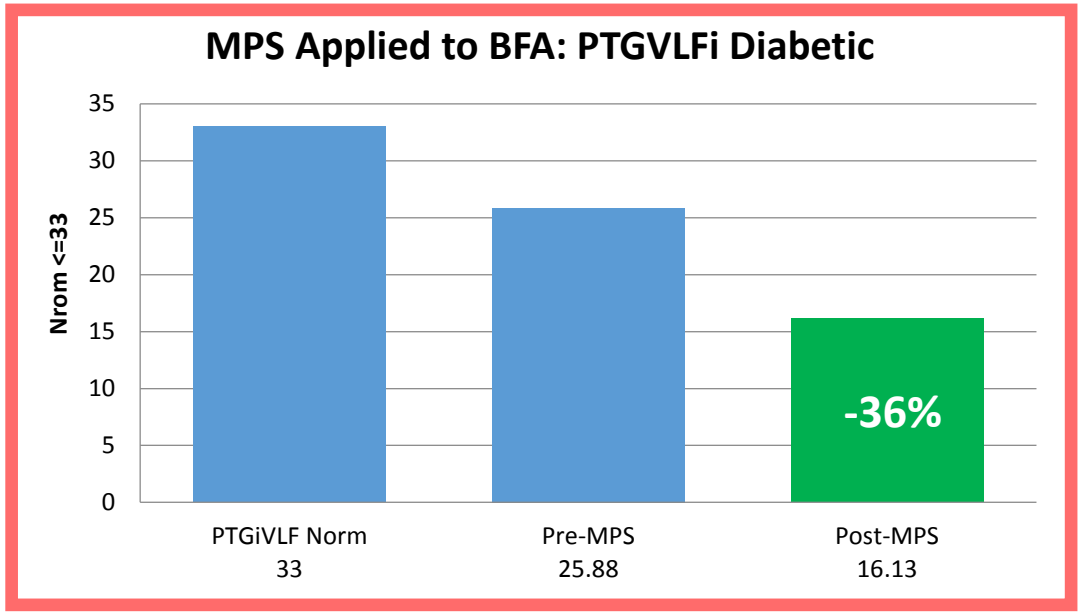
PTGVLFi Response: Different Modalities Applied to BFA







- All three Modalities EA, Acupuncture and MA provided positive PTGVLFi outcome responses

PTGVLFi—Photoplethysmography very low frequency index; normal range: <33 ms2/lSi

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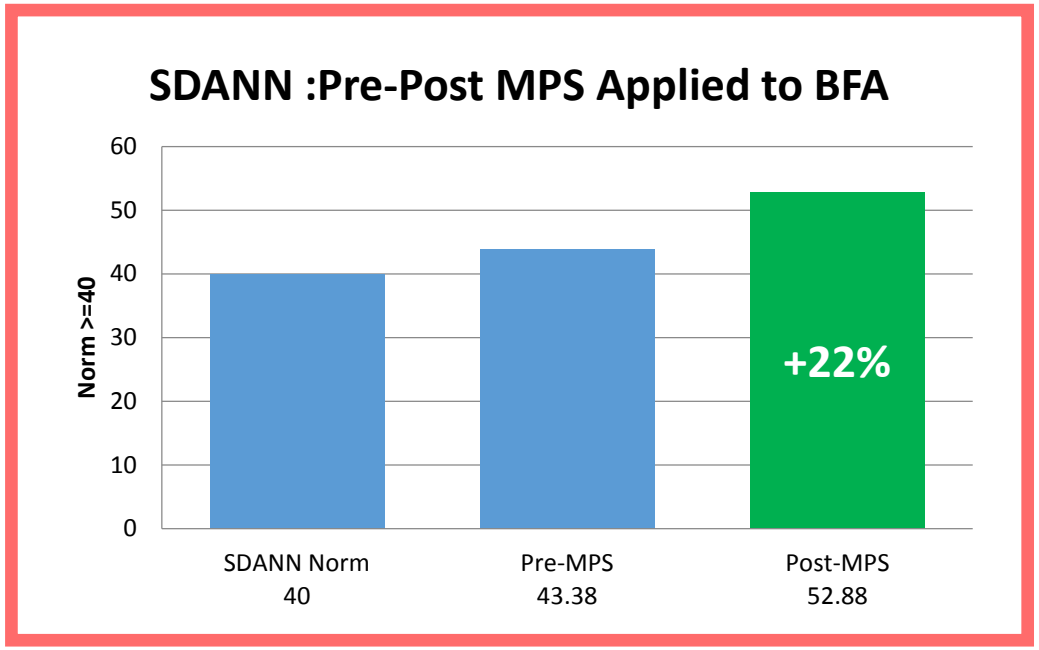
SDANN: Exercise Tolerance - (VO2 max)

- VO2 max as the maximum volume of oxygen that by the body can consume during intense, whole-body exercise, while breathing air at sea level.
- SDANN is a measure of your capacity to generate the energy required for endurance activities such as football ***and is the most important factors determining your ability to exercise for longer than four to five minutes.***
- Improving your VO2 max by ***10 percent*** without changing any other performance factors ***can take more than a minute off your 5k time.***
- *Values for Elite players lie in the 55-70 ml/kg/min region with the (mean value of 500 UK professional soccer players in 2003 being 59 ml/kg/min)*

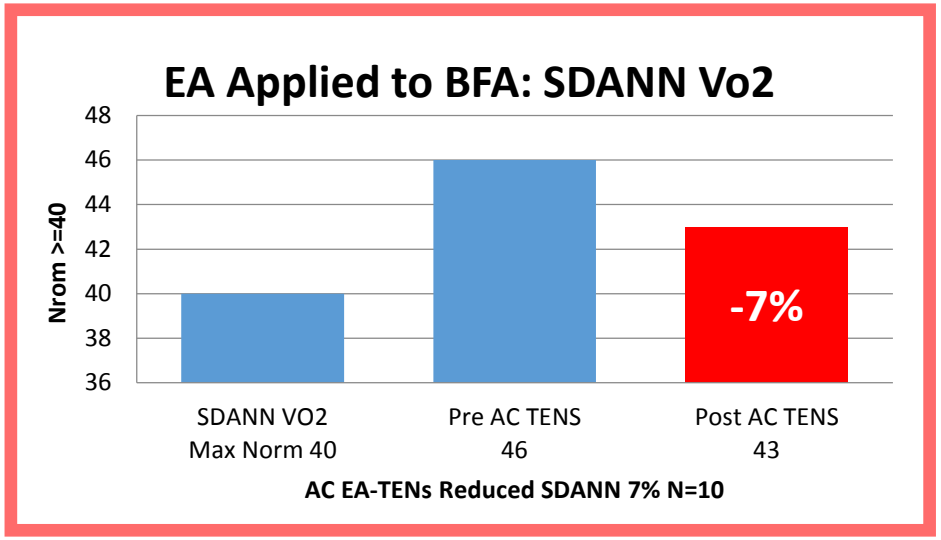
SDANN: Exercise Tolerance - (VO2 max)

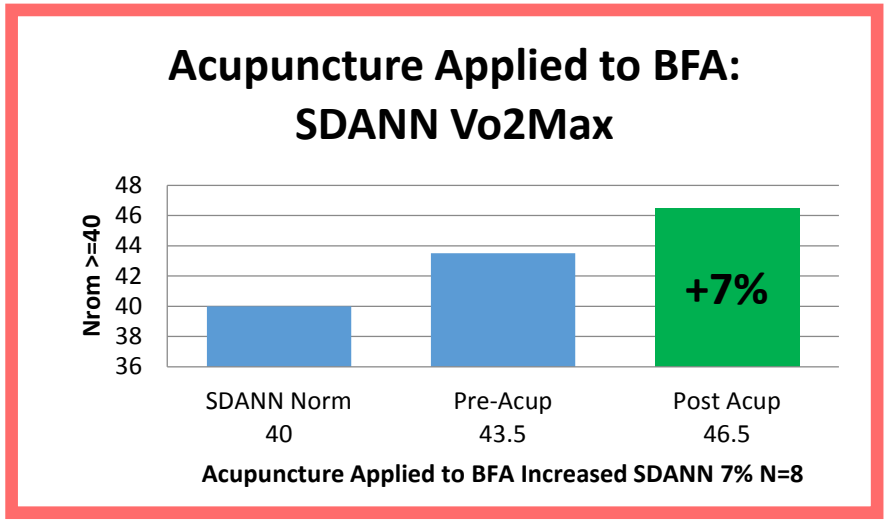
- SDANN or Exercise tolerance (VO2 Max) increased by an impressive **22% … in <=5 MINUTES**
- **This alone has significant implications for performance sport medicine – Olympics etc**
- MA is non-invasive , may be applied inside or outside clinical setting without treatment table

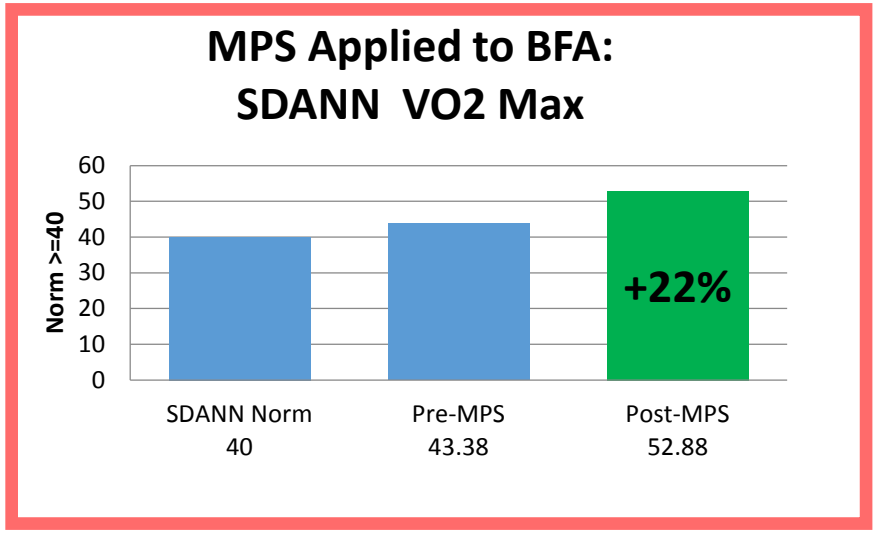


SDANN—Standard deviation of all normal-to-normal R–R intervals; normal range: 40–80 ms..

SDANN: Exercise Tolerance - (VO2 max)







EA produced negative SDANN response.

Acupuncture and MPS provided positive

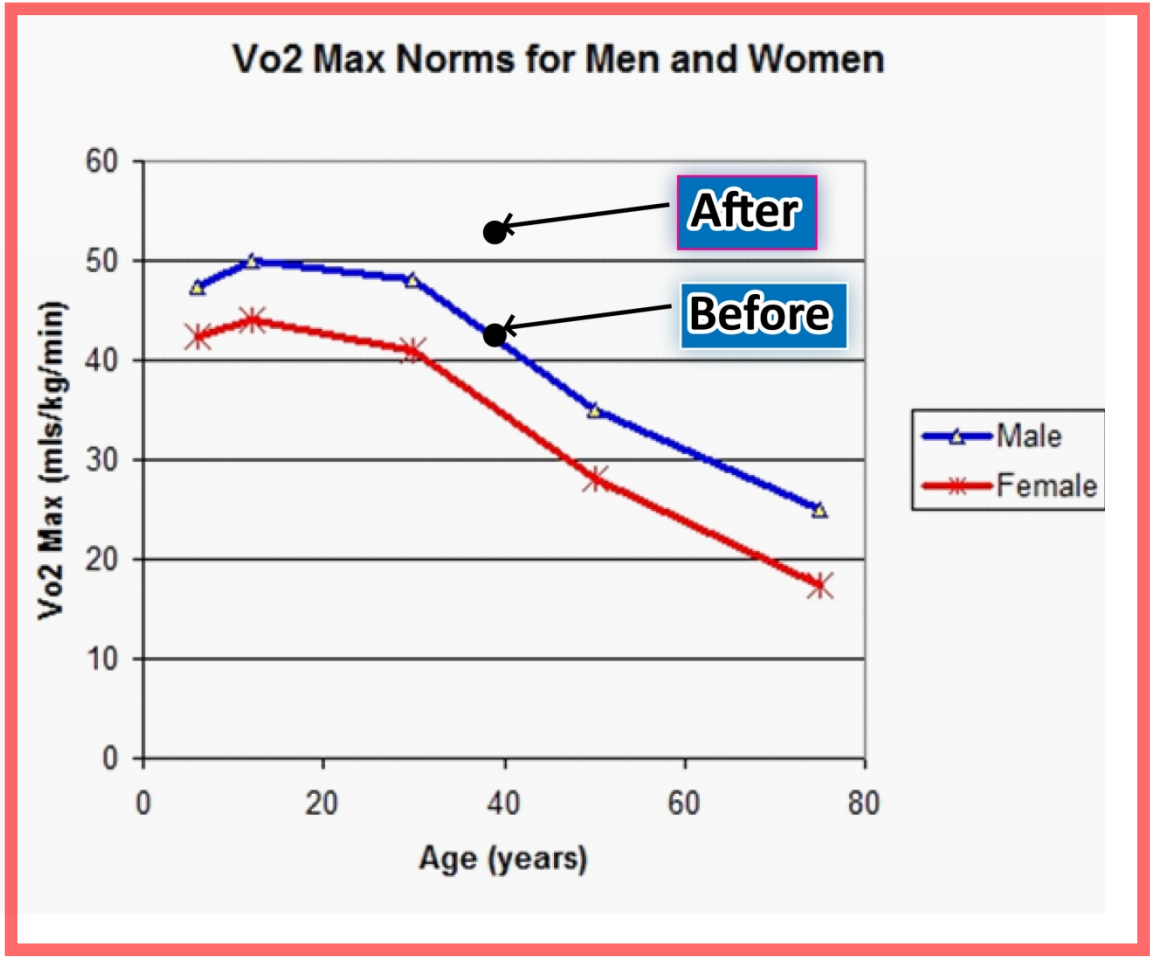
SDANN VO2 Max responses

SDANN—Standard deviation of all normal-to-normal R–R intervals; normal range: 40–80 ms..

SDANN Norms Men & Women

•SDANN or Exercise tolerance (VO2 Max) increased by an impressive **22% or 9.5 pts**

•Patient sample moved from "average" **(Pre = 43.38)** to "excellent" **(Post= 52.88)** in <5 min



Pain

Chronic Pain is Now a National Crisis

- 40 Americans die each day from overdoses involving prescription opioids; they cost the United States economy $78.5 billion a year; and 227 million opioid prescriptions were handed out in the U.S. in 2015.

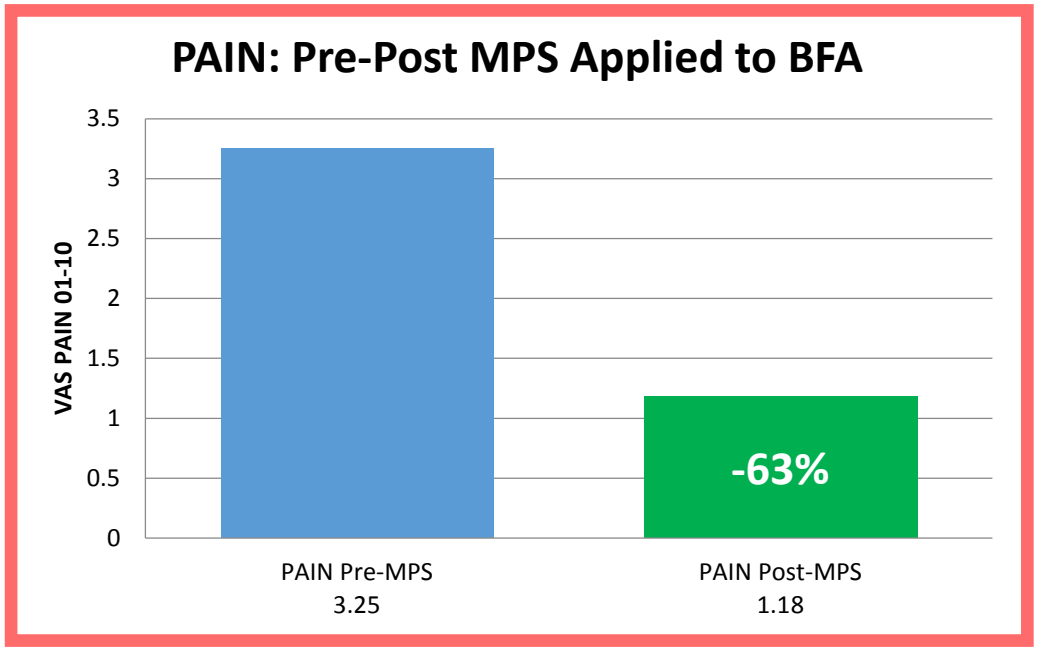
  About 2.6 million people are estimated to have an opioid use disorder in America — and experts widely agree this is, if anything, an underestimate.

- Opioid prescribing continues to fuel the epidemic. In 2016, more than 65,000 people died from overdoses involving prescription opioids, lowering life expectancy in USA 2nd year in row!
- Today, nearly half of all U.S. opioid overdose deaths involve a prescription opioid.[1]

- Any non-invasive Pain Reliving solution is welcome news !

MPS Applied to BFA to Reduce Pain

- **Age 39.75 (years) , duration of pain 4.85 (years)**
- Chronic PAIN Decreased by **63% * <5 minutes ... WITHOUT NARCOTICS!**
- *MPS-BFA short application and consistent pain/stress outcomes suggest this approach could possibly help the current pain prescription crisis*



***Study employed Visual Analogue Scale (VAS):**
11-point scale from 0-10 with 0 being no pain and 10 being the most intense pain imaginable The VAS has good sensitivity and excellent test-retest reliability.

MPS applied to BFA Protocol: Study Summary:

Stress -27%	(sympathetic)
Cortisol -14%	(sympathetic-endocrine)
HF Parasympathetic + 56%	(healing)
RMSSD Parasympathetic + 38%	(healing)
HRV + 42%	(vitality/health)
SDANN + 22%	(VO2 max-exercise)
Heart Health + 48%	(cardiac-endothelial)
Diabetes/Diabetic Neuropathy - 36%	(sympathetic)
Pain - 63%	(sympathetic)

Study Conclusion:

"Recognizing this portable, ***non-invasive procedure had an application time of under 5 minutes per patient,*** *these consistent improvements with ANS stress markers suggest a possible significant future role for both MPS (MA) applied to BFA in the real-time management of pain or stress related diseases inside or outside of the clinical setting."*

Kelly Armstrong OTR, MPP, PHd

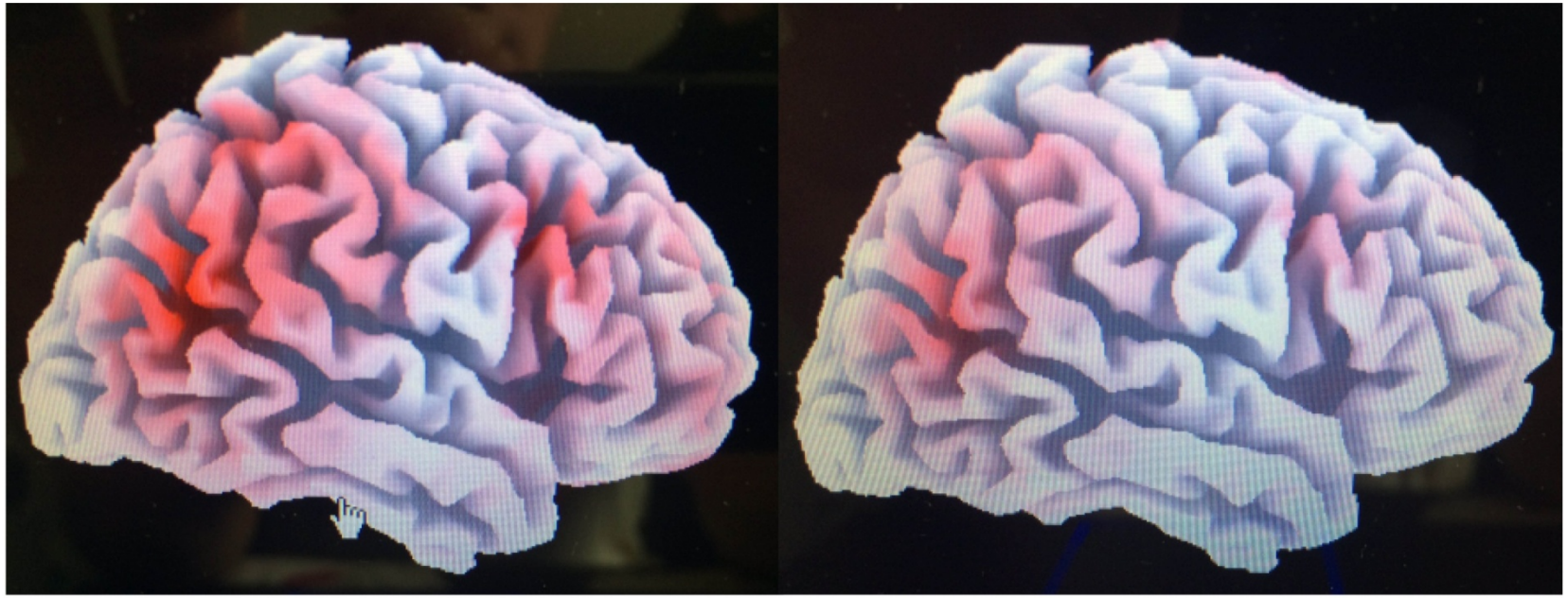
Future BFA Research:

Concussion & Brain Healing

MPS Applied to BFA: Post Concussion Patient

- Data was recorded and analyzed using ***Neuroguide Q20 EEG with LORETA*** *capability by a registered Psychotherapist (Ont)*

- Visual reductions in the concentration of electro-activity (associated with trauma) are clearly seen



Now Go Heal Your Patients & Yourself!

- **Health, zest for life, well-being** and functional vitality are in very close relationship with the regulatory processes the autonomic nervous system (ANS) and STRESS levels

- MPS applied to BFA protocol can provide on-the-spot pain & stress relief literally anywhere or anytime needed!

Thank You!

www.DolphinMPS.com