Centre for Pain Medicine
6th International Symposium
Invasive Procedures in Motion 2018
2 / 3 March 2018, Nottwil / Lucerne / Switzerland

20th ANNIVERSARY
Centre for Pain Medicine Nottwil

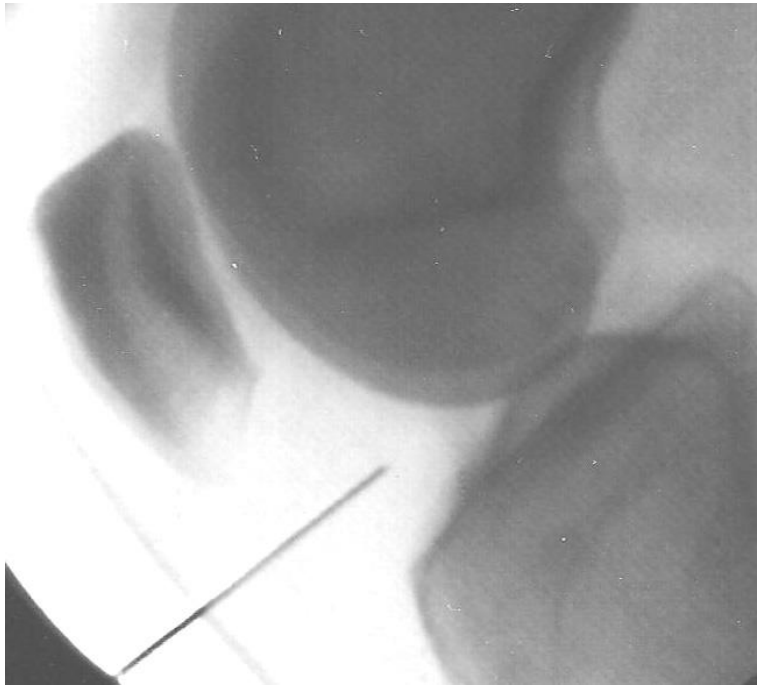
Swiss Paraplegic Centre

ImmunoPRF for non-malignant conditions

Alexandre Teixeira
Clínica de Dor
Porto - Portugal

2005: INTRA-ARTICULAR PRF

Causes CRP drop



- In intra-articular PRF the electrode may be several centimeters away from any nerve
- E fields at this distance are of very low magnitude

Prof Menno Sluijter 2007 – 1º working hypothesis

PRF affects the immune cells and has an anti-inflammatory action

- In Immune cells exposed to the low electric fields are stimulated to produce TNF-alfa and other proinflammatory cytokines that affect the nerve and immune cells (neuro-immune bidirectional communication)

- This brief initial phase triggers the final effect in away that we presently do not yet understand

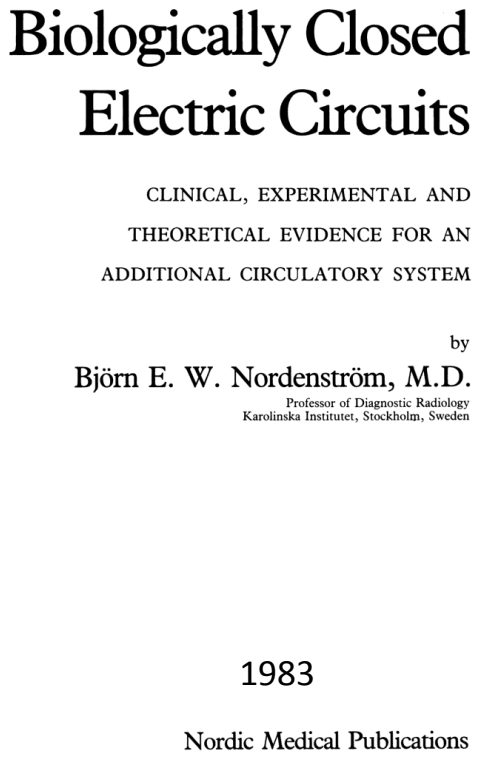
- The hypothesis is supported by the informal observation of a fall in CRP level following intra-articular and intradiscal PRF

- The initial event is possibly triggered by a mechanotransduction mechanism involving cell receptors (? Integrins) activated by the oscillating EF (shaking effect)

2008 - We choose iv-PRF application based on the work of Nordenstrom

Treated conditions :

Cancer stage 4
Rheumatoid arthritis
Psoriasis arthritis
Depression
Diabetes II on insulin
Post stroke deficit


Biologically Closed Electric Circuits

CLINICAL, EXPERIMENTAL AND THEORETICAL EVIDENCE FOR AN ADDITIONAL CIRCULATORY SYSTEM

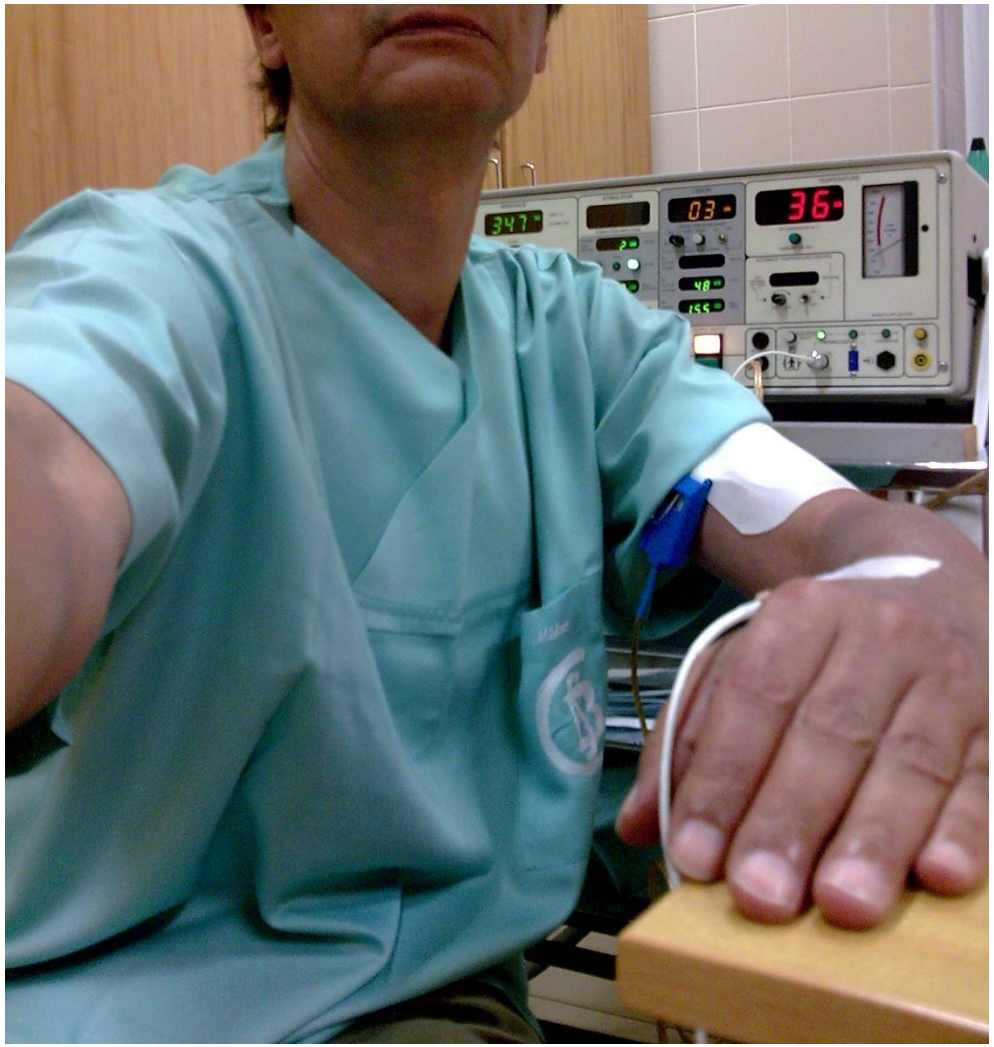
by

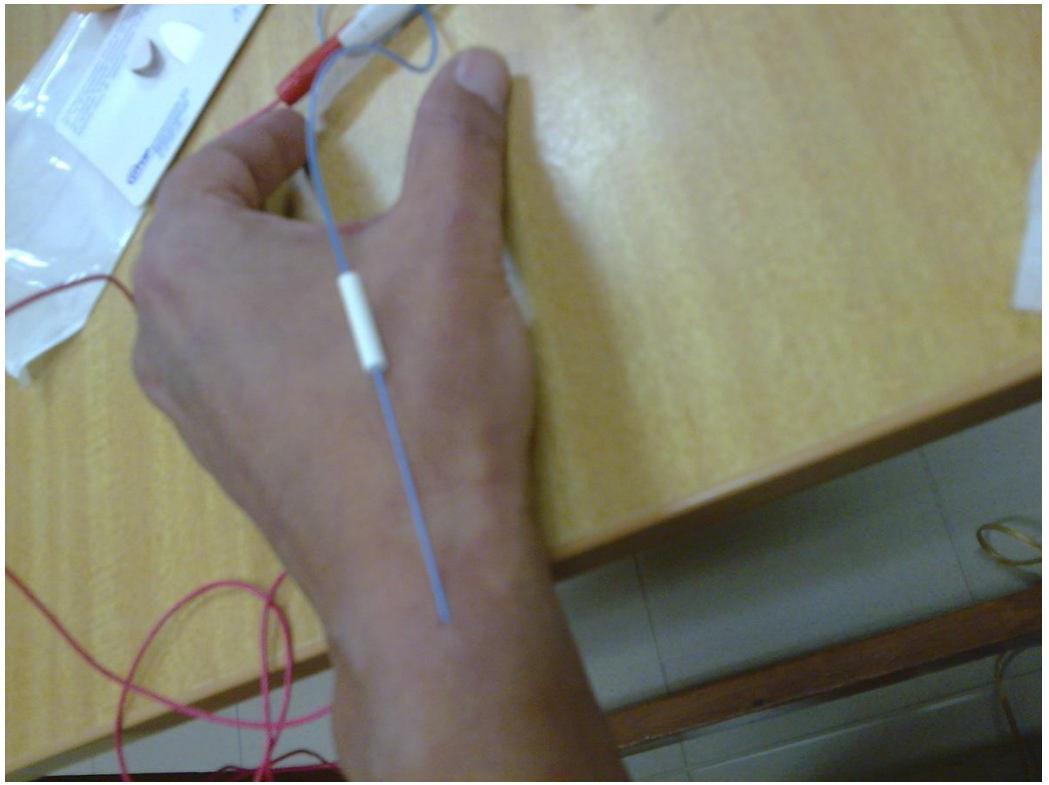
Björn E. W. Nordenström, M.D.

Professor of Diagnostic Radiology
Karolinska Institutet, Stockholm, Sweden

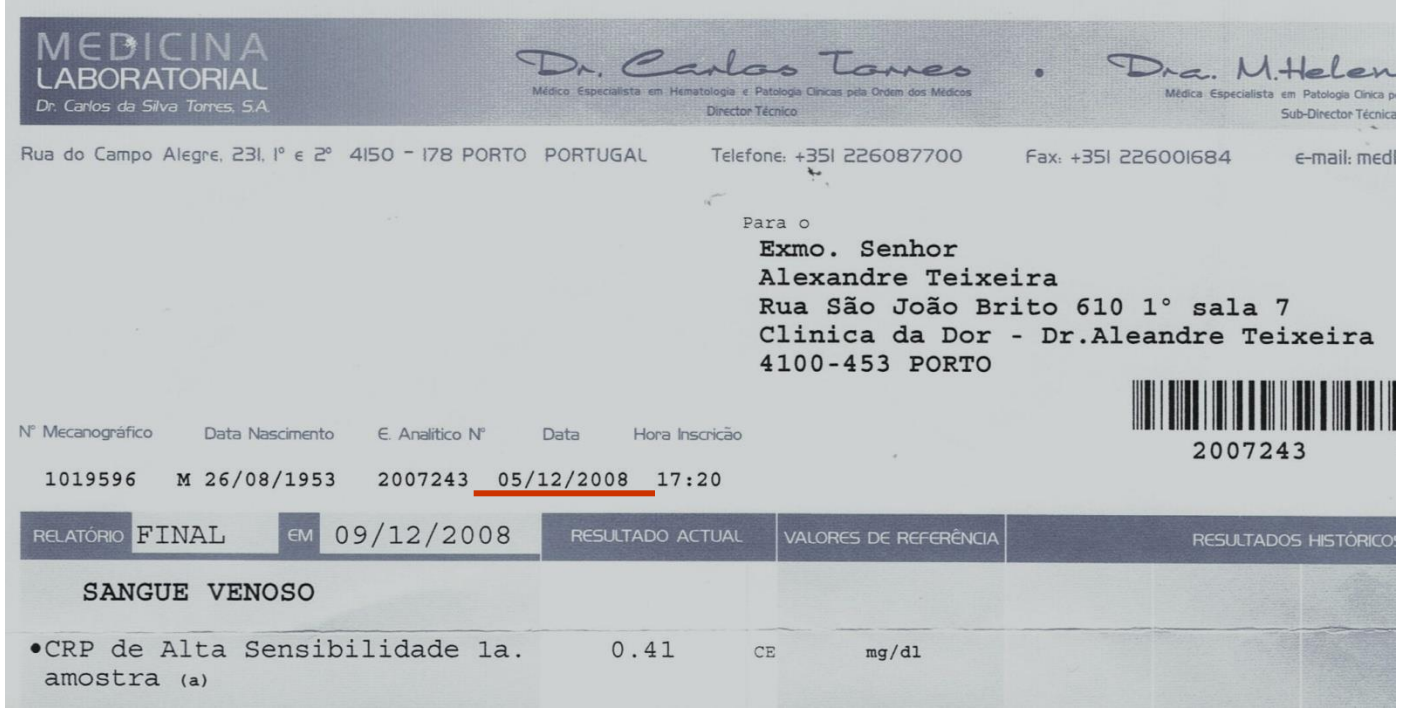
1983

Nordic Medical Publications





iv-PRF self experiments - 2008



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Para o
Exmo. Senhor
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Clinica da Dor - Dr.Aleandre Teixeira
4100-453 PORTO

2007243

Nº Mecanográfico	Data Nascimento	E. Analítico Nº	Data	Hora Inscrição
1019596	M 26/08/1953	2007243	05/12/2008	17:20

RELATÓRIO FINAL EM 09/12/2008

	RESULTADO ACTUAL	VALORES DE REFERÊNCIA	RESULTADOS HISTÓRICOS
SANGUE VENOSO			
•CRP de Alta Sensibilidade 1a. amostra (a)	0.41	CE mg/dl	

Relatório analítico requisitado pelo
Exmo. Senhor Dr.
Alexandre José Leonardo Teixeira

Para o
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2007256

Nº Mecanográfico	Data Nascimento	E. Analítico Nº	Data	Hora Inscrição
1019596	M 26/08/1953	2007256	10/12/2008	14:17

Exmo. Senhor Dr. Alexandre José Leonardo Teixeira

RELATÓRIO FINAL EM 12/12/2008

	RESULTADO ACTUAL	VALORES DE REFERÊNCIA	RESULTADOS HISTÓRICO
SANGUE VENOSO			
•CRP de Alta Sensibilidade (a)	0.22 ↓	CE ate 0.29 mg/dl	

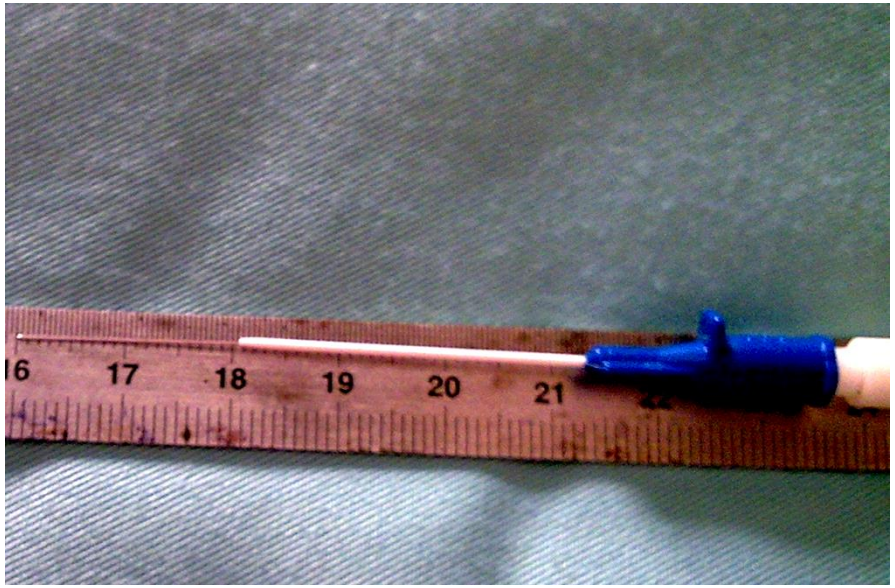
CRP 5 days : 46% drop

4.1 mg/l to 2.2 mg/l

Thirth session iv-PRF

07-09-2010

IV PRF parameters:
347 Ohms
45 V
2 Hz
10 msec.
20 min
36º C



CRP

Pre iv-PRF 3,90 mg/l

Post iv-PRF

2,29	24 hrs	
1,87	72 hrs	52%
2,49	14 days	
2,65	3 Months	
2,82	4 Months	28%
2,94	8 Months	24,6%

Prof. Ernesto Morais

50 Anos

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10-09-2010 (0-0) 10-09-2010

MA6250

Dr. Alexandre Teixeira

Exmo Sr. Dr.
ALEXANDRE JOSÉ L TEIXEIRA

26-08-19

C S BOAVISTA - CONSULTAS

Análises	Resultados	Unidades	Valores de Referência	Resultados Anter 09-09-2010	07-09-2010
PROTEÍNA C REACTIVA (Ultra)	0.187	mg/dL	0.000 - 0.450	0.229	0.390

iv PRF April 2009 - 1st patient

Stage 4 NSCL - complete response 6 months after the iv PRF that lasted 64 months

Teixeira A, Sluijter M
Intravenous application of intravenous pulsed radiofrequency- 4 cases report
Anesth Pain Med 2013, 3(1):219-22

Iv- PRF Outcomes:

Rheumatoid arthritis (1pt) and Psoriasis (1pt)

- In the RA and psoriasis arthritis patients the CRP had an initial significant fall with a subsequent increase, but to a level inferior to the initial value.

RA - CRP		Psoriasis - CRP	
18,0mg/l	Pre	39,29 mg/l	Pre
8,25mg/l	24hrs	30,25mg/l	day 5
5,50 mg/l	day 4	17,86mg/l	day 18
4,97mg/l	day 11		
8,47 mg/l	2 months	26,75mg/l	1,5 months
8,00 mg/l	4 months		

The NRS had a modest improvement of 30% in both patients

Improvement of the skin lesions in the psoriasis patient at 6 months

Depression - 1Pt

Become controlled at 3weeks

Requires treatment every 8 months

Iv- PRF Outcomes:

Diabetes II (3pts) on insulin unable to achieve a good control

Fasting glycaemia reduction at 24hrs

Achieved a good control with a 20-25% drop in insulin requirement

1 pt had a hypoglycemia episode at 24hrs

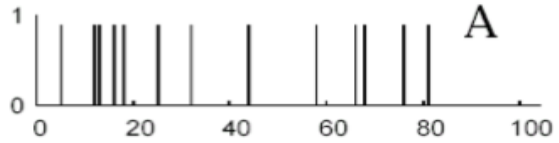
The effect last at least 1 year in these pts

Severe 2 months post stroke deficit (speech production and understanding)

Significant recovery in 3months

Requires treatment every 6 months

2012- STP Current



- **Variant of PRF with an irregular distribution of duration between pulses with a Poisson distribution**

Parameters

- Mean frequency: 5,2 Hz
- Mean pulse duration : 2,86 msec/sec.
- Duty cycle: 14,9 msec/sec
- Coef. of variance: 3,4

Changing from iv to transcutaneous PRF

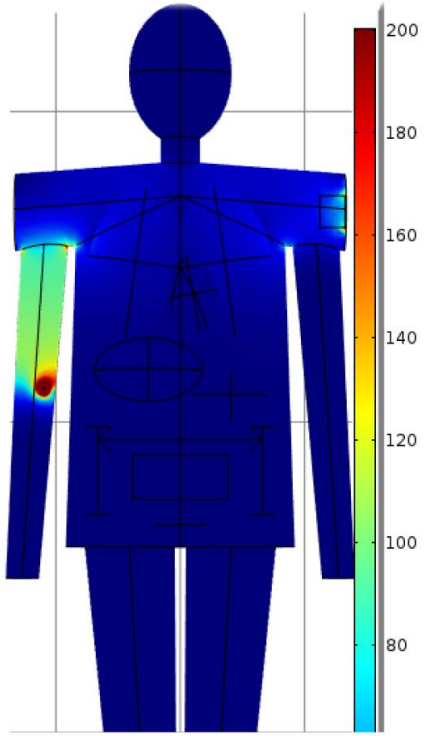
Finite element computer simulation of intravenous and transcutaneous PRF

Sumientra Rampersad, at 5th International Symposium Invasive Procedures in Motion, 2015

420 Hz/60 V/4Hz/10 msec

Intravenous - PRF
SMK needle 23G, 5 cm active tip
5x5cm skin ground electrode

Transcutaneous PRF
5X5 cm skin electrode over brachial vein
5x5 cm skin electrode contralateral upper arm



0-200 V/m

Conclusions

- Electric field is not conducted through the blood stream
- If fields > 2Kv/m are desired inside the blood stream - IV PRF is needed
- If fields up to 500 V/m are desired inside the blood stream TC- PRF over the vein can be used

2016 PRF - new working hypothesis on the mode of action

- Physiological range PRF Efields (40 – 250 V/m) are responsible for the effect
- Causes a higher availability of electrons transfer
- Improves the Redox status in stressed cell (Prof Luis Josino Brasil)
- Longer term effect is caused by an effect on the epigenetic part of the chromatin

Types of Pulsed Radiofrequency

- Classical PRF
  - Safer alternative of thermolesions
  - Target: Afferent chain
  - Application: invasive
- immunoPRF (iPRF)
  - A method to reduce oxidative stress and inflammation both in painful and in non-painful conditions
  - Target: T-cells and other effector cells of the Innate Immune System
  - Application: transcutaneous
  - Systemic and regional

Immuno PRF

Systemic ImmunoPRF- type I

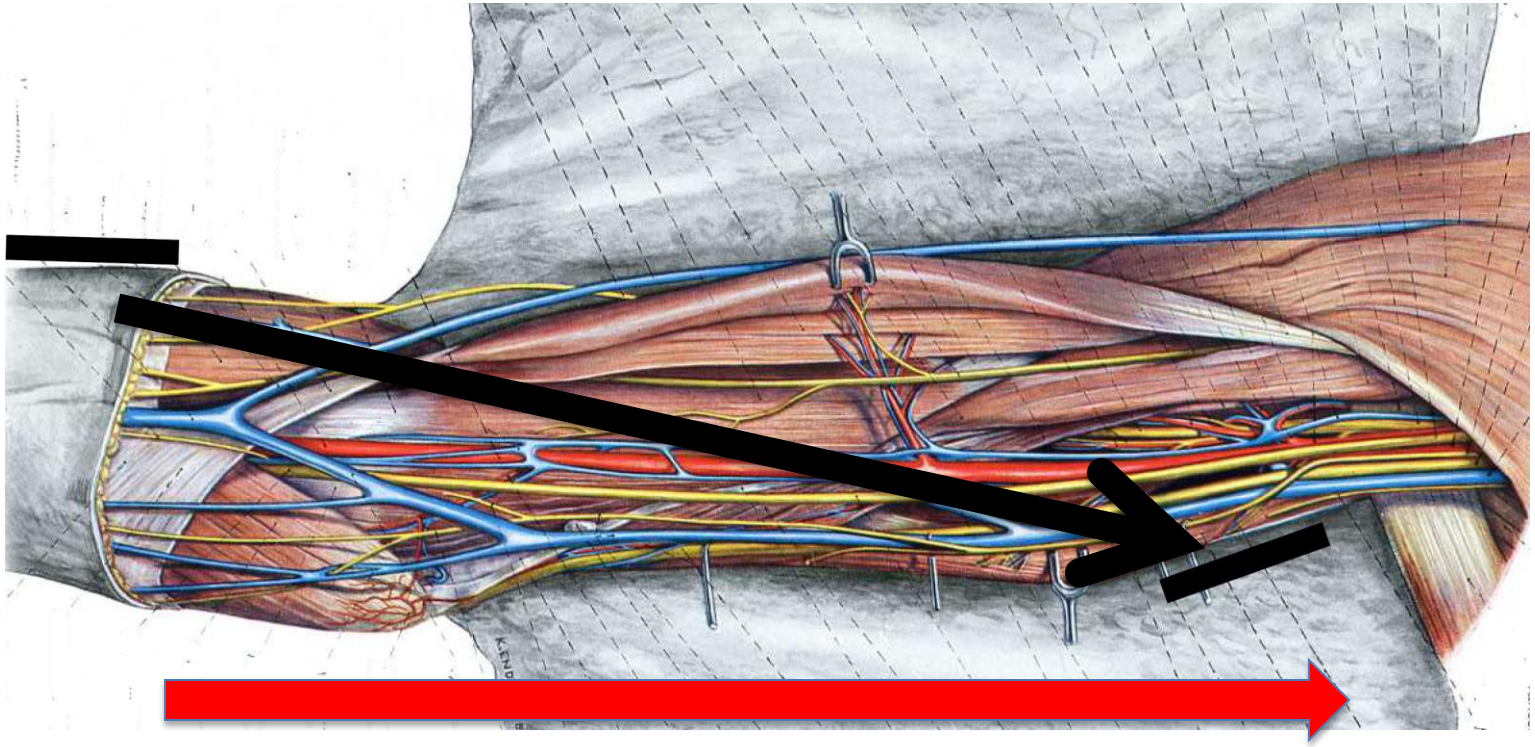
. Purpose: a systemic change to
  - A low level of inflammation
  - A normal level of T-cell reactivity
  - An ANS in vagus mode (↑ heart rate variability)

- Target: intravascular T-cells

- Technique:
  - Large skin plates over the arm
    - Inside of upper arm over neurovascular bundle
    - Ventral surface of underarm
  - Required current: 0.8 – 1 A
  - Assembly line principle

Upper arm exposure to systemic iPRF

an assembly line with a constant *E*



Prof. M.Sluijter

Requirements criteria for treatment

- Conditions in which deregulation of the Redox system and /or the Immune system are implicated
- Pts not responding to the indicated available treatments or refuse them due to severe side effects or there is no available treatment, curative or palliative Informed of the experimental nature of the treatment
- Patients require treatment, we do not offer or advertise the treatment
- Verbal or written consent
- We do not interfere with ongoing treatments
- If psychological issues are present a caregiver consent is required

All patients were treated free of charge

my settings

I. Immuno PRF **systemic**

- PRF with STP current

- Applied over a neurovascular location for systemic effects

  brachial artery….ventral forearm

  carotid artery…. cervical spine

  supraclavicular artery….ventral forearm

  infraclavicular artery…..ventral forearm

  femoral artery…..sacrum

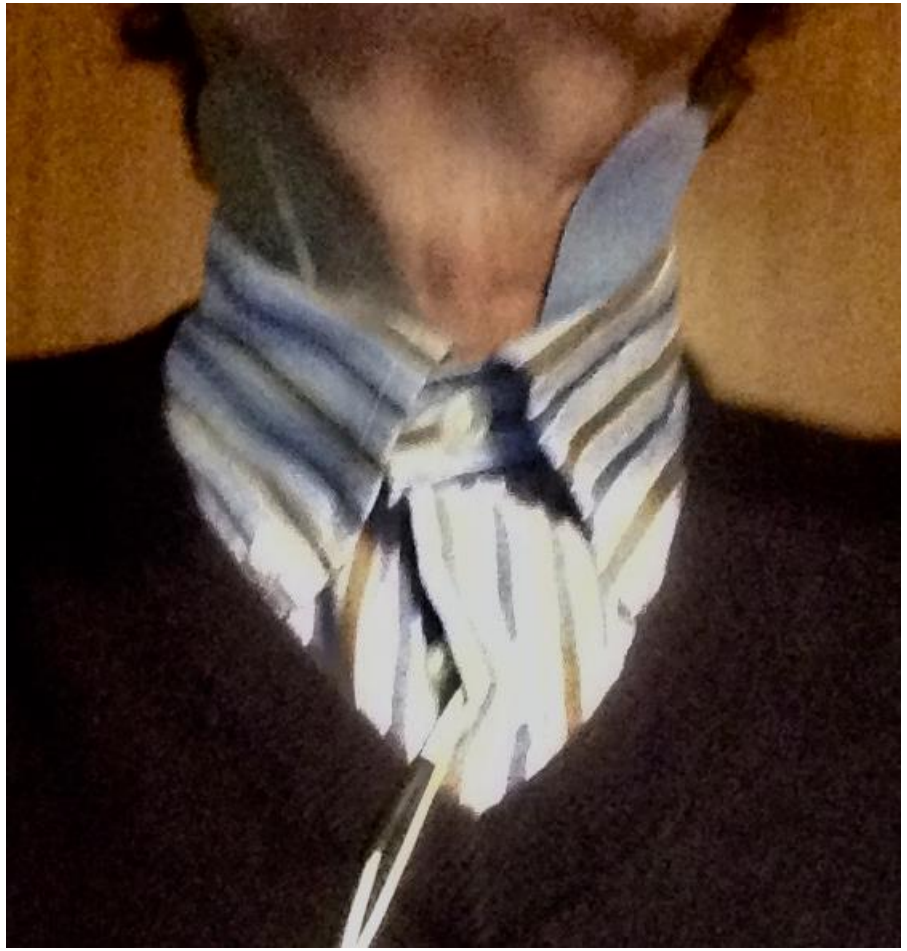
- Frequency of application every 1 to 12 months

II. Immuno PRF local

- STP applied over the site of pathology for local effects: ex.: Transcranial

Electrodes over carotid arteries

7.5x5 cm electrodes



Electrodes over axillary artery and forearm - 10x5 cm electrodes

Transcranial electrode disposition

TENS electrodes
5x5 cm each

Half surgical plate
electrodes 10x5 cm each

Treated Conditions- iPRF transcutaneous and number of patients (22)

- Depression - 4
- Diabetes- 4
- Panic attacks - 1
- Sleep attacks - 1
- Psoriasis - 2
- Carotid stenosis - 1
- TIA -2
- AR Macular disease - 1
- Irritable Bowel Syndrome - 1
- Chronic Fatigue Syndrome - 1
- Amyotrophic Lateral Sclerosis - 1
- Chronic Renal Failure g. 4 (eGFR < 20 mls/ 1.73m^2) - 2
- Post partum hair loss – 1
- COPD (Prof Sluijter pts)

Limoge current

Aimé Limoge
An introduction to electroanesthesia
University Park Press, Baltimore, Maryland. 1975

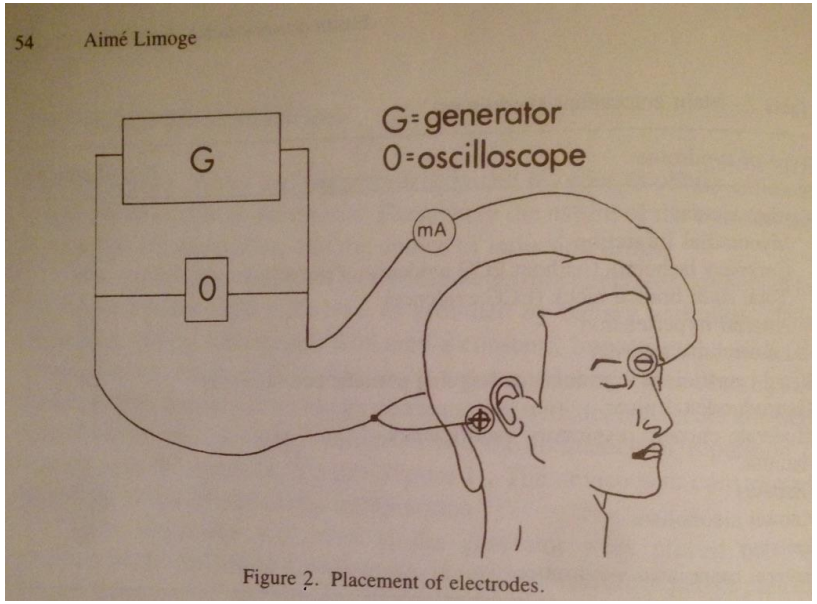


Figure 2. Placement of electrodes.

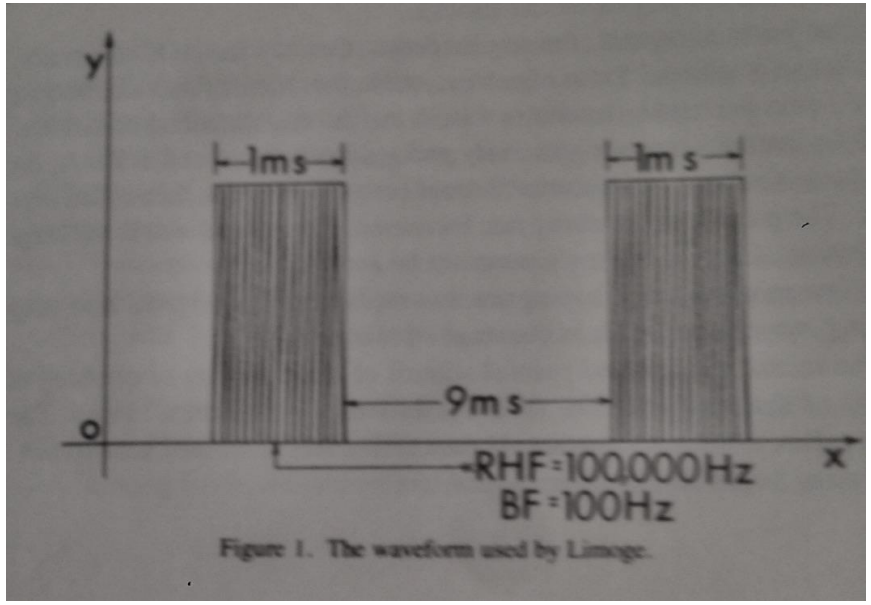


Figure 1. The waveform used by Limoge.

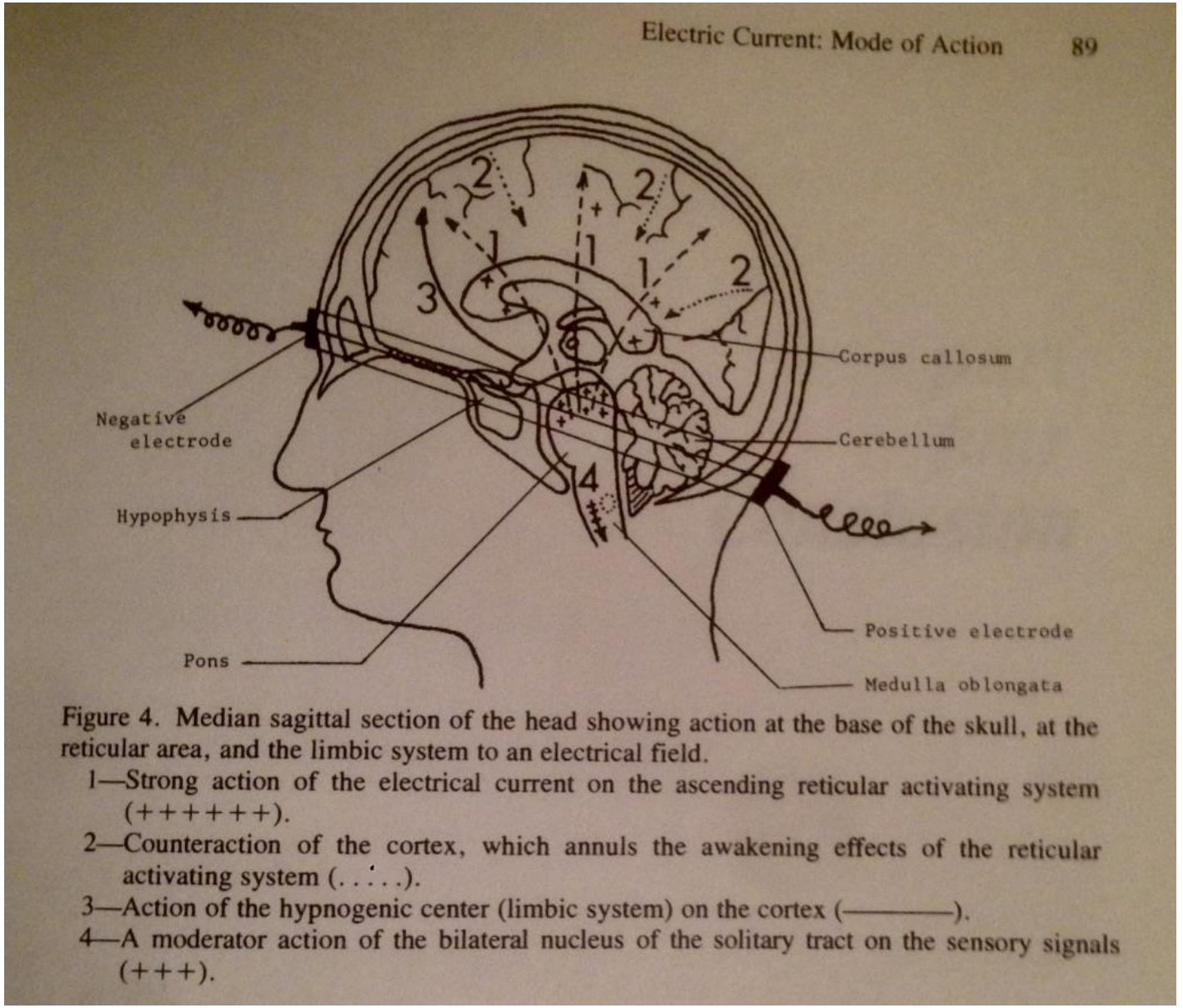


Figure 4. Median sagittal section of the head showing action at the base of the skull, at the reticular area, and the limbic system to an electrical field.

1—Strong action of the electrical current on the ascending reticular activating system (++++++).

2—Counteraction of the cortex, which annuls the awakening effects of the reticular activating system (. . . . .).

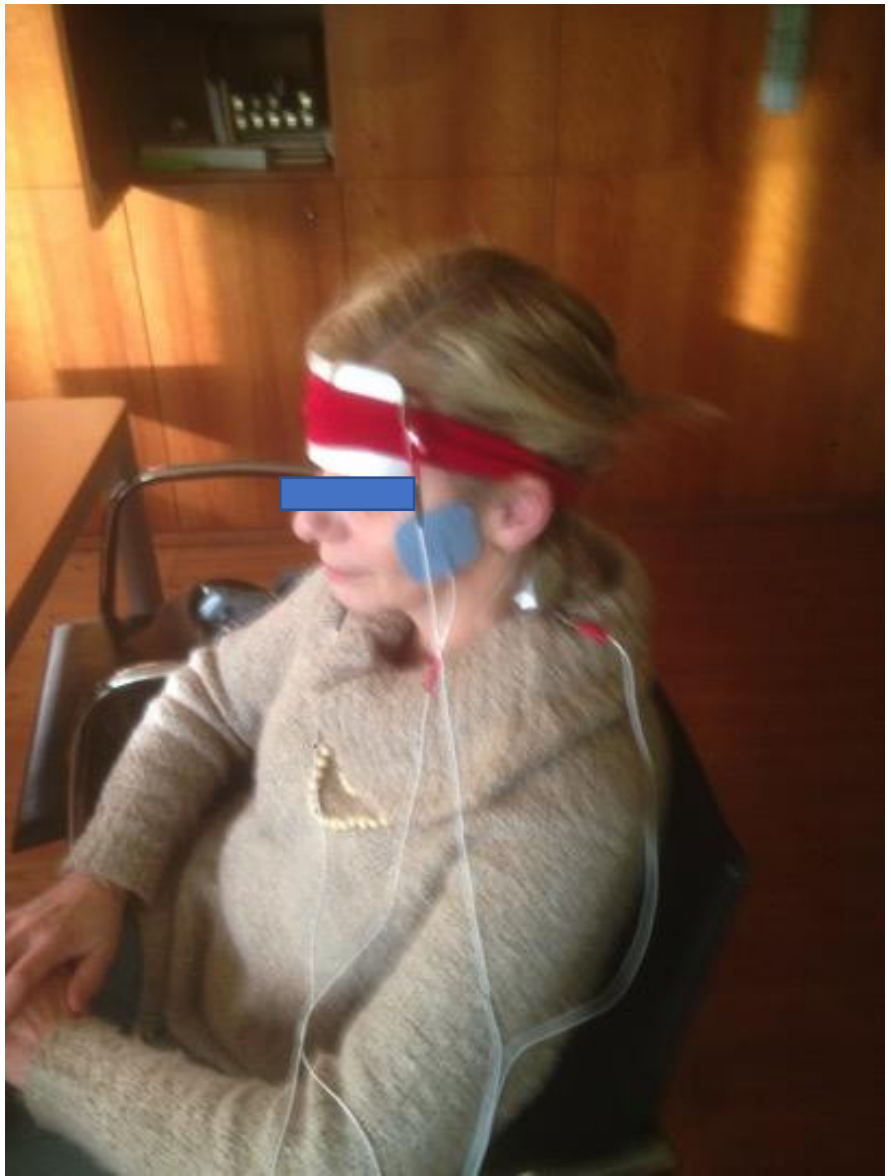
3—Action of the hypnogenic center (limbic system) on the cortex (————).

4—A moderator action of the bilateral nucleus of the solitary tract on the sensory signals (+++).

Depression – PRF every 8 months

Stroke of left MCA 29/12/2009

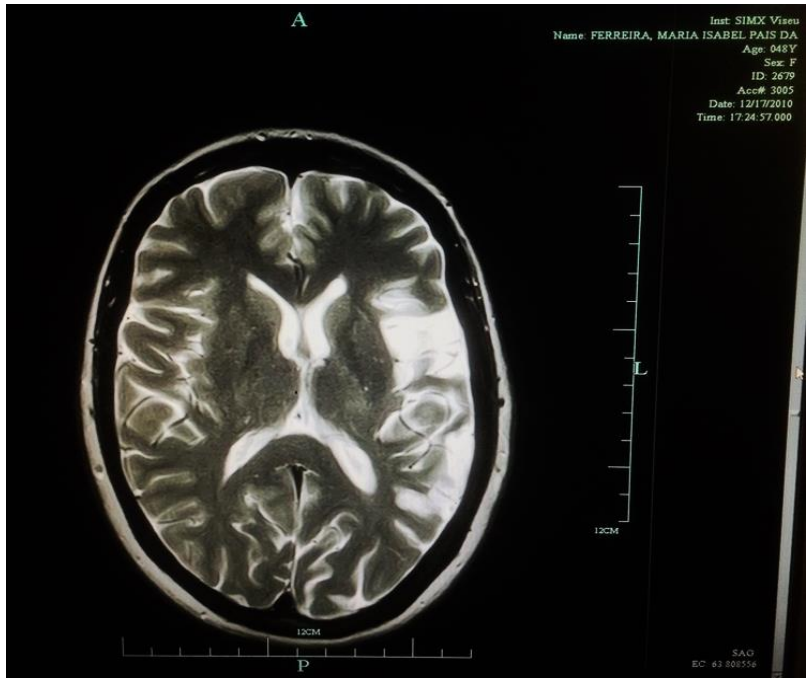
Severe post stroke deficit- 1st PRF iv on 29/12/2010



PRF at 6 months intervals

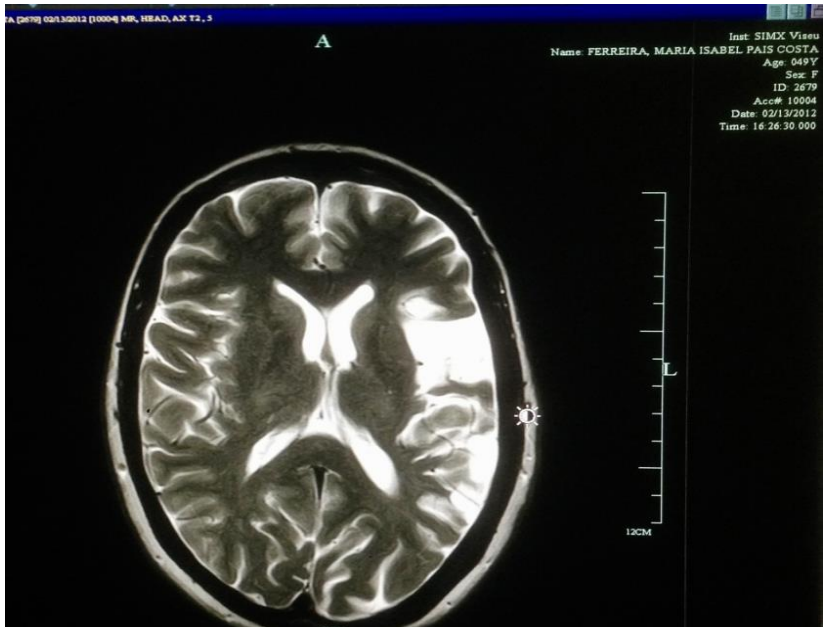
MRI- follow up:
no changes

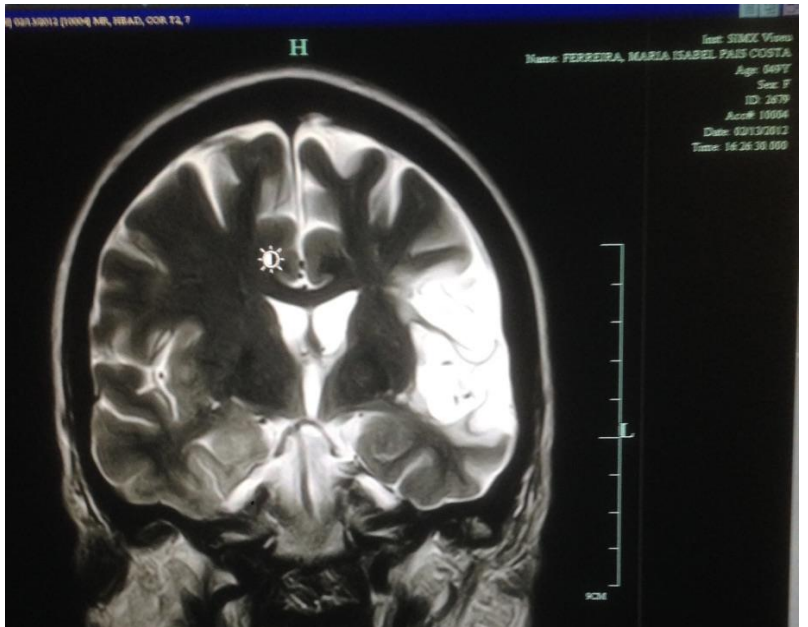
17/12/2010



Clinically:
tremendous
improvement

13/02/2012



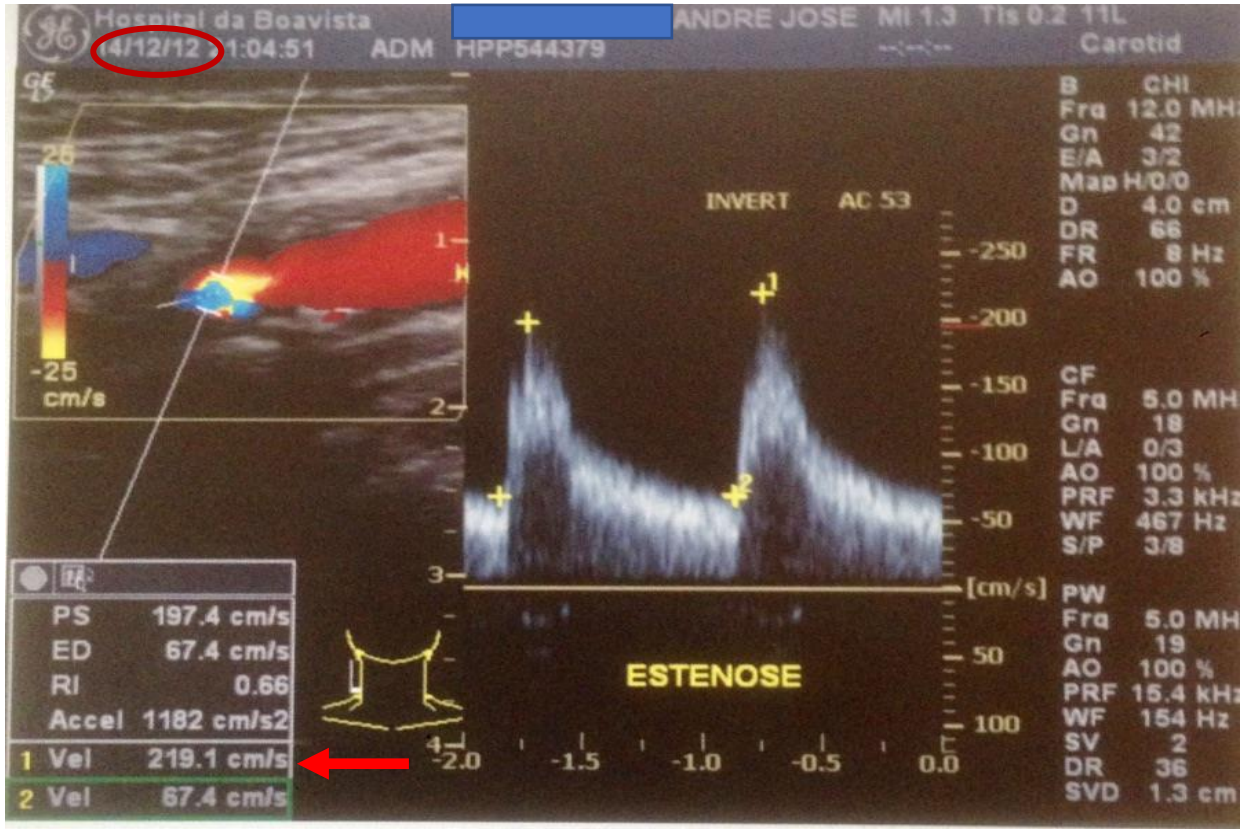


59 years
Smoker
No drugs

Right Carotid Stenosis 50-70% - 5 years follow up + TIA - paralysis of left thumb for 2hrs

64 y
Smoker
Low dose AAS
Anti hypertensive
No statins

Dez 2012



Feb 2018

Peak systolic velocity - 219.1 cm/s

Peak systolic velocity - 189.1 cm/s

13,7% drop in PSV

Right Internal Carotid stenosis

Dez 2012

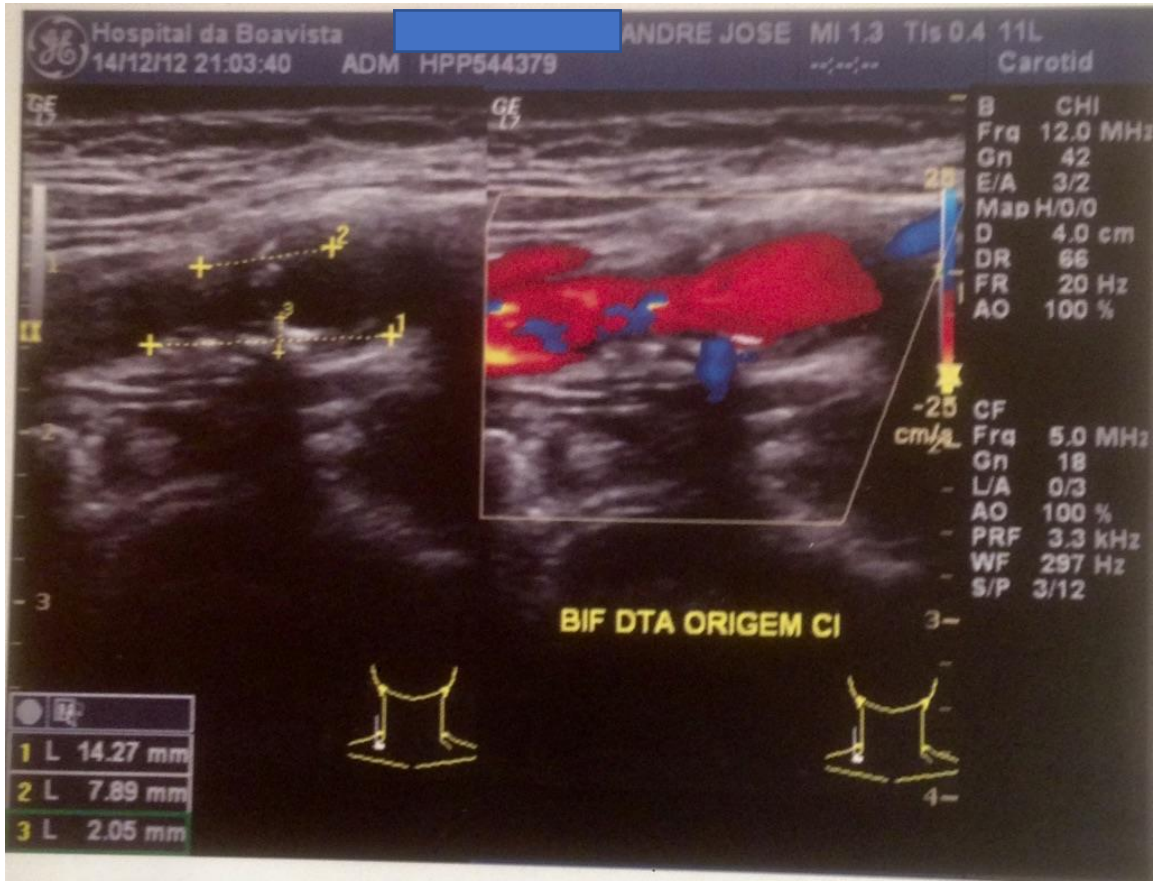


Plate thickness - 2.05 mm

Feb 2018

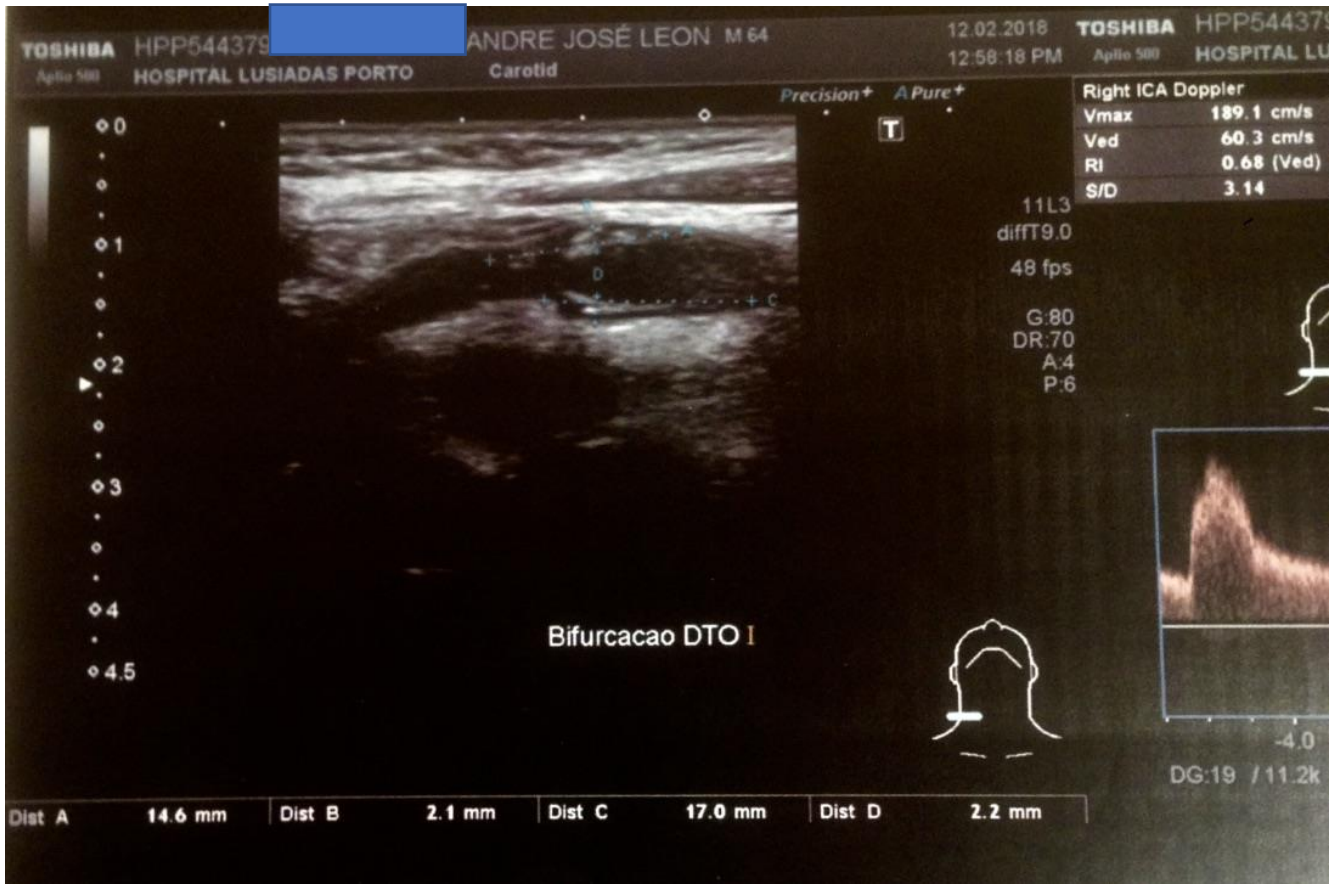


Plate thickness - 2.2 mm

7% increase in plate thickness

Right Common Carotid - 5 years follow up

Dez 2012

Plate thickness – 0.9 mm

Feb 2018

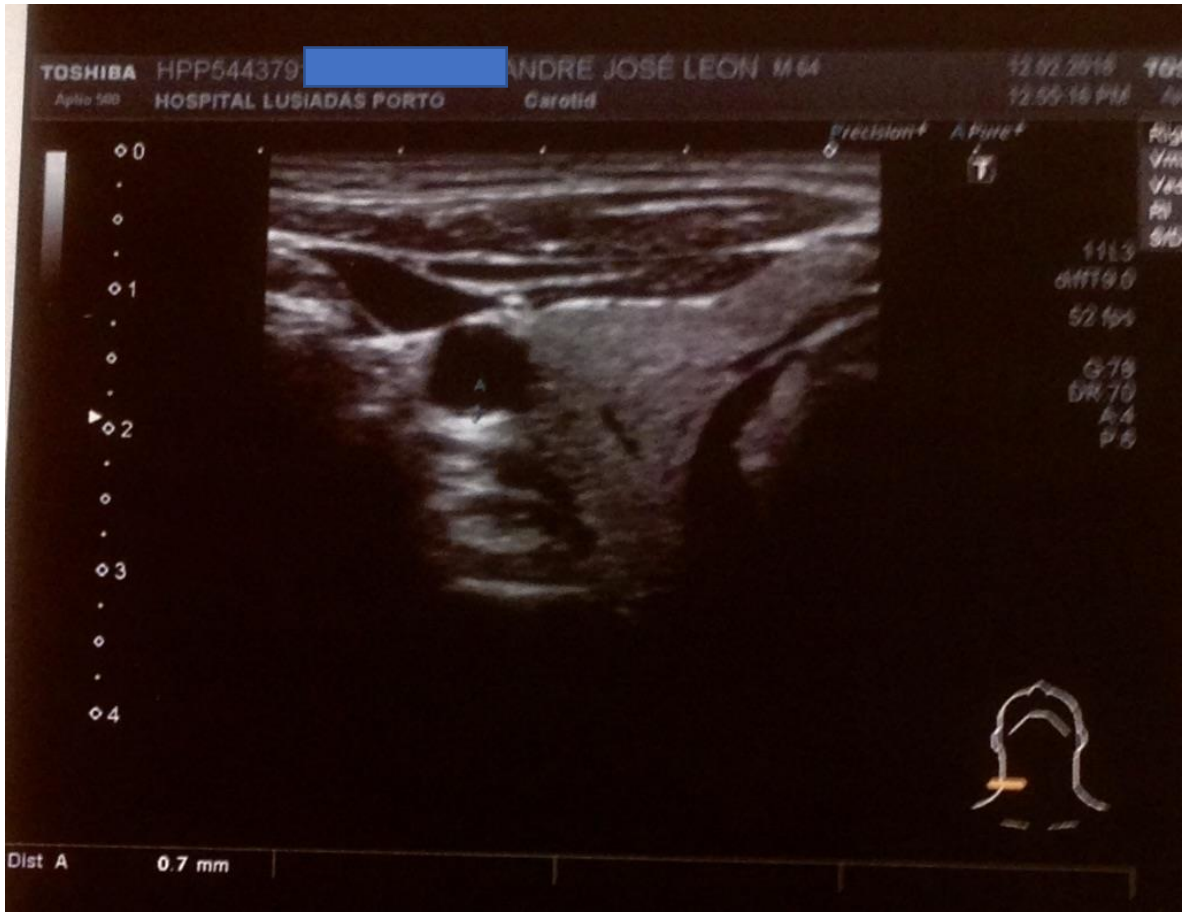


Plate thickness – 0.7

22% reduction in plate thickness

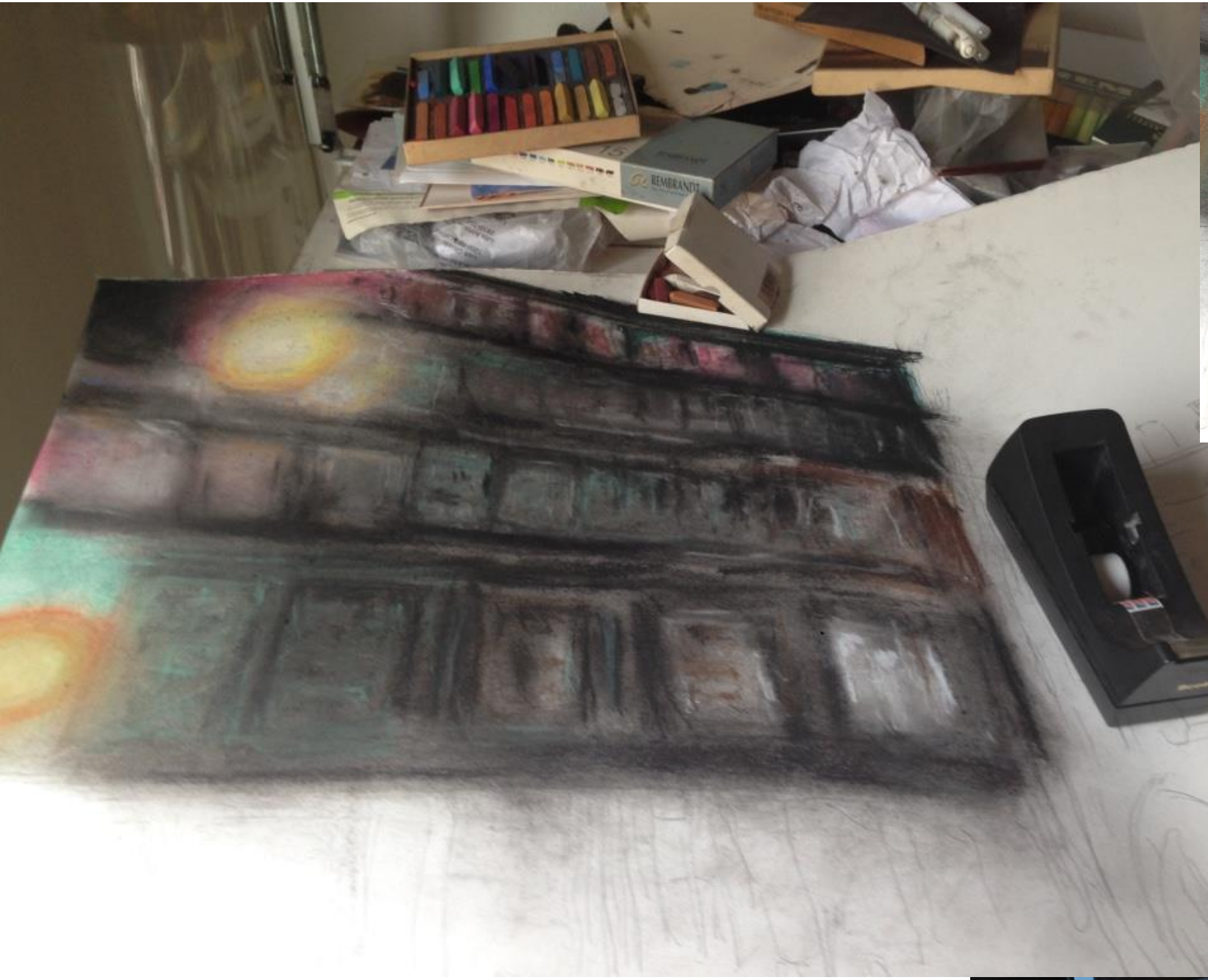
“ couldn’t you try the magic box in my eyes”

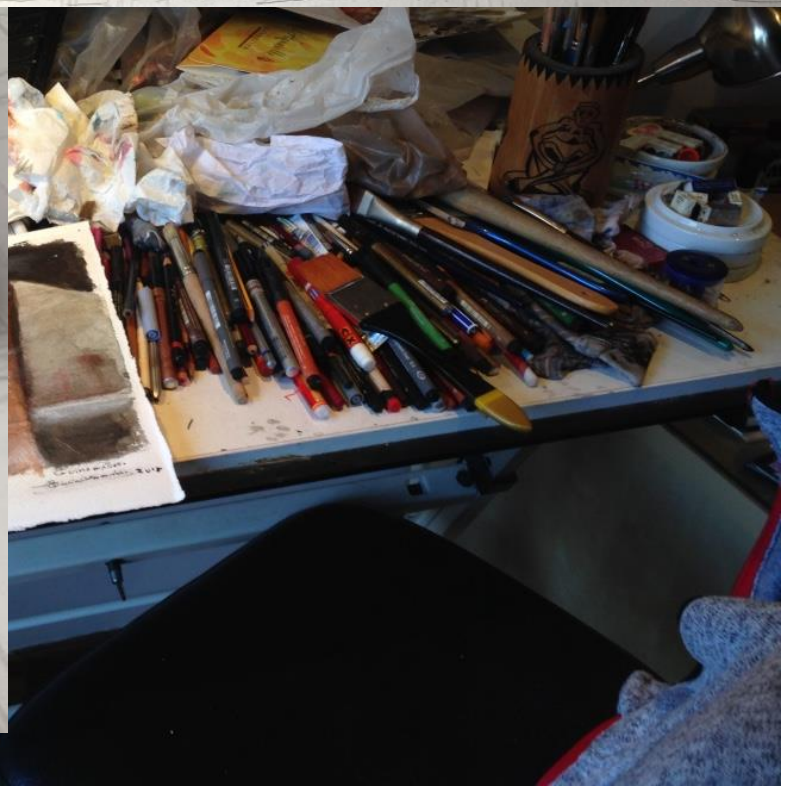
- Macular disease
- 93 y old, art painter
- Stopped painting due to vision problems 2 years ago
- He suggested the treatment after a successful PRF-TC for knee pain.

93 years –Age Related Macular Degeneration

27/01/2015 - PRF

Painted on the same night



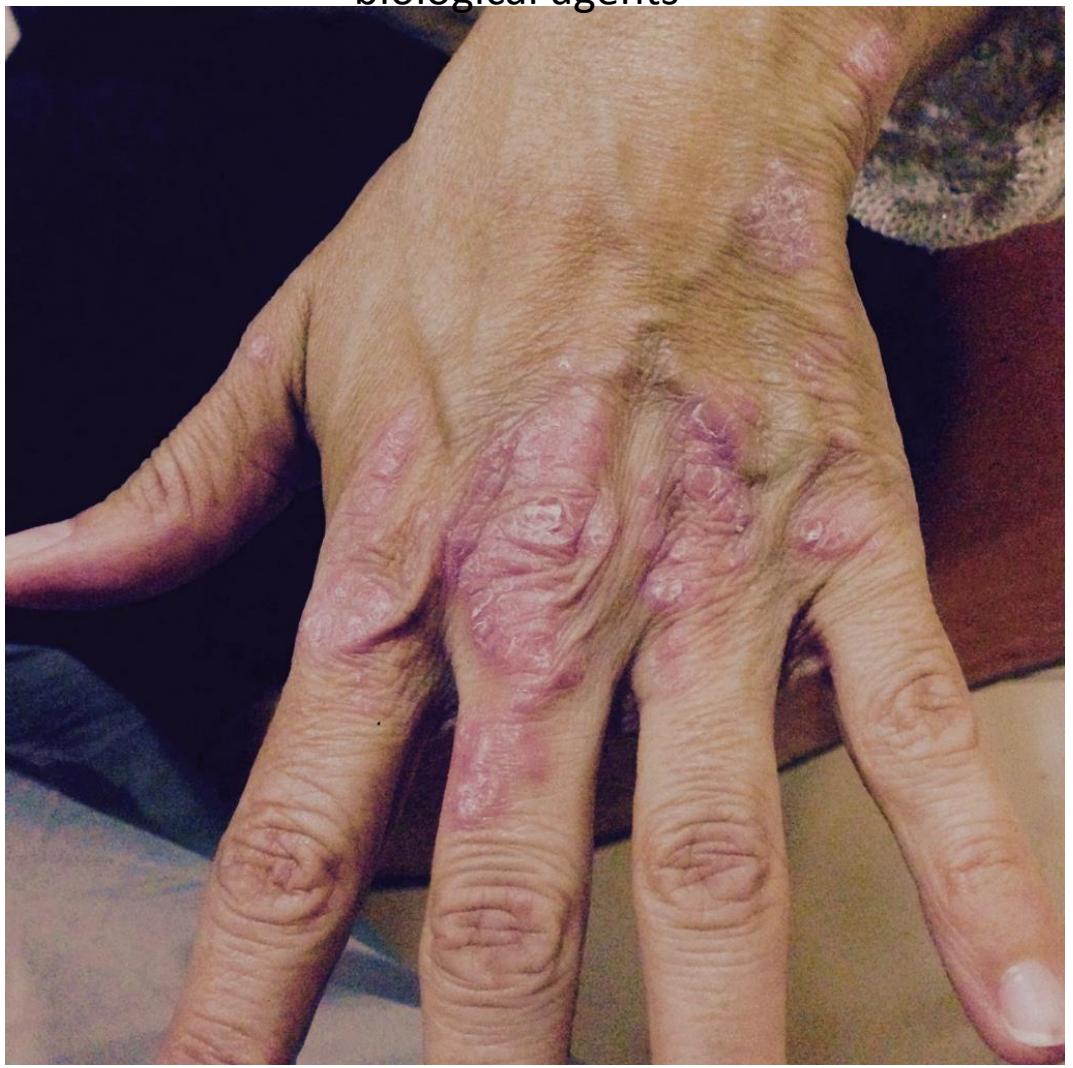


Continues obsessive work

Psorisis

24/07/2015

42 years old
Lesions since 13 years old
Refused corticoids, methotrexate and biological agents



1st PRF

8-02-2016

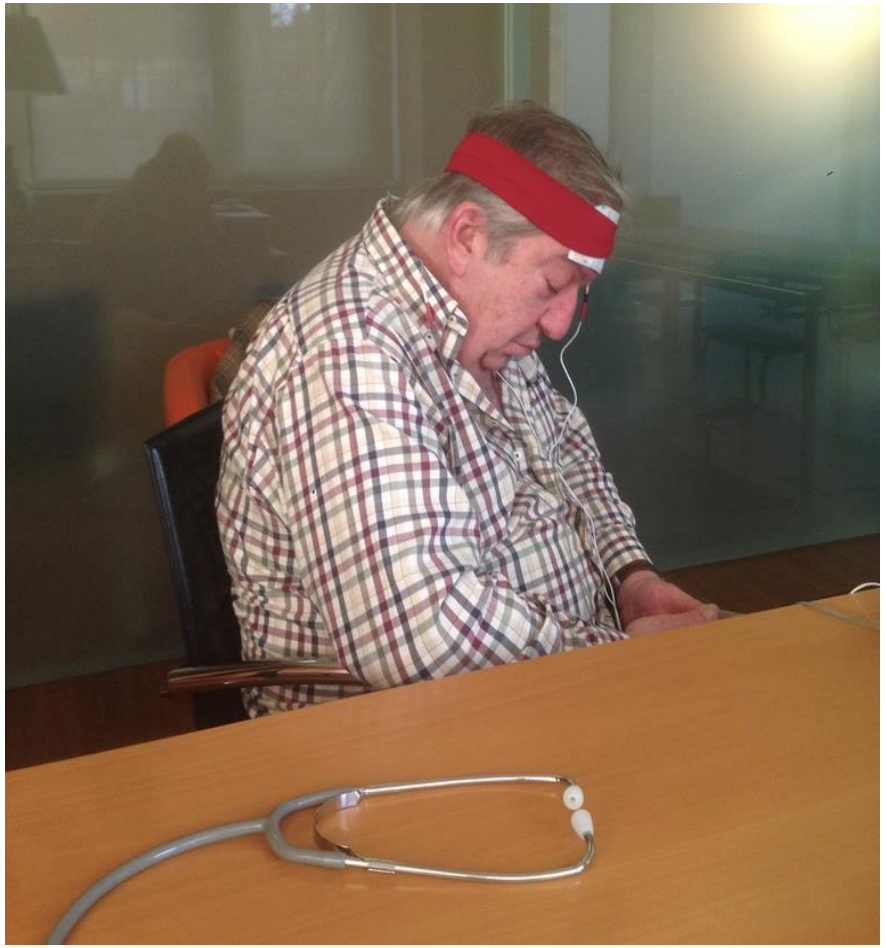
2º PRF

13/06/2016

28/12/2016

3th PRF

63 years
Narcolepsy / sleep attacks for 2 years
PRF January 2017
 Improvement > 50%; less attacks and of shorter duration



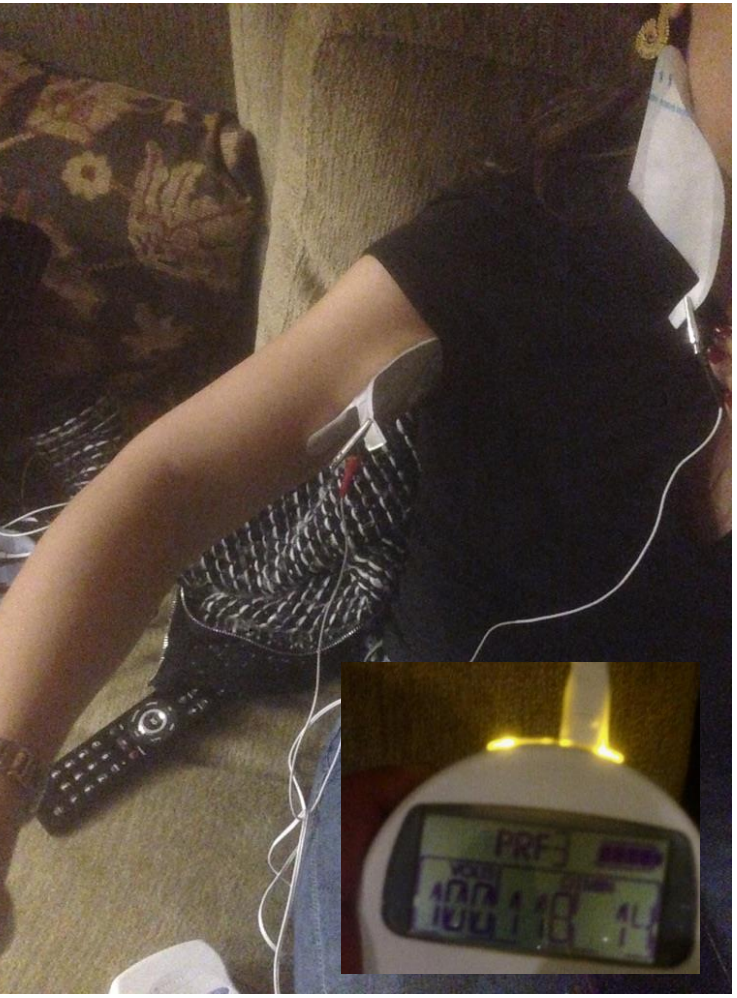

Jan 2017

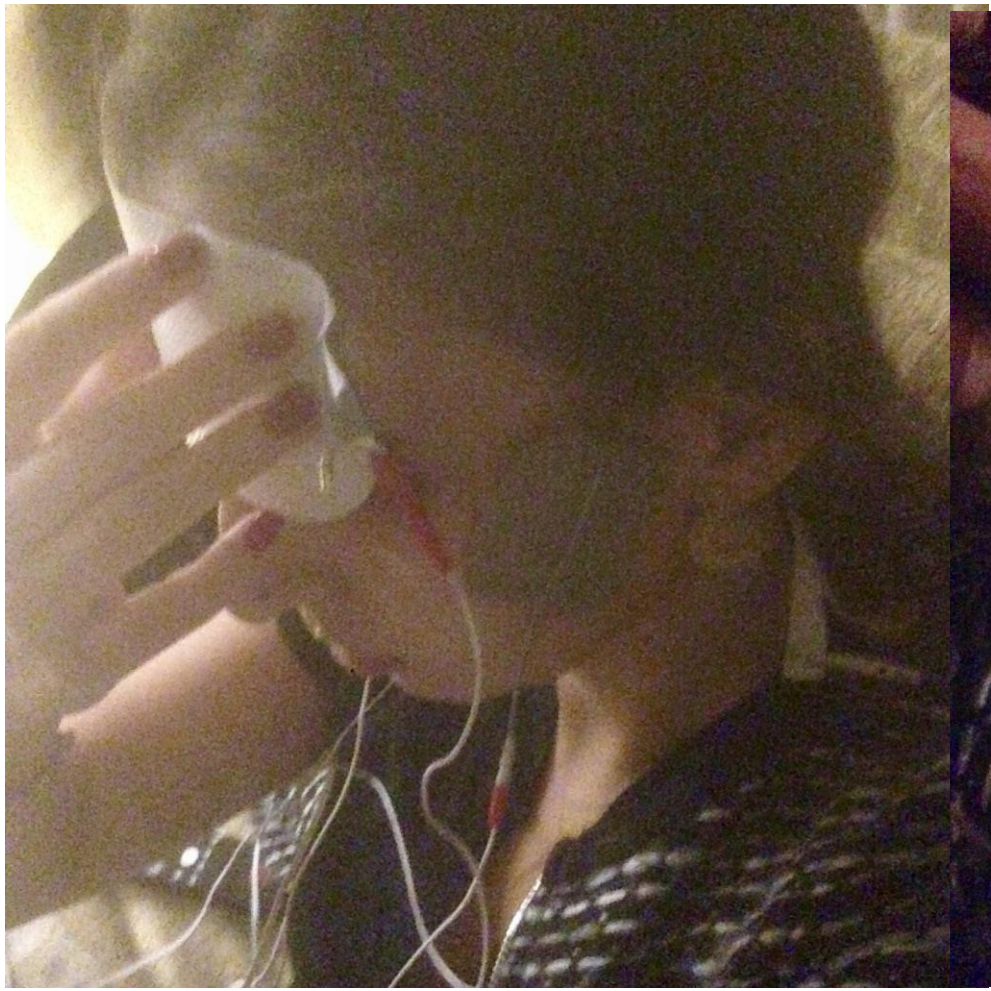

Jan 2017 pre PRF

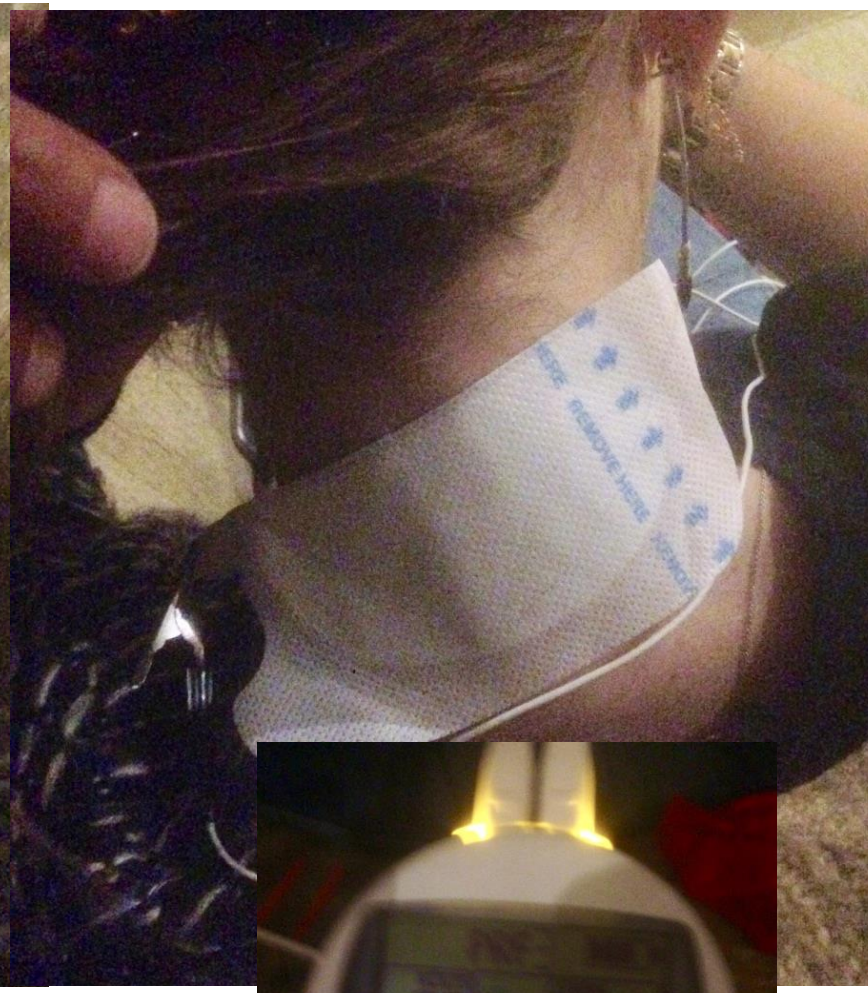

September 2017

Postpartum hair loss – delivery on 23/05/2017

iPRF on 16/10/2017 asymptomatic in 10 days





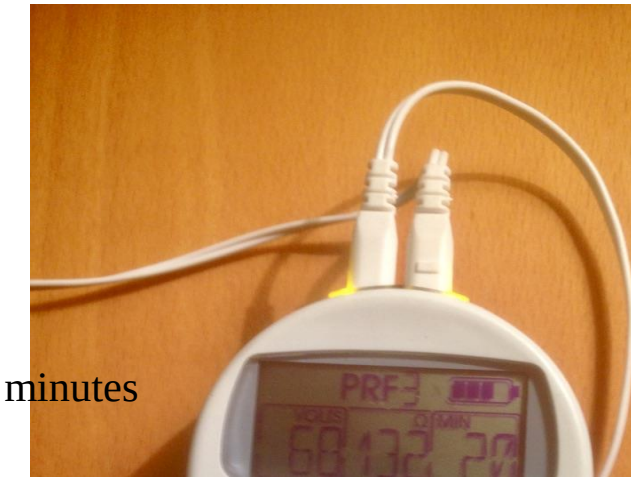


Postpartum hair loss initiates 2 to 4 months after childbirth.
It usually continues for 6 to 24 weeks but rarely persists up to 15 months.
Virtually the whole hair is replaced after several weeks

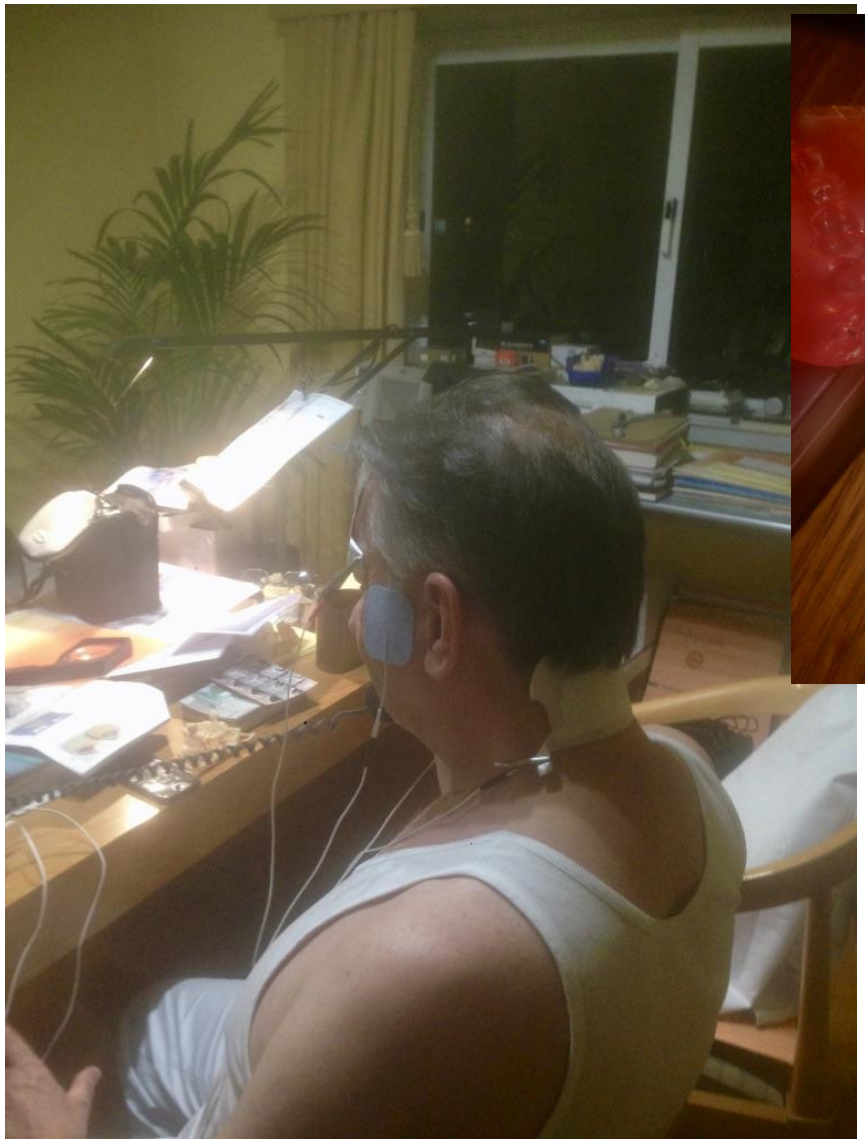
23/11/2017

69 y
TIA - notice left hand paralysis at 08:00h upon waking
PRF -12 hrs after, still with paralysis at 20:00
Noticed full recovery at 06:00 h up on waking

60% of TIAs last less than 1 hour
40% of those lasting for less than 10 minutes

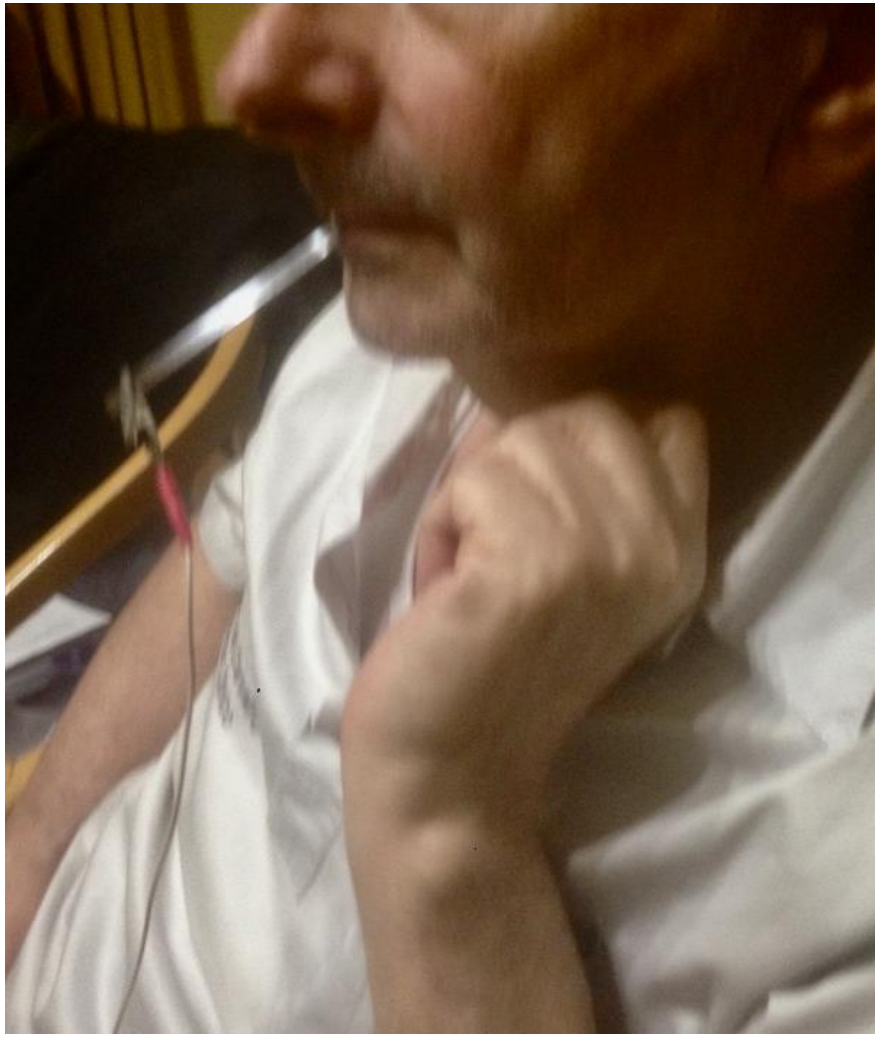


62 years
Chronic fatigue syndrome + Irritable bowel disease
1.5 years duration, refractory to treatments



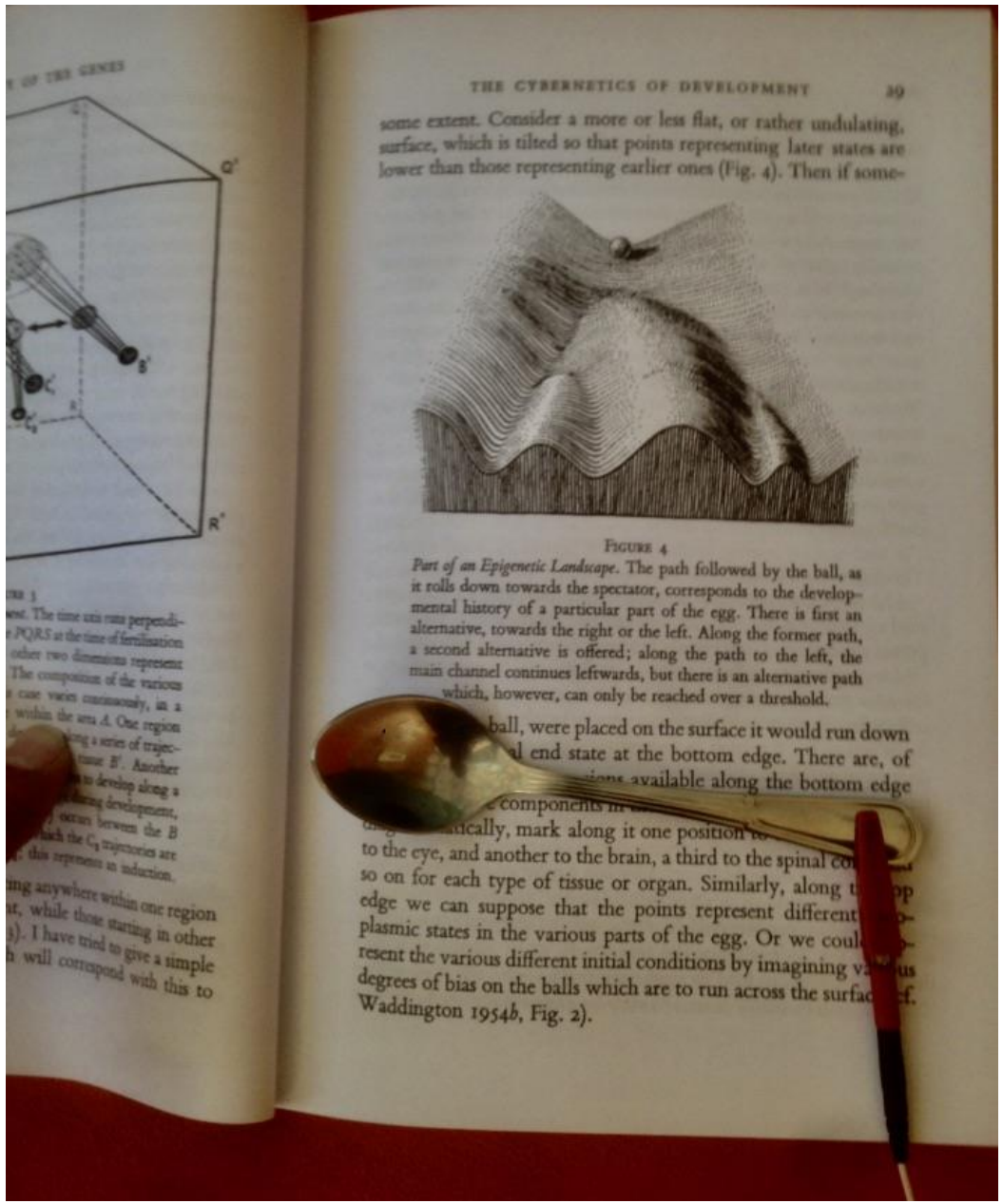
PRF on 23 Nov 2017

Requested new treatment after significant improvement with the first PRF
2º PRF on 12/01/ 2017
3 weeks after declares 100% asymptomatic



Tea spoon as an electrode

The epigenetic landscape- space diagram



THE CYBERNETICS OF DEVELOPMENT 39

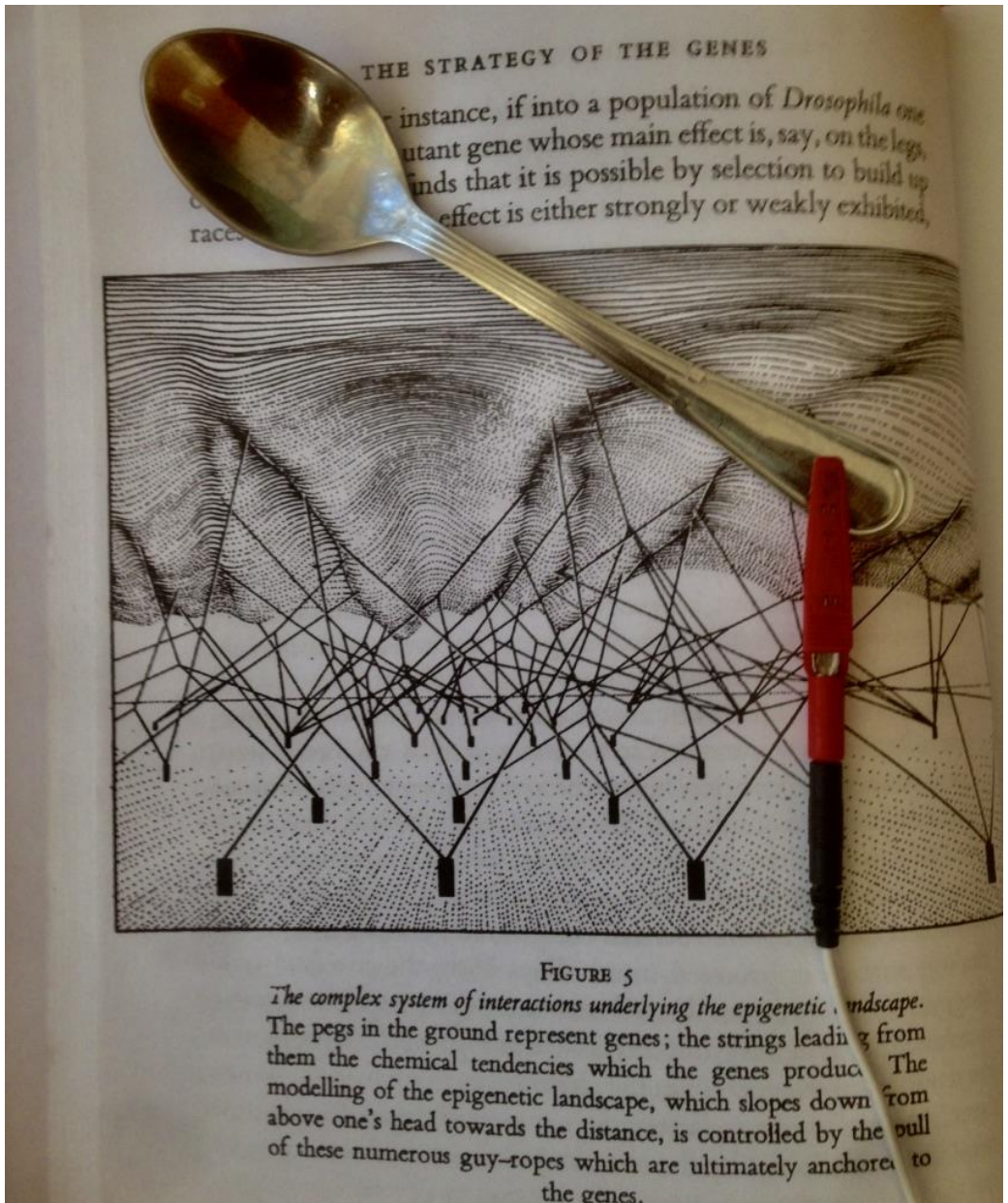
some extent. Consider a more or less flat, or rather undulating, surface, which is tilted so that points representing later states are lower than those representing earlier ones (Fig. 4). Then if some-

FIGURE 4

Part of an Epigenetic Landscape. The path followed by the ball, as it rolls down towards the spectator, corresponds to the developmental history of a particular part of the egg. There is first an alternative, towards the right or the left. Along the former path, a second alternative is offered; along the path to the left, the main channel continues leftwards, but there is an alternative path which, however, can only be reached over a threshold.

ball, were placed on the surface it would run down
l end state at the bottom edge. There are, of
ions available along the bottom edge
components
ically, mark along it one position
to the eye, and another to the brain, a third to the spinal co
so on for each type of tissue or organ. Similarly, along t
edge we can suppose that the points represent different
plasmic states in the various parts of the egg. Or we coul
resent the various different initial conditions by imagining v
degrees of bias on the balls which are to run across the surfa
Waddington 1954*b*, Fig. 2).

Underlying view of the epigenetic landscape



THE STRATEGY OF THE GENES

instance, if into a population of *Drosophila* one
utant gene whose main effect is, say, on the legs,
inds that it is possible by selection to build up
effect is either strongly or weakly exhibited,
race

FIGURE 5

The complex system of interactions underlying the epigenetic ndscape. The pegs in the ground represent genes; the strings leadi g from them the chemical tendencies which the genes produc The modelling of the epigenetic landscape, which slopes down from above one's head towards the distance, is controlled by the pull of these numerous guy-ropes which are ultimately anchore to the genes.

The strategy of genes
C.H. Waddington,
1957

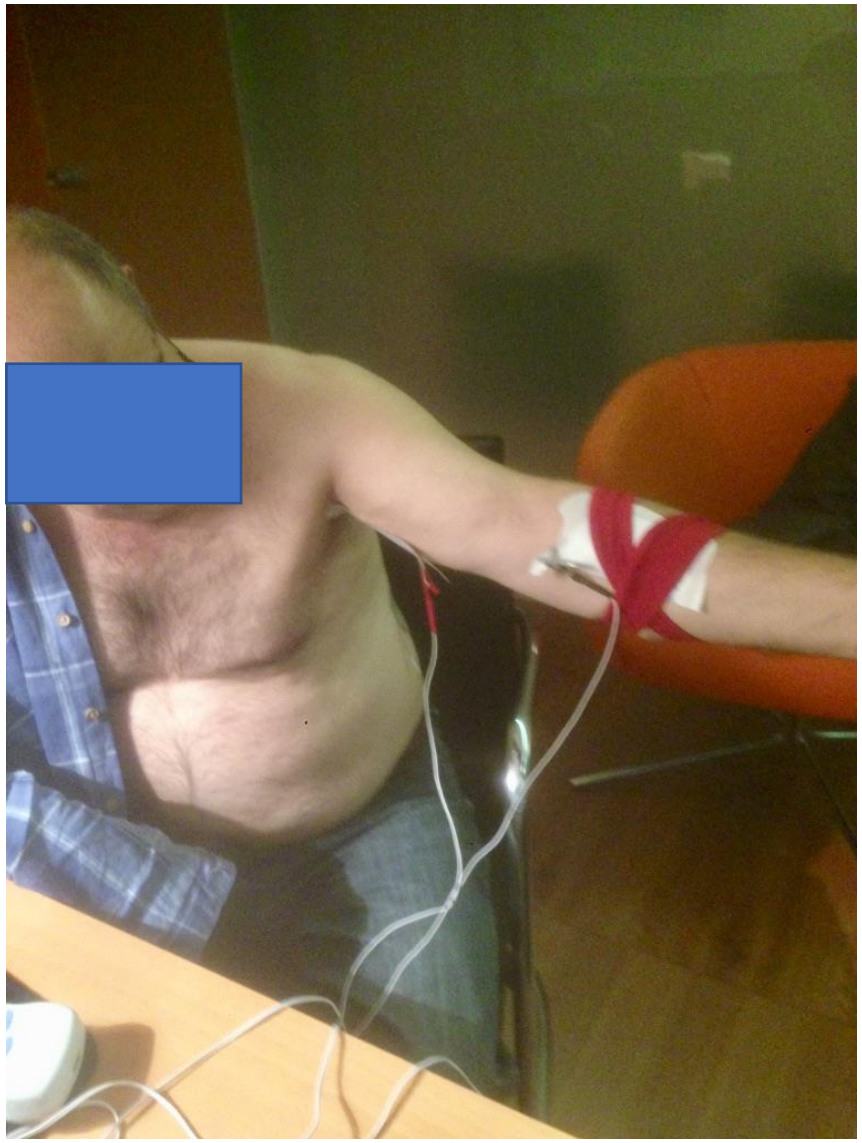
62 years, chronic renal failure grade 3 for 8 years
Etiology: Diabetes and hypertension
Chronic Renal Failure Class 4; eGFR 19 mls/min/1.73m^2 since Jan 2017

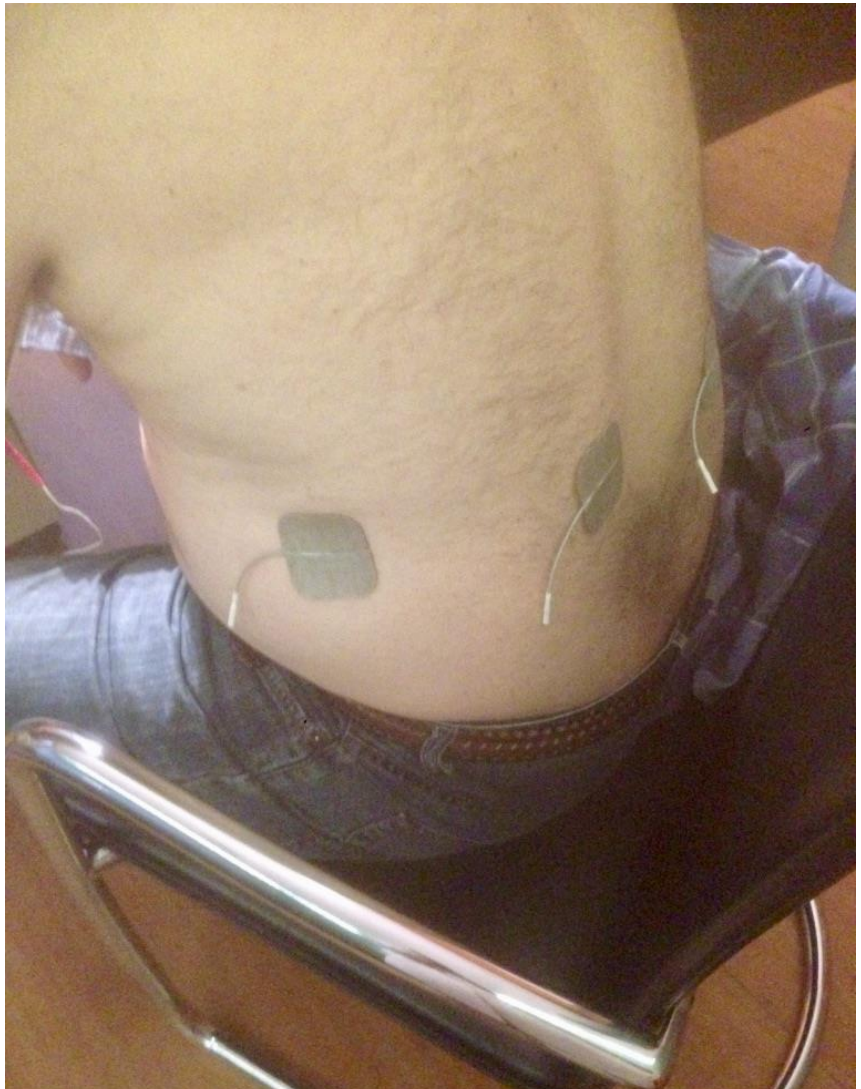
1º PRF on 3/02/2017

Grade 3 (moderate) : 30-59 ml/min/1.73 m^2
Grade 4 (severe): 15-29 ~ml/min/1.73 m^2

58 years, renal failure grade 3 for 12 years
Chronic Renal Failure Class 4 eGFR 19 mls/min/1.73/m^2 since August 2017
Etiology HT

1º PRF on 03/11/2017





Grade 3 : 30-59 ml/min/1.73 m^2
Gade 4 : 15-29 ~ml/min/1.73 m^2

CRF- outcome of eGFR

CRF 1st pt	
	GFR ml/min/1.73m^2
Jan 2017	19
Feb	17
Jun	17
Aug	19
Nov	14
Dez	14
Feb	14

CRF 2nd pt	
	GFR ml/min/1.73m^2
Jun 2017	21
Aug	19
Nov	19
DEZ	19

1st iPRF on 03/02/ 2017

Repeated every month till 2 Jun 2017 (5 treatments)

Restarted on Nov on a monthly base

1st iPRF on 03/11/ 2017

2nd iPRF on 21/02/ 2018

67 years
Lateral amyotrophic sclerosis with 1,5 years evolution

PRF on 23/11/2015

On this day before PRF
- Unable to raise from the chair
- Unable to walk without an assistant


PRF
VOUS
MIN
100
73
14


30 min post PRF
23/11/2015


3 weeks post PRF
16/12/2015


8 Jun 2016
6 months after PRF



Remarks

- From the results of this small group of patients it is possible and even probable hat PRF is efficacious in these conditions.

- No adverse side effects were detected

Conclusions

The potential benefits are high and justify:

- A scientific approach involving laboratory investigation on the biological mechanism of action

- Clinical audits as a first step on the clinical applications


This is not a pipe
Ceci n'est pas une pipe.
RENÉ MAGRITTE