



SUPPLEMENT

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**Pain, Interventions and Regional Anaesthesia
(PIRA)
Constitution
(proposed)**

1. NAME

The name of the Society shall be Pain,
Interventions and Regional Anaesthesia
(hereinafter called "PIRA")

The society shall be registered as a Section 21 Company under the above name.

2. OBJECTIVES

The objectives of the Society shall be:

2.1 Acute Pain Management

The promotion of the science and practice of acute pain management in all its forms – including but not limited to postoperative pain, trauma and emergency medicine, by means of a "multi-modal" approach utilising all modalities available for acute pain management.

2.2 Chronic Pain

The promotion of the science and practice of chronic pain management in all its forms utilising a multi-modal approach but with special emphasis on and interest in "interventions" for chronic pain

2.3 Regional Anaesthesia;

The promotion of the science and practice of regional anaesthesia, and the setting and maintaining of standards for it as it pertains to;

- 2.1.1 Anaesthesia for surgical procedures and labour.
- 2.1.2 The management of acute pain – inclusive of post operative as well as trauma and emergency medicine and all acute pain states.
- 2.1.3 The management of, and interventions for, chronic pain states.
- 2.1.4 Any other application of regional anaesthesia.

2.4 To achieve the promotion and maintenance of standards by

- 2.4.1 Holding regular programs (workshops, seminars, CME's, presentations) to educate, inform and train all interested medical practitioners, nursing staff, care givers, medical schemes and all parties with a proven interest in pain management.
- 2.4.2 Regular communication with members to keep them up to date with new developments.
- 2.4.3 Communication with other societies to inform them of our activities.
- 2.4.4 To regularly inform SAMA regarding our objectives, standards and developments.

2.5 To inform and keep informed, medical funders regarding:

- 2.5.1. the reasons and rationale for pain management – acute and chronic.
- 2.5.2. the scope of pain management acute and chronic and
- 2.5.3. new developments in acute and chronic pain management.
- 2.5.4. ICD10 codes, procedural codes and tariffs pertaining to pain management

2.6 To promote all matters related to the realization of the foregoing objectives.

MEMBERSHIP

3.1 MEMBERSHIP CATEGORIES

3.1.1 Full members

Any medical practitioner registered with the Health Professions Council of South Africa shall be eligible for full membership if admitted as in 3.2 below.

3.1.2 Associate members

3.1.2.1 The Executive Committee shall be empowered to extend Associate Membership to any persons who are not medical practitioners but who are involved with the discipline or medical science associated with the practice, teaching and advancement of regional anaesthesia and acute and chronic pain management.

3.1.2.2 Medical practitioners not registered with HPCSA but registered with the relevant authorities in their own countries may apply for associate membership

3.1.2.3 **Associate members shall have access to ALL the benefits of full membership, but shall NOT have voting rights in matters affecting the Society and their participation in the activities of the Society shall be limited to professional and teaching matters.**

3.1.2.4 Honorary Life Membership

The Executive Committee shall be empowered to bestow Honorary Life Membership, as defined in the Memorandum and Articles of Association of SAMA upon any person whose pursuit of the Society's aims and objectives has been exceptional. Honorary members shall be entitled to such privileges as may from time to time be determined by the Executive committee of the Society.

3.2 New members

3.2.1 New membership shall be approved by the Executive Committee.

3.2.2 The Executive committee shall be empowered to refuse membership at its sole discretion to any applicant, provided such refusal is not discriminatory in nature.

3.2.3 Application for membership must be made in writing on the prescribed form and sponsored by two members of the Society in good standing

3.2.4 The Executive Committee shall inform the next Annual General meeting of the names of the new members



**Full proposed constitution
can be forwarded upon request**



RADIO FREQUENCY – WHAT EXACTLY IS IT?

To Heat or Not to Heat – That is the Question

Dr Russell Raath, MBChB MMed, Pretoria East Chronic Pain Management Group

The use of 'radiofrequency' for the treatment of chronic pain has been around since 1965. IT has enjoyed peaks and troughs of popularity as well as peaks and troughs of misuse. Currently radio frequency treatment is experiencing a resurgence of popularity, use and misuse in South Africa and worldwide. The term 'treatment' is used instead of 'ablation' as used in earlier days, because nowadays ablation or destruction of the nerves is rarely performed with the advent of **pulsed** radio frequency.

In essence 'radio frequency' treatment or ablation refers to the application to a nerve of alternating or oscillating current which is alternating at 500 – 700 mHz. This frequency range is the range of radio wave frequency - hence the term 'radio-frequency. Currently this is achieved with specially designed needles. The needles are thin (22 G) and insulated with a bare tip – the so-called active tip, of varying length (5 – 15 mm). The configuration of the needles vary in length (5 – 15 cm), the tip can be sharp or blunt, straight or curved.

Originally in 1965 and up to the late 1990's radio frequency current was applied to the nerve in a continuous fashion to generate heat and to create a heat lesion. This was a destructive or ablative technique. This was first done in 1965 individually by Mullan and Rosomov for percutaneous lateral cordotomies for unilateral malignant pain^{1,2}.

1975 saw Shealy use RF for treatment of spinal pain when he described RF lesioning of the medial branch nerve for pain from the facet joints³. He used a 14 G thermistor through a 12 G needle! – a huge device compared to currently used instruments. The technique was popular for few years then its popularity waned for various reasons. The treatment method was overused. This is apparently not only a current phenomenon – it was the case even back in 1975. It is often incorrectly thought that RF of the medial branch nerves (so called, incorrectly, in South Africa – rhyzotomy) is the only RF treatment for back pain other than surgery and that there are no other options. So, because "if you have a hammer, everything looks like a nail", the treatment is very often applied for the wrong indications. This leads to reduced success rates with, not inappropriate, scepticism by medical aids as to its efficacy. The treatment method is good and effective when used for the correct indications and not inappropriately as a shotgun therapy for the incorrect indications.

Today we know that the incidence of pure facet joint pain in a population of back pain patients is in the 20 – 30% range. RF of the facet joints must often be combined with other RF therapies to obtain good pain relief. These include RF to the Lumbar Sympathetic Chain, RF to the Doral Root Ganglion, Intra-disc RF therapies. So one can see that modern RF therapy for back pain is much, much more than just medial branch treatments (so called, incorrectly, rhyzotomies), which requires strict adherence to protocols and algorithms when choosing the therapy for a specific patient.

So, up to the late 1990's RF was applied in a continuous fashion to produce heat lesion ablation of medial branch nerves. In 1997 Uematsu tried RF heat ablation of the dorsal root ganglion (DRG)⁴. The recommended temperature was 75oC and using the large electrode of Shealy, produced sizable lesions causing serious damage to the DRG and, predictably, many deafferentation sequelae and the technique never really gained popularity.

Passing the high frequency alternating current through the tissue has too effects:

1. The production of heat. This created a heat lesion which was thought to be the mode of action of RF
2. The production of an electromagnetic field.

1. THE PRODUCTION OF HEAT AND THE HEAT LESION:

The final temperature achieved at the active tip is a balance between heat generation and heat washout.

Heat Generation

The electrical current flows from the needle tip to the dispersive, or ground, plate placed elsewhere on the body. The surface area of the plate is so much bigger than then needle tip, resulting in a very low current density at the plate making any events at the ground plate of little or no interest.

At the needle the current density is so much higher. This dense current passes through the tissue which acts as a resistor and current flowing through a resistor generates heat. The electrical resistance to a high frequency alternating current is called **impedance**.

The formation of heat will be greatest where the current density is highest – that is around the tip of the needle. So the tissue immediately around the needle tip heats up and **this in turn heats up the needle tip**.

The current density is slightly higher at the proximal end of the active (bare) tip of the needle and a little lower at the tip of the needle, This results in a heat lesion which is more or less pear shaped with the thicker base at the proximal part of the active tip and the thinner part around the needle tip.

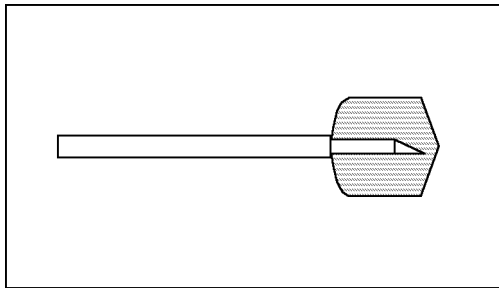


Figure 1: Approximate shape of the heat lesion around the needle tip. As the lesion is mostly to the sides of the shaft, for optimal effect the needle tip should be placed parallel to the nerve to be treated.

The amount of heat generating energy delivered to the tissues is specified in Watts or “wattage”

Since

$$W \text{ (watts)} = V \text{ (voltage)} \times I \text{ (current)}$$

and since the relationship between V and I is determined by Resistance **R**

$$V \text{ (voltage)} = R \text{ (Resistance)} \times I \text{ (current)}$$

The relationship between voltage, current and impedance determines the amount of heat generated around the needle tip. The impedance is determined by the composition of the tissue around the electrode tip and voltage is a setting on the machine and current then varies according to the relationship between the voltage and impedance. This is why, on the machine the voltage is manipulated to achieve and maintain at a steady state a certain temperature for the given impedance of the patient’s tissues.

If the impedance of the tissue is too low, no amount of increasing the voltage will achieve a high enough temperature. If the impedance is too high heat will be generated with a low voltage (and low current – this becomes important with pulsed RF - the effect of which is dependent on **current and electric field** – see later)

Heat Washout

This is basically determined by two factors – the heat conductivity of the tissue - the ability to conduct heat

away from the needle, and the removal of heat from the area by the circulation. Both of these have high variation.

Because of all the variability of all the factors in heat generation and washout, the temperature of the tip of needle is measured by the machine – because we thought that heat was important for the clinical effect.

2. THE ELECTRIC FIELD

Any current (direct or alternating) flow generates a surrounding electromagnetic field around itself and this, then, obviously, applies to our RF electrical current as well. The electric field has nothing to do with formation of heat as discussed above. The ‘shape’ of the electric field is also completely different to the shape of the current density and resultant heat lesion as described earlier.

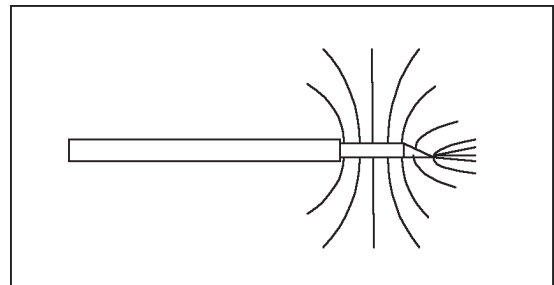


Figure 2: The Electric field relative to the needle tip. The intensity of the electric field is dependent on the shape of the tip

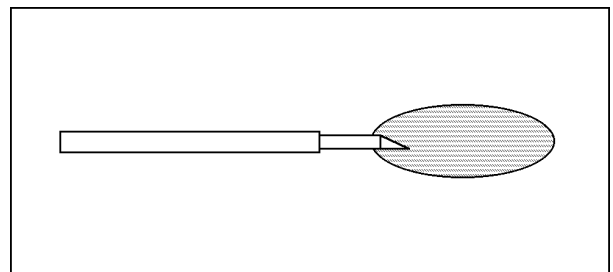


Figure 3: The shape of the area of clinical effect of the electric field. This implies that the needle tip can be placed perpendicular to the nerve and still have a clinical effect.

In the late 1990’s questions arose about the mode of action of RF and the idea that heat was the element causing the clinical effects of RF.

The questions came about because the action of RF lesions of the lumbar sympathetic chain – other than for vascular disease - was not well understood at all. There is an acceptable success rate, but the effects do not correlate well with the degree of sympathetic block. Many patients have good pain relief without any sign of sympathetic block and vice versa.

It was soon understood that the clinical effect of radio frequency treatment was a product of the **electrical field** independent of heat and a heat lesion. So, the

next obvious step was to find a means of applying RF at sufficient intensity to be clinically effective without allowing the tip temperature to rise to neurodestructive levels. There are basically 3 ways to attempt to do this:

1. Cooling the tip with cold saline. This is not a viable option as the destructive temperatures may be reached away from the electrode tip
2. Diminishing the output of the generator. The output would have to be diminished considerably and it would then be doubtful that the output would have any clinical effect.
3. Leaving the output of the generator in the same range as for heat lesions but interrupting, or pulsing, the output to allow sufficient time for the tissue to cool down by thermal conductivity and circulation. This has been termed **pulsed radio frequency or PRF which utilizes the electric field for clinical effect as opposed to heat by continuous RF**

Due to the difference in 'shape' of the effect of continuous (heat) and pulsed radio frequency (electric field), when doing continuous or heat RF the active tip of the needle should be placed parallel to the nerve and when doing **PRF** the needle should be placed perpendicular to the nerve

Computer predictions found that 2 active cycles /second of 20 msec each, was indicated for a starting point, and further research and trials have found this to be appropriate.

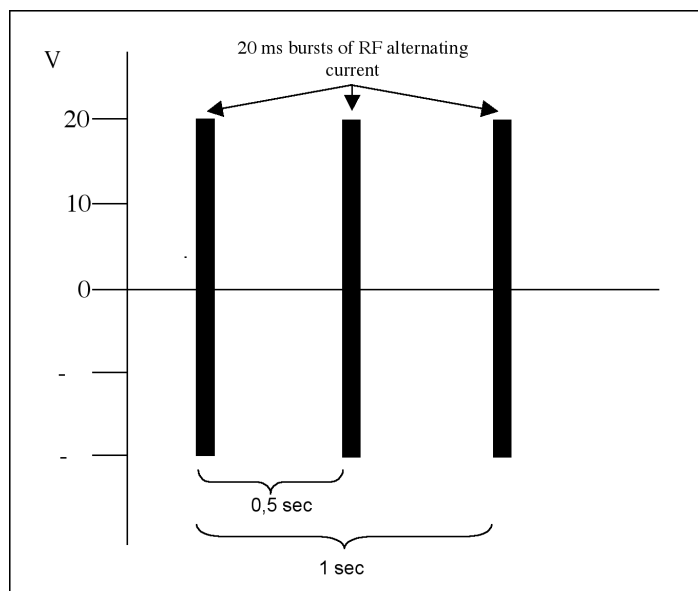


Figure 4: There are two active cycles, or bursts of RF current for 20 ms, per Second. During each burst RF is delivered at the normal radiofrequency of 500 000 mHz. Copied from Sluijter M E Prof

PRF was first used in 1996 by Prof M E Sluijter and since then the technique has been adopted by many others for various procedures. The reports are encour-

aging and PRF seems to be as effective as RF without being neurodestructive^{5,6,7,8}.

PRF seems to be non-destructive. In keeping with the dictum of 'First do no harm' it appears that PRF can do no harm:

1. No reports of sensory or motor loss. The sensory threshold of both large and small fibres is not affected IF it was normal to start with. It is lower to start with, it will return to normal but rising above normal levels has not been observed yet.
2. No procedure related complications have been reported yet.

Other 'generic' complications of inserting a needle can still occur such as hematoma, or nerve or vessel mechanical injury.

These developments, while good news, do bring with them some uncertainties. The good news is that RF has been turned into a non-destructive method opening up many potential new applications and even further diminishing complications.

The bad news is that where we once thought we knew how RF worked we find that we did not. Originally we thought that all we had to do was watch the temperature and keep it up for 60 seconds. **PRF** erased all that. We did not know how the methods worked and temperature had lost its meaning.

SO in summary. In retrospect, we have discovered that it is very unlikely that heat was in any way responsible for the clinical effect of RF, as it has been practised since 1965 where tissue destructive lesions were made. This has all changed now with the advent of **pulsed radio frequency** which has opened all sorts of procedures to the benefits of radio frequency such as the Dorsal Root Ganglion and even peripheral nerves.

The mode of action, practical use and clinical application of **Pulsed Radio Frequency** will be discussed in a follow up article in the next edition of SAJRAPI.

References:

1. Mullan S, Hekmatpanah J, Dobbin G, Beckman F Percutaneous intramedullary cordotomy utilizing the unipolar anodal electrolytic lesion J. Neurosurg 22:548-553,1965
2. Rosomoff HL, Carrol F, Brown J, Sheptak P Percutaneous radiofrequency cervical cordotomy technique J. Neurosurg 23:639-644, 1965
3. Shealy CN Percutaneous radiofrequency denervation of the lumbar facets J Neurosurg 43: 448-451,1975
4. Uematsu Percutaneous electrothermocoagulation of spinal nerve trunk, ganglion and rootlets In: Current technique in operative neurosurgery, Eds Schmidl HH, Sweet WS, Grune and Stratton, New York, 1977.
5. Munglani R The longer term effect of pulsed radio frequency for neuropathic pain Pain 80: 437-439, 1999
6. Erdine S, Talu GK Percutaneous rhizotomy application with pulsed-RFTC in FBSS: case report Abstract, Worldwide Conference on Pain, San Francisco,2000
7. Brabant S, van Zundert J, van Buyter JP, Vueghs P, Smet I, Vanduffel L Pulsed radiofrequency (RF) treatment of the Gasserian ganglion in patients with essential trigeminal neuralgia: a retrospective study. Abstract: Worldwide conference on Pain, San Francisco, 2000
8. Van Zundert J, Jansen J, Sluijter M, Kessels F, Van Kleef M Pulsed radiofrequency (PRF) treatment of the cervical dorsal root ganglion in chronic cervical pain syndromes. Abstract: 2nd World Congress of World Institute of Pain, Istanbul, June 2001.



Please find below an extract from a proposed constitution for an organisation called PIRA (Pain, Interventions and Regional Anaesthesia). This is NOT carved in stone and actually we are seeking comments on this before a final one is prepared for, presented to and voted on by prospective members.

There do exist organisations in South Africa whose roles could be seen to overlap with PIRA, but which in fact do not.

Painsa is affiliated to the **IASP (International Association for the Study of Pain)**. This organisation looks at the holistic treatment of pain from medication and psychology to physiotherapy and alternative therapies – the whole spectrum of the ‘multimodal approach’. BUT they do not look at the **interventions for chronic pain**.

Internationally there is an organisation WIP which is the guardian and promoter of interventions for chronic pain and seeks to teach, train and maintain standards in interventions for pain. They even have an exam which give the successful candidate an extra qualification – the FIPP (Fellow of Interventional Pain Practice). At present there is no organisation in South Africa affiliated with WIP. There is, therefore, also no organisation in South Africa specifically looking after the interests of *interventions for chronic pain*.



Interventions are largely needle skills and who are more needle skilled than anaesthesiologists practiced and skilled in regional anaesthesia techniques? – Hence the combination of the two in PIRA and **regional anaesthesia**

will receive due attention as an intervention for management of acute pain (post-op pain) and well as for surgery

Acute pain also does not have a body specifically promoting it and its interests and standards, so PIRA will seek to fill that role as well. Acute pain is receiving much more attention internationally than ever before and we cannot afford to lag behind. What is especially receiving attention is the process whereby acute pain develops into chronic pain and how successful management of acute pain can pre-empt a considerable amount of chronic pain developing in patients.

As anyone who practices interventions for chronic pain (from surgery to radio frequency to epidural steroids) it is very difficult, especially with some

medical aids, to get authorisations for the procedure. There are two main contributing factors to this problem:

1. There is an abysmal lack of knowledge and understanding among the medical aids and their medical advisors on what chronic pain is, and what newer techniques are available for its treatment. PIRA undertakes to attempt to educate and inform them and to keep them informed.
2. The other problem is that, even if they do understand the procedures, there are no appropriate procedure codes and their systems cannot handle our requests. PIRA undertakes to attempt to change this situation with medical aids or BHF to make appropriate codes available to pain practitioners. We can negotiate in an organised, united fashion instead of everyone for themselves causing much confusion with medical aids.

The target membership for this organisation is, obviously, not only anaesthesiologists but anyone with an interest in **acute pain** – sisters, surgeons, emergency doctors, paramedics, surgeons and anaesthesiologists and those interested in **chronic pain interventions** – orthopaedic surgeons, neuro-

surgeons, physiotherapist and anaesthesiologists, so membership will cover a broad spectrum, making this a multidisciplinary association.

We plan to hold a **small VERY cost effective / efficient** meeting-conference (probably just one day or maybe a weekend) later in the year to organise this organisation. This serves as advanced notification to you to assist you in your planning for the year.

Everyone who indicates their interest in the organisation between now and then will be sent a proposed constitution for their comment and input. Thus we should have a fairly finalised document by the meeting. At the meeting the interested people can vote on approving the constitution and elect the first EXCO for the new organisation.

Should you interested in being a founder member:

1. Fill in the very basic form below and fax it to 0866 531 287 or post it to P O B ox 74895, LYNNWOOD RIDGE, 0040
2. Send an email to rpr@mweb.co.za – and we will email forms to you
3. Fax a request to 0866 531 287
4. Visit the website www.pira.co.za

FOR MORE INFORMATION ON PIRA:
Cut off, fill in and fax to 0866 531 287 or post to
P O Box 74895 LYNNWOOD RIDGE 0040

SURNAME: _____ **INITIALS:** _____ **TITLE: Prof / Dr / Mr / Mrs / Ms**

Please send more information on the formation of PIRA (Pain Interventions and Regional Anaesthesia) to:

POSTAL ADDRESS _____

Email ADDRESS: _____ **FAX NUMBER** _____