

Recent Advances in Pain Management



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Neuromodulation



Neromodulation

Electrical

Spinal Cord Stimulation



Chemical

Intrathecal Drug Delivery



Indications for Implantables

Spinal Cord Stimulation (SCS)

- Lumbar Radiculopathy
- Cervical Radiculopathy
- “Mononeuropathy”
- Intercostal Neuralgia
- Peripheral Vascular Disease
- Angina
- Novel uses

Reflex Sympathetic Dystrophy

Causalgia

Failed Back Surgery Syndrome

Arachnoiditis

Diabetic Neuropathy

Alcoholic Neuropathy

AIDS Related Neuropathy

Stump Pain

Phantom Limb Pain

Postherpetic Neuralgia

Spinal Cord Injury

Plexus Neuropathies

Intrathecal Drug Delivery System

- Diffuse Cancer Pain
- Osteoporosis
- Visceral Pain
- Axial Somatic Pain
- Hand, Neck Pain
- Multiple Sclerosis

Intrathecal Drug Delivery



Indications For Intrathecal Drug Delivery System

- **Management of Spasticity**
- **Management of Malignant pain**
- **Management of Nonmalignant pain**



Intrathecal Baclofen Infusion

Excellent evidence for treatment of spasticity in:

- **Multiple sclerosis**
- **Cerebral palsy**
- **Spinal cord injury**

(Penn 1989, Penn1992, Ochs 1987, Lazorthes 1990, Muller1991, Laubser 1991, coffey 1993)

Case series:

- **Traumatic Brain Injury**
- **Hydromyelia**
- **Lateral sclerosis**

Why Intrathecal ?

- **Control complex pain conditions**
- **Less medication**
- **Less side effects?**
- **Unique route to deliver certain medication**

Bupivacaine
Ziconotide

Equivalent Dosages for Morphine

Oral = Parentral = Epidural = Intrathecal

300 mg = 100 mg = 10mg = 1mg



Reservoir volumes

from

■ 20ml to 60ml

Flow rates

■ 0.5 ml/24h

■ 0.8 ml/24h

■ 1.0 ml/24h

■ 1.3 ml/24h

■ 1.5 ml/24h

■ 2.0 ml/24h

■ 3.0 ml/24h



Volume 20ml



Volume 60ml



Volume 35ml



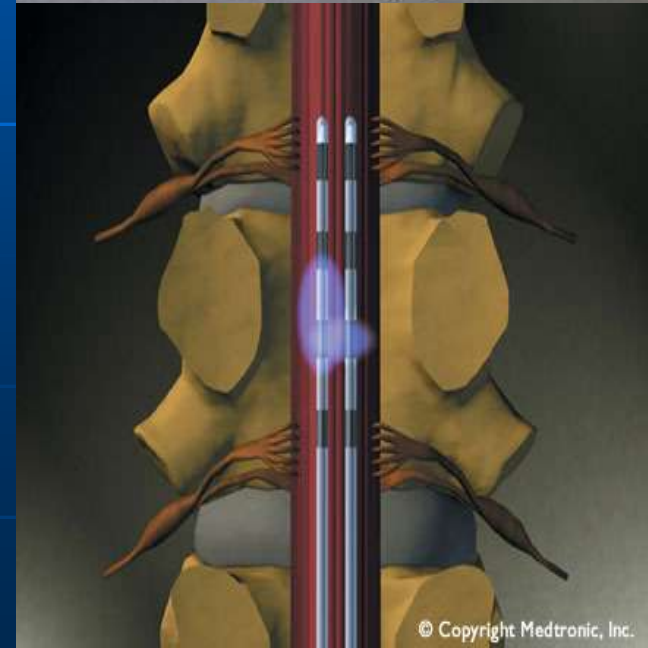
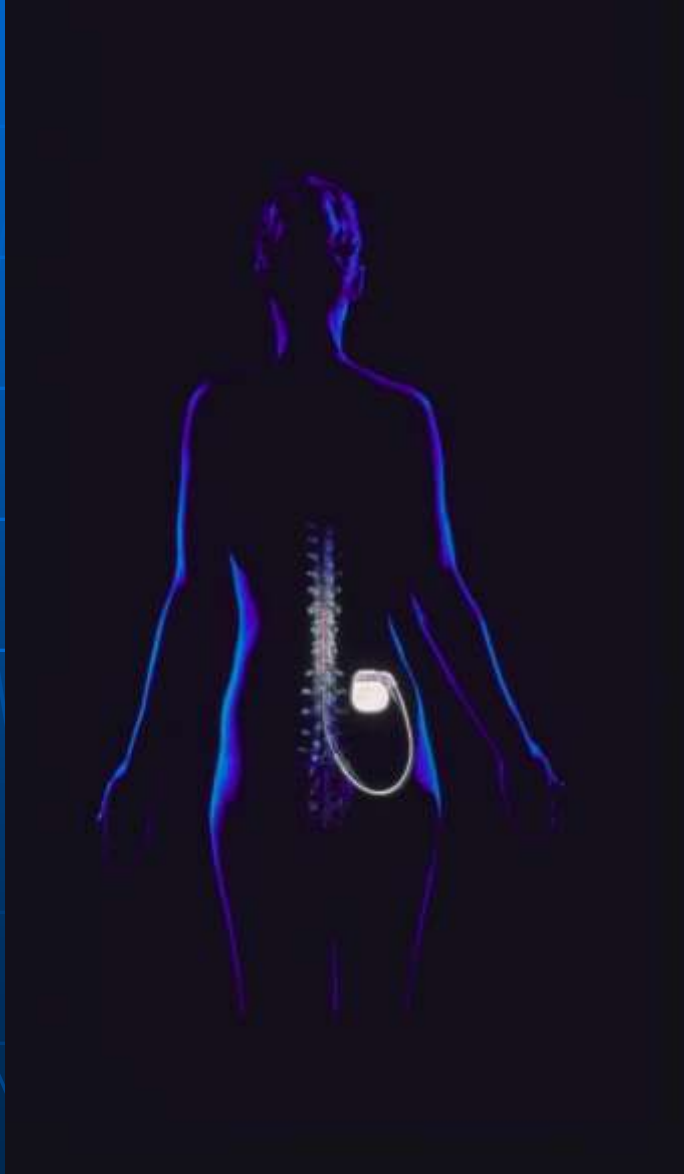
Volume 40ml



Volume 50ml



Spinal Cord Stimulation



Spinal Cord Stimulation

- 1970's in disrepute, poor indications, no follow up
- 1980's middle, slow rise, better indications and assessment
- 1990's steady rise in popularity
- 2000's new indications, decade of Sacral Nerve stimulation, peripheral neuromodulation???

Early applications of electrical stimulation for pain



- 46 AD
- Scribonius Largus describes the use of torpedos (aquatic animals capable of electric discharge) for medical applications.
- “The live black torpedo when applied to the painful area relieves and permanently cures some chronic and intolerable headaches...carries off pain of arthrites...and eases other chronic pains of the body”

Effect of electrical stimulation of the nervous system for the control

(a)

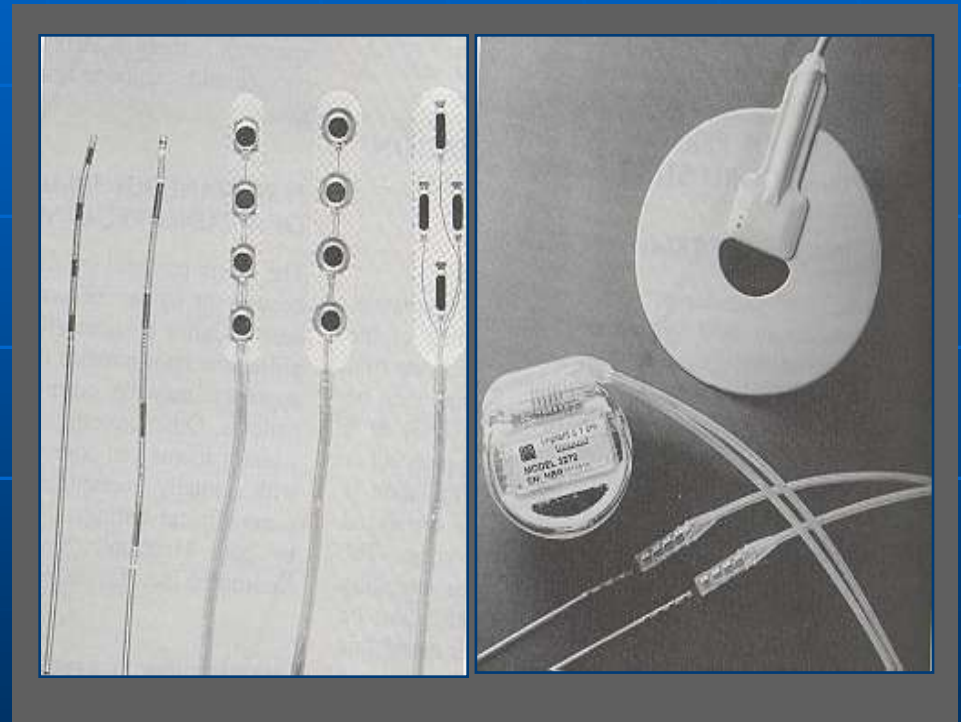


(b)



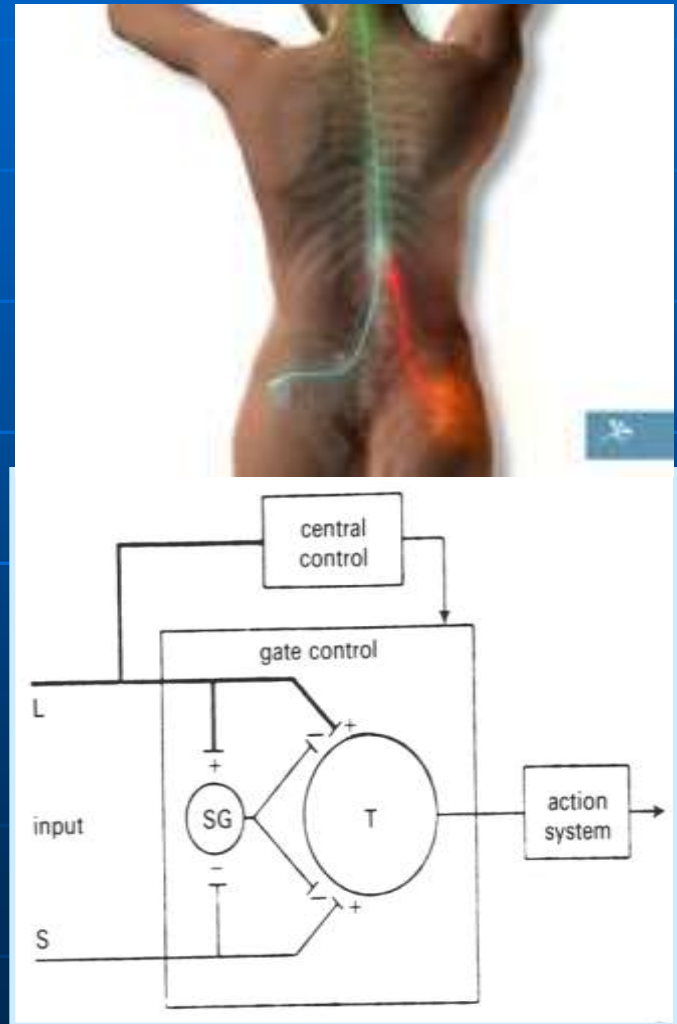
What is it?

- Electrodes that are placed in the spine
- Connected to a pulse generator or receiver
- Spinal cord is stimulated



How does spinal cord stimulation work?

- Gate Control Theory
- Increase inhibitory neurotransmitters
 - Glycine
 - GABA
 - Serotonin
- Inhibit transmission
- ***Probably not***
 - opiate mediated response
 - Placebo effect



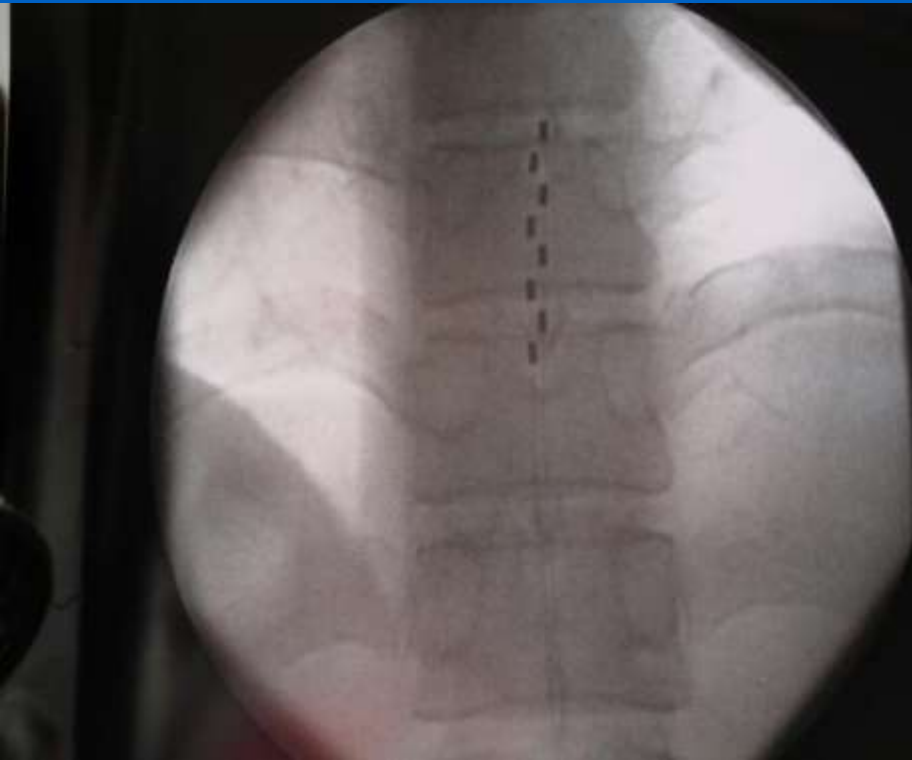
Traditional Indications for Neural Stimulation of the Spinal Cord (SCS)

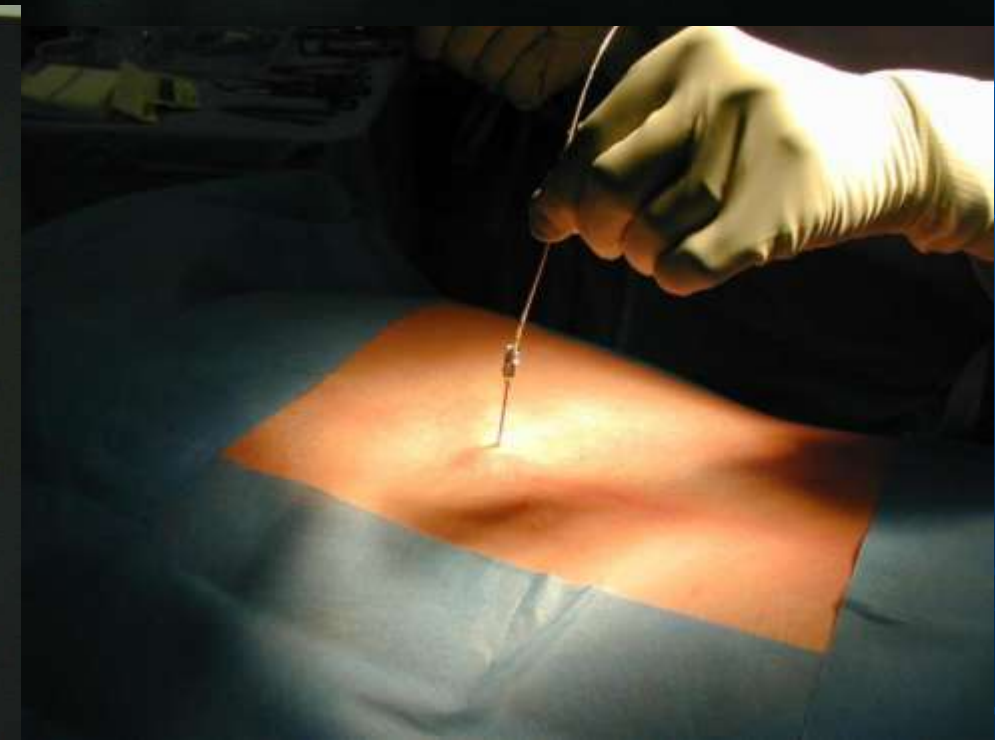
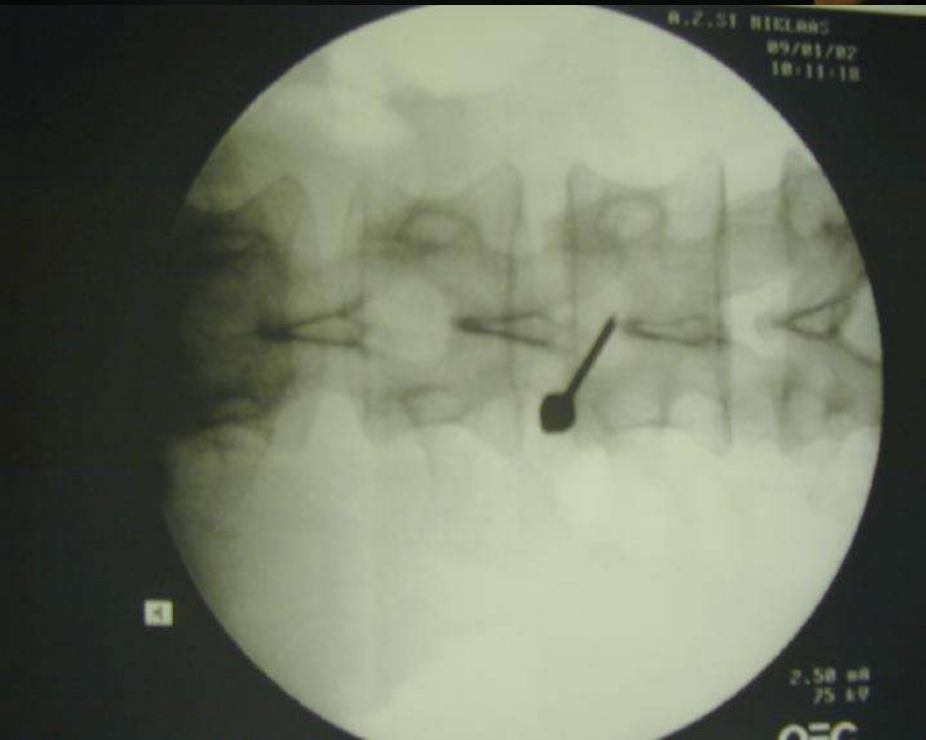
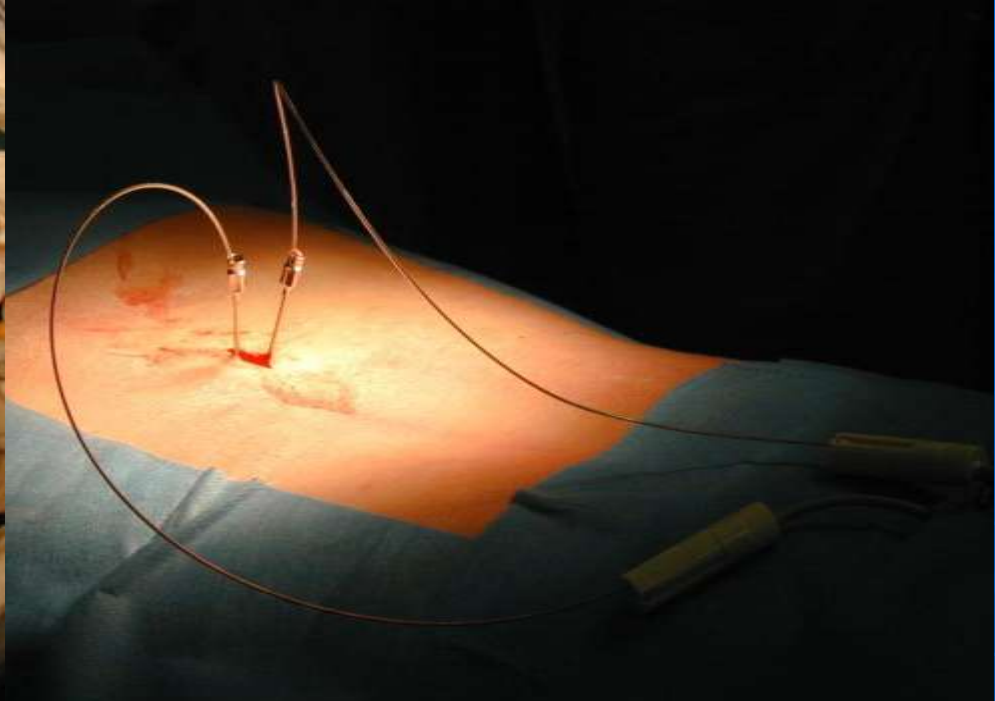
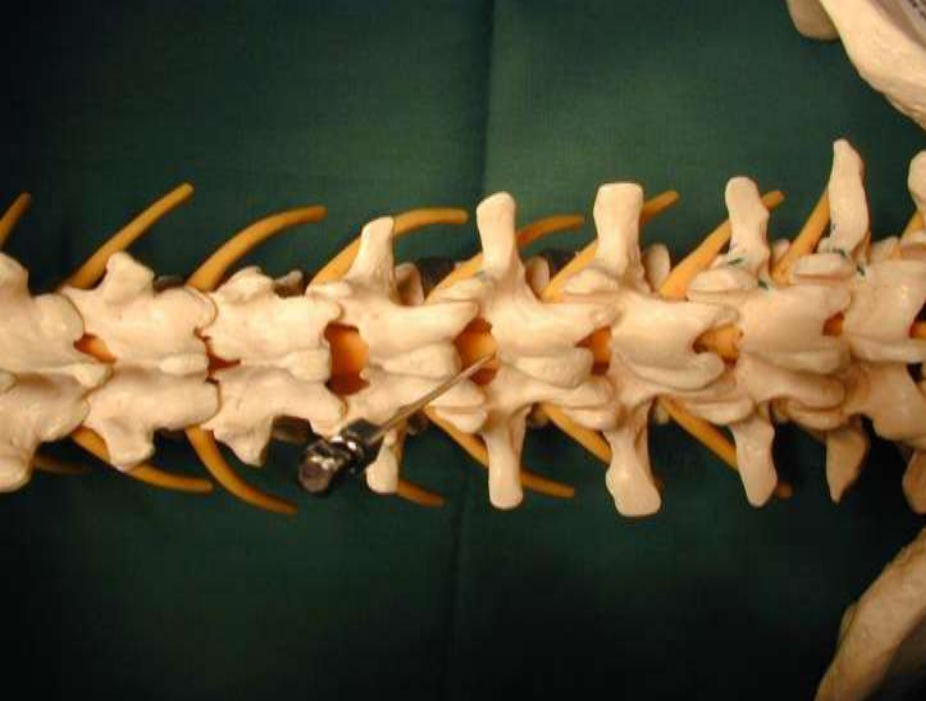
- Lumbosacral radiculitis (failed back surgery syndrome) and cervical radiculitis (primary indication in the USA)
- Peripheral vascular disease (mainly in Europe)
- Nerve injury pain
 - diabetic neuropathy
 - neurotrauma
- Angina (mainly in Europe)
- CPRS

New Indications for Electrical Stimulation

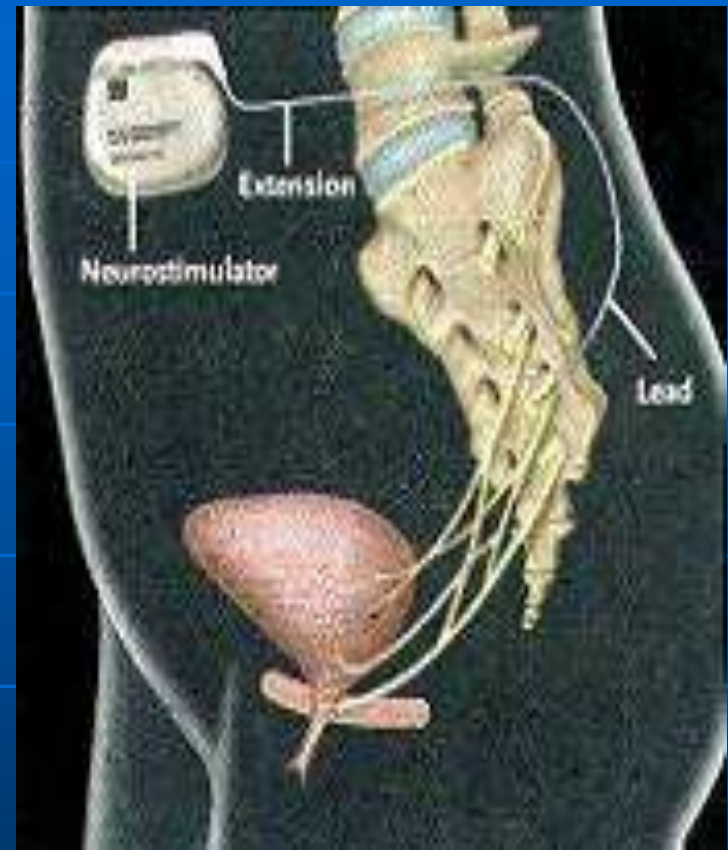
- Retrograde for Complex unilateral pain patterns
- Retrograde SNRS
- peripheral N. for Intractable Occipital Neuralgia
- Complex Abdominal Pain
 - Pancreatitis
 - Irritable bowel disorder







Sacral Nerve Stimulation



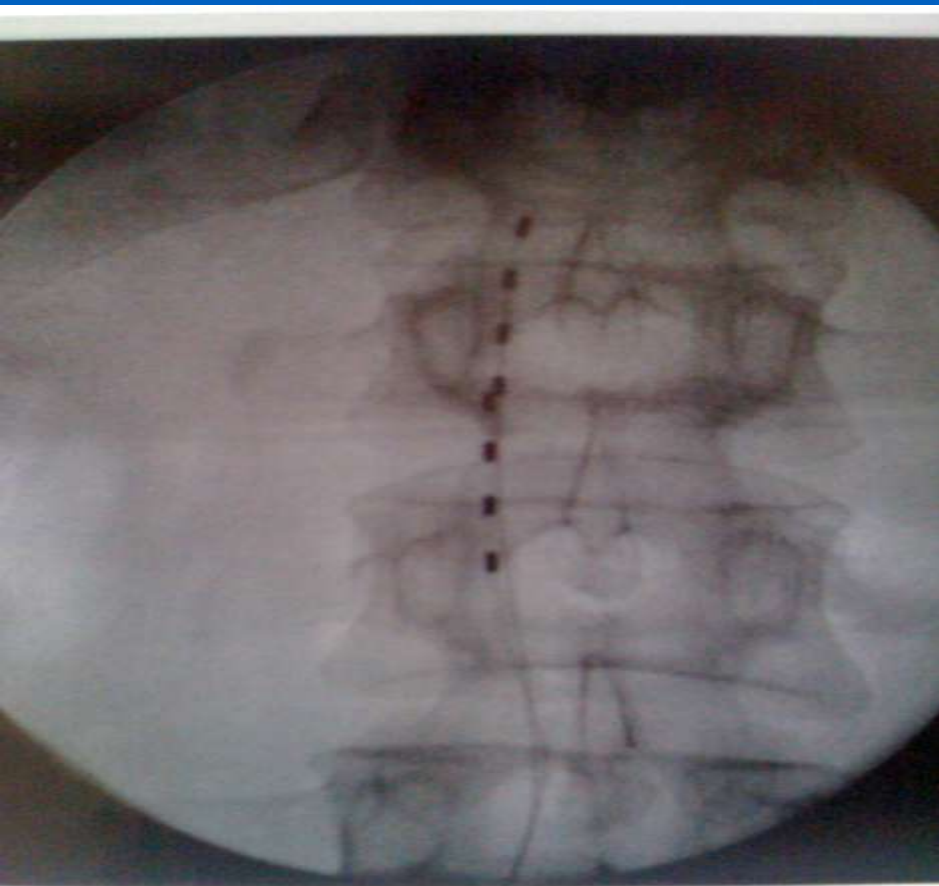
Peripheral Subcutaneous Field Stimulation

Post Herpetic Neuralgia Left side of the Face



PSFS: Dr.A Al-kaisy
London Pain Workshop 2008

Inguinal Neuralgia



Intercostal Neuralgia

