

# Neurophysiology of Acupuncture

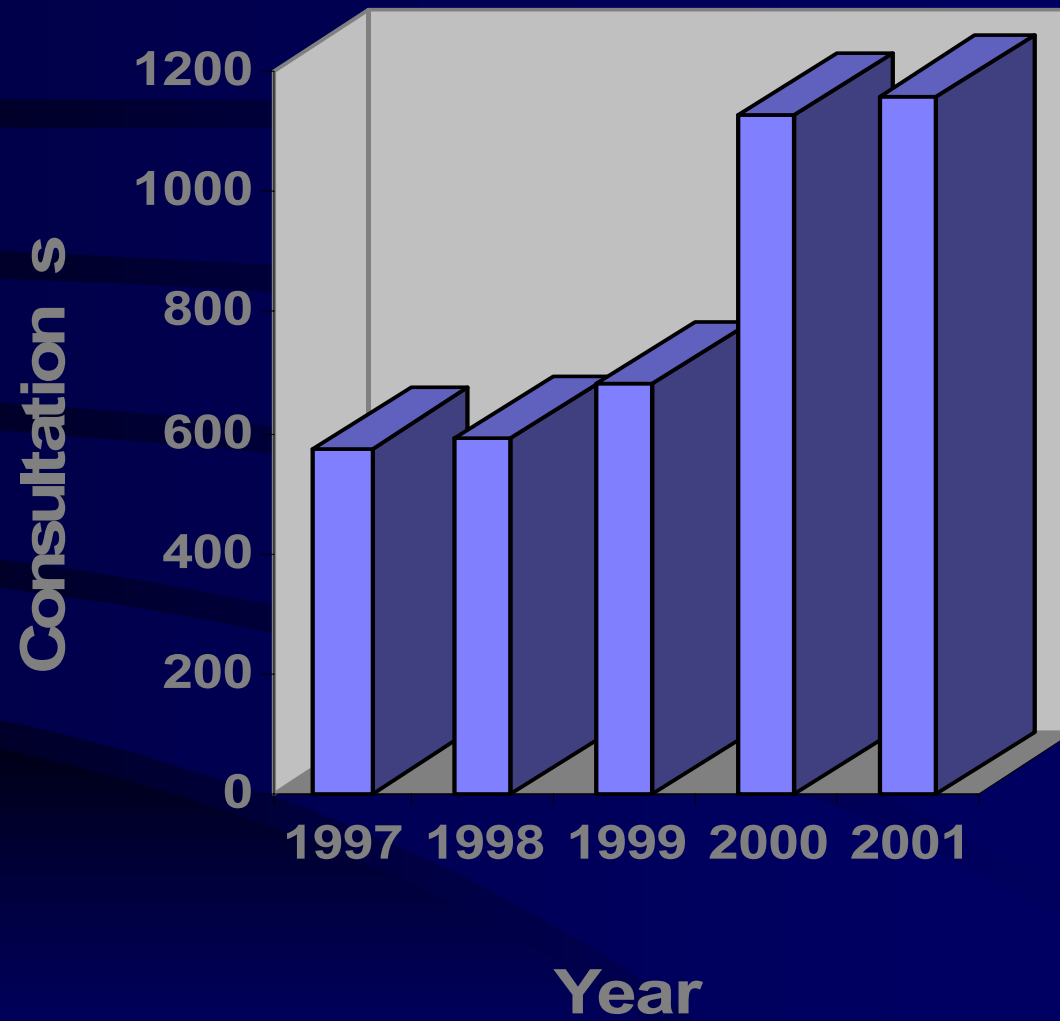
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# Acupuncture applied to the Clinic of Infertility and Gynaecological Endocrinology



1996~2002



# Indications formulated by WHO

## – Upper Respiratory Tract

- Acute sinusitis
- Acute rhinitis
- Common cold
- Acute tonsillitis

## – Respiratory System

- Acute Bronchitis
- Bronchial asthma

## ◆ Disorders of the Eye

- ☞ Acute conjunctivitis
- ☞ Central retinitis
- ☞ Myopia (in children)
- ☞ Cataract (without complications)

## ◆ Disorders of the Mouth

- ☞ Toothache
- ☞ Post-extraction pain
- ☞ Gingivitis
- ☞ Acute and chronic pharyngitis

## – Gastro-intestinal Disorders

- Spasms of oesophagus and cardia
- Hiccough
- Gastroparesis
- Acute and chronic gastritis
- Gastric hyperacidity
- Chronic duodenal ulcer (pain relief)
- Acute duodenal ulcer (without complications)
- Acute and chronic colitis
- Acute bacillary dysentery
- Constipation
- Diarrhea
- Paralytic ileus

## ◆ Neurological and Musculoskeletal Disorders

☞ Headache

☞ Migraine

☞ Trigeminal neuralgia

☞ Facial palsy (early stage, i.e., within 3 to 6 months)

☞ Pareses following a stroke

☞ Peripheral neuropathies

☞ Sequelae of poliomyelitis (early stage, i.e., within 6 months)

☞ Meniere's disease

☞ Neurogenic bladder dysfunction

☞ Nocturnal enuresis

☞ Intercostal neuralgia

☞ Cervicobrachial syndrome

☞ “Frozen shoulder”

☞ “Tennis elbow”

☞ Sciatica

☞ Low back pain

☞ Osteoarthritis

# Gynaecology and Obstetrics

- **Menstrual Disorders**
  - Menorrhagia
  - Metrorrhagia
  - Dysmenorrhea
  - Amenorrhea
  - Pre-menstrual Syndrome
- **Infertility**
  - Ovulation Induction

# Indications continued

- Hyperemesis
  - gravida
  - post chemotherapy
- Breech presentation of the fetus (27-36 weeks)
- Relaxation during labor
- Postpartum
  - urinary retention
  - perineal pain
  - hemorrhage
  - retention of lochia
- Acute mastitis
- To promote lactation
- To inhibit lactation
- Menopausal symptoms
  - Hot Flushes
  - night sweats
  - irritability
  - insomnia
  - depression

*Hou JL. In Acupuncture and Moxibustion therapy in gynecology and obstetrics. Beijing Sc. & Techn. 1995*

*Maciocia G. in Obstetrics & Gynecology in Chinese Medicine. Churchill Livingstone 1998*

# Reviews: Acupuncture in infertility

## Modification of semen quality

- Crimmel AS, J Androl. 2001 Mar-Apr;22(2):173-82. Review
- Siterman S Andrologia. 2000 Jan;
- Siterman Arch Androl. 1997 Sep-Oct;39(2):155-61.
- Urologe A. 1984 Nov;23(6):329-33.
- Crimmel AS et al: Withered Yang: a review of traditional Chinese medical treatment of male infertility and erectile dysfunction
- J Androl 2001 Mar-Apr;22(2):173-82



# Ovulation induction

- Stener-Victorin et al: Effects of Electro-acupuncture on anovulation in women with polycystic ovary syndrome.  
Acta Obstet General Scand. 2000 Mar;79(3):180-8.
- Stener-Victorin et al. Effects of electro-acupuncture on nerve growth factor and ovarian morphology in rats with experimentally induced polycystic ovaries.  
Biol Reprod. 2000 Nov;63(5):1497-503
- Chen BY. Acupuncture normalises dysfunction of hypothalamic-pituitary-ovarian axis.  
Acupunct Electrother Res 1997;22(2):97-108

# Ovulation induction

- Chen BY, Yu J. Relationship between blood radioimmunoreactive beta-endorphin and hand skin temperature, during the electroacupuncture induction of ovulation. *Acupunct Electrother Res.* 1991;16(1-2):1-5.
- Yu J et al: Changes in serum FSH, LH and ovarian follicular growth during Electroacupuncture for induction of ovulation. *Zhong Xi Yi Jie He Za Zhi* 1989 Apr;9(4):199-202, 195

# Infertility

- Stener-Victorin E: Reduction of blood flow impedance in the uterine arteries of infertile women with Electro-acupuncture.  
Hum Reprod 1996 Jun;11(6):1314-7
- Gerhard I et al:  
Auricular acupuncture in the treatment of female infertility.  
Gynecol Endocrinol 1992 Sep;6(3):171-81

# Analgesia in IVF

- Stener-Victorin et al: A prospective randomized study of electro-acupuncture versus alfentanil as anaesthesia during **oocyte aspiration** in in-vitro fertilisation.

*Hum Reprod 1999 Oct;14(10):2480-4*

- **Ovum transfer** (Embryo transfer)

# Anti-emetic

- Preoperation: Kotani N et al. Preoperative intradermal acupuncture reduces postoperative pain, nausea and vomiting, analgesic requirement, and sympathoadrenal responses
- Anaesthesia: Somri M et al. Acupuncture versus ondansetron in the prevention of postoperative vomiting. A study of children undergoing dental surgery. Anaesthesia  
2001 Oct;56(10):927-32

# Anti-emetic

- Pregnancy: Knight B et al. Effect of acupuncture on nausea of pregnancy: a randomised, controlled trial.

Obstet Gynecol 2001 Feb;97(2):184-8

Chemotherapy-induced nausea: Shen J et al. Electroacupuncture for control of myeloablative chemotherapy-induced emesis: A randomised controlled trial

JAMA 2000 Dec 6;284(21):2755-61

# Breech presentation

- Cardini F et al Moxibustion for correction of breech presentation: a randomised controlled trial.

JAMA 1998 Nov 11;280(18):1580-4

# Pain condition

- Martin DC. Endometriosis and pain.

*Clin Obstet Gynecol 1999 Sep;42(3):664-86*

- Helms JM. Acupuncture for the management of primary dysmenorrhea.

*Obstet Gynecol 1987 Jan;69(1):51-6*

- **Dellenbach P et al Chronic pelvic pain. Another diagnostic and therapeutic approach**

*Gynecol Obstet Fertil 2001 Mar;29(3):234-43*



# Induction of labour

- **Dunn PA et al.** Transcutaneous electrical nerve stimulation at acupuncture points in the induction of uterine contractions.  
Obstet Gynecol 1989 Feb;73(2):286-90
- **Zeisler H et al.** **Influence of acupuncture on duration of labor**  
Gynecol Obstet Invest 1998;46(1):22-5
- **Ternov K et al:** **Acupuncture for pain relief during childbirth.**  
Acupunct Electrother Res 1998;23(1):19-26

# Menopause

**Does not alter blood pressure or serum lipids for hypertensive postmenopausal women.**

*Kraft K, et al. Forsch Komplementarmed. 1999  
Apr*

**An Exploratory pilot study of acupuncture on the Quality of Life and Reproductive Hormone Secretion in Menopausal Women**

*Dong HG et al. J Altern Complement Med. Volume 6,  
2001 PP 651-658*

# Menopause

- In rat model, EA inhibits the decrease in brain catecholamine contents, improves the memory loss and decrease of immune responses accompanying aging

*Toriizuka K, et al. Acupunct Electrother Res. 1999*

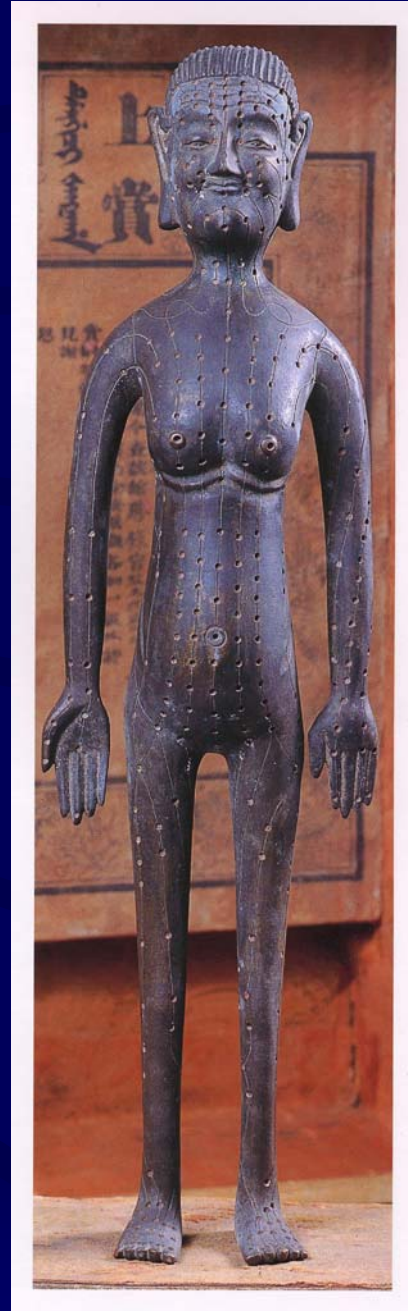
- In adult rats mode, EA increase calcitonin gene-related peptide concentrations in the nervous system.

*Wyon Y,et al. Acta Physiol Scand. 1998 Apr.*

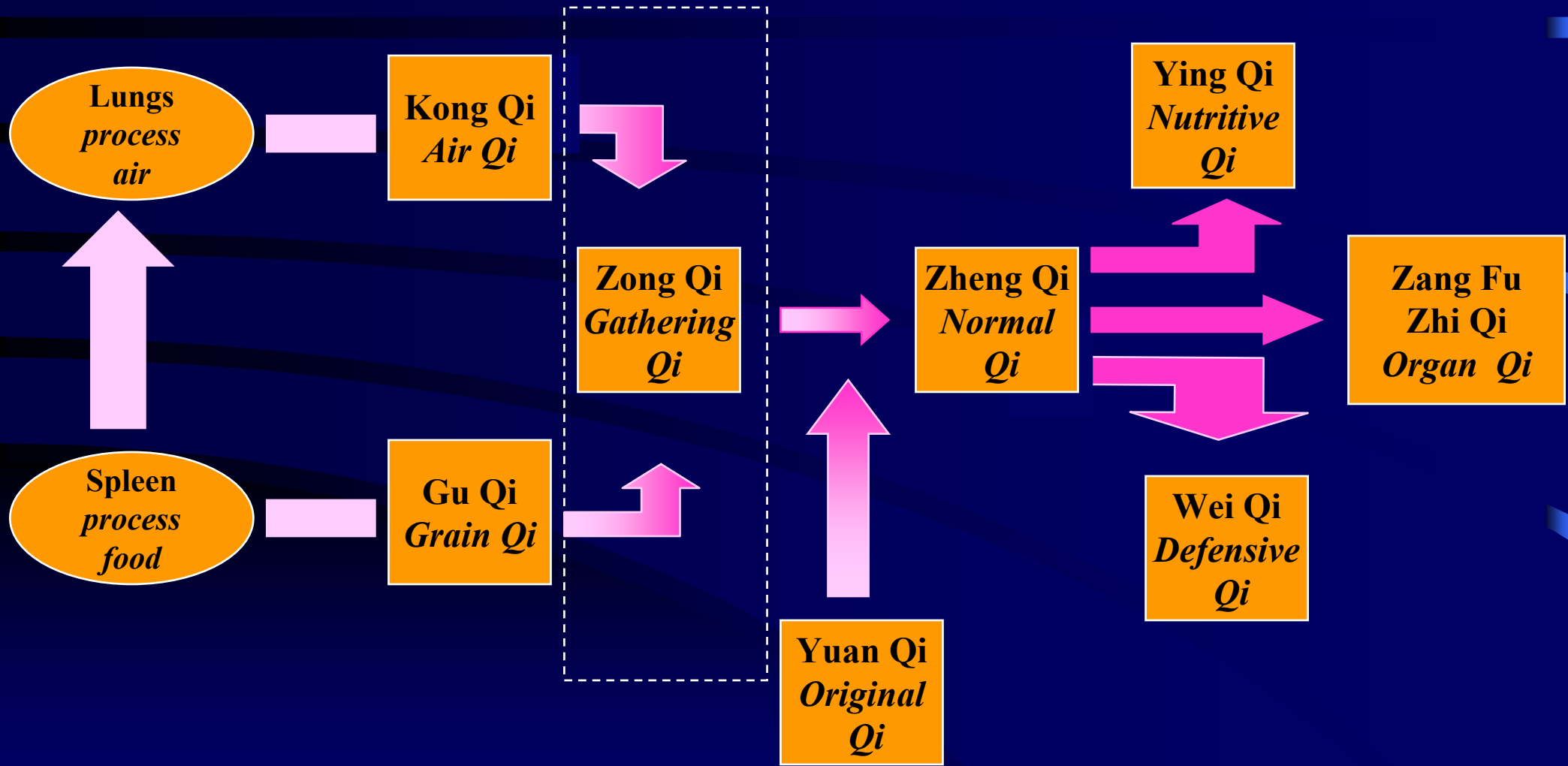
- Functions of Qi
  - ◆ Source of body activity and movement
  - ◆ Warming the body
  - ◆ Source of protection for the body
  - ◆ Source of transformation in the body
  - ◆ Governing retention and containment
- Disharmonies of Qi
  - ◆ Deficient Qi (Qi Xu)
  - ◆ Sinking Qi (Qi Xian)
  - ◆ Stagnant Qi (Qi Zhi)
  - ◆ Rebellious Qi (Qi Ni)



Bronze Model for  
the Meridian and  
acupuncture point  
(Qing dynasty 1744)



# Types of Qi and their origins



# Meridian - The pathway of the body

- Components
  - ◆ 12 regular meridians
  - ◆ 8 extraordinary meridians
  - ◆ 15 collaterals
- Functions
  - ◆ Connecting effects
  - ◆ Transporting effects

# Spleen Meridian





# Neurophysiological Evidences

- Acupuncture is ineffective in the territory supplied by that nerve when a nerve is blocked
- Acupuncture analgesia is reversed or abolished by naloxone -**Opioidergic mechanism**
- Acupuncture increase **beta-endorphin** in cerebrospinal fluid level
- Many of acupuncture points correspond with the points at which small nerve bundles penetrate the fascia

# L'acupuncture et la médecine occidentale

Un Problème de Langage

“In this book, I will show that acupuncture points do not exist, meridians do not exist, and that most of the laws of acupuncture are laws about non-existent entities. Yet acupuncture works.”

*Dr Felix Mann*

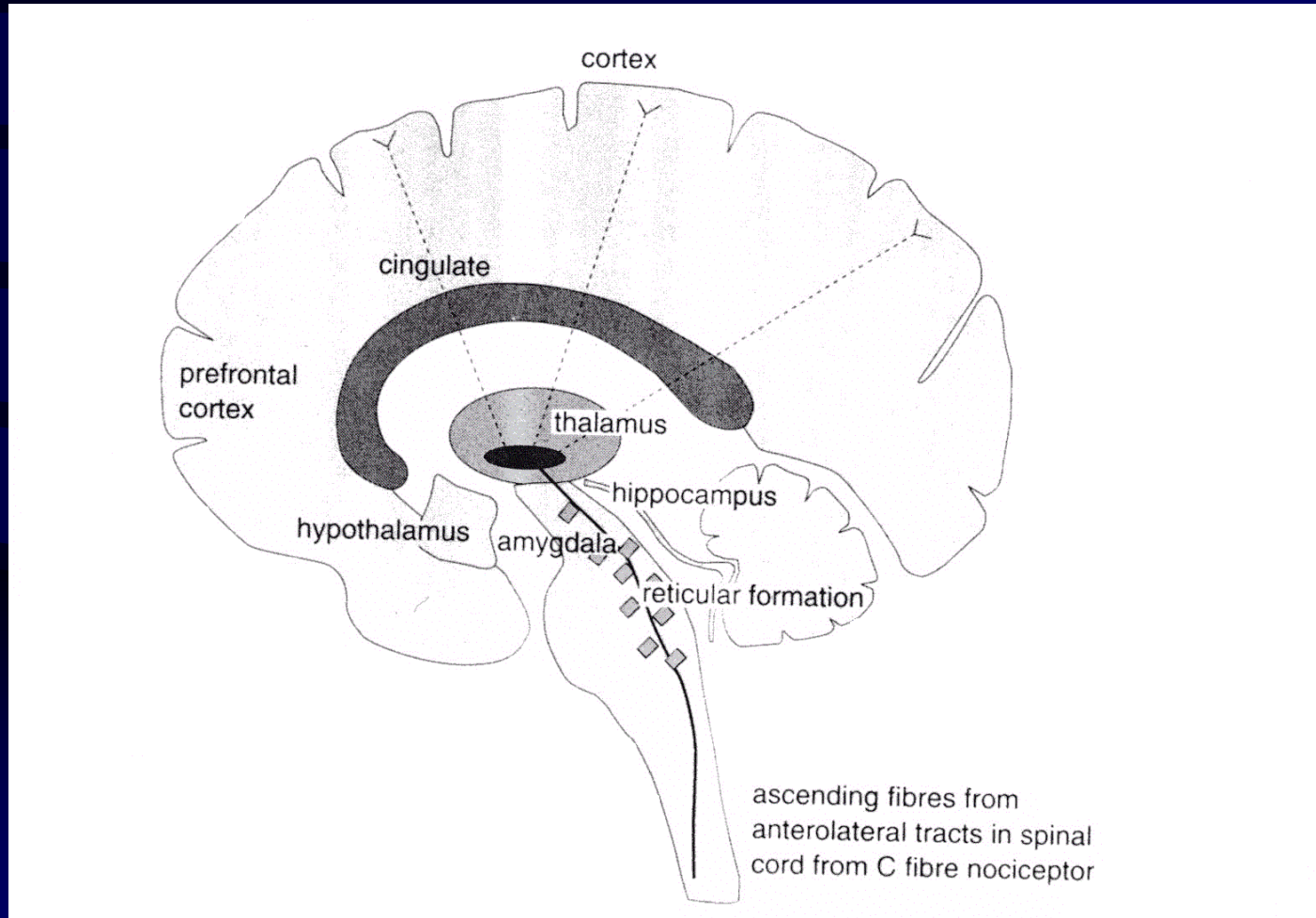
# Nociception - Voies de la douleur

- Les effets de l'acupuncture passent par un stimulus nociceptif
- Douleur aiguë et sourde
- Fibres A Delta et C

# Douleur sourde: Fibres C

- Répondent aux stimuli mécaniques, thermiques et chimiques
- Largement distribuées sous la peau, tissus profonds, viscères
- Phylogénétiquement plus anciennes, non myélinisées, conduction lente.
- Localisation peu précise du stimulus nociceptif, effet d'éveil et impact émotionnels considérables

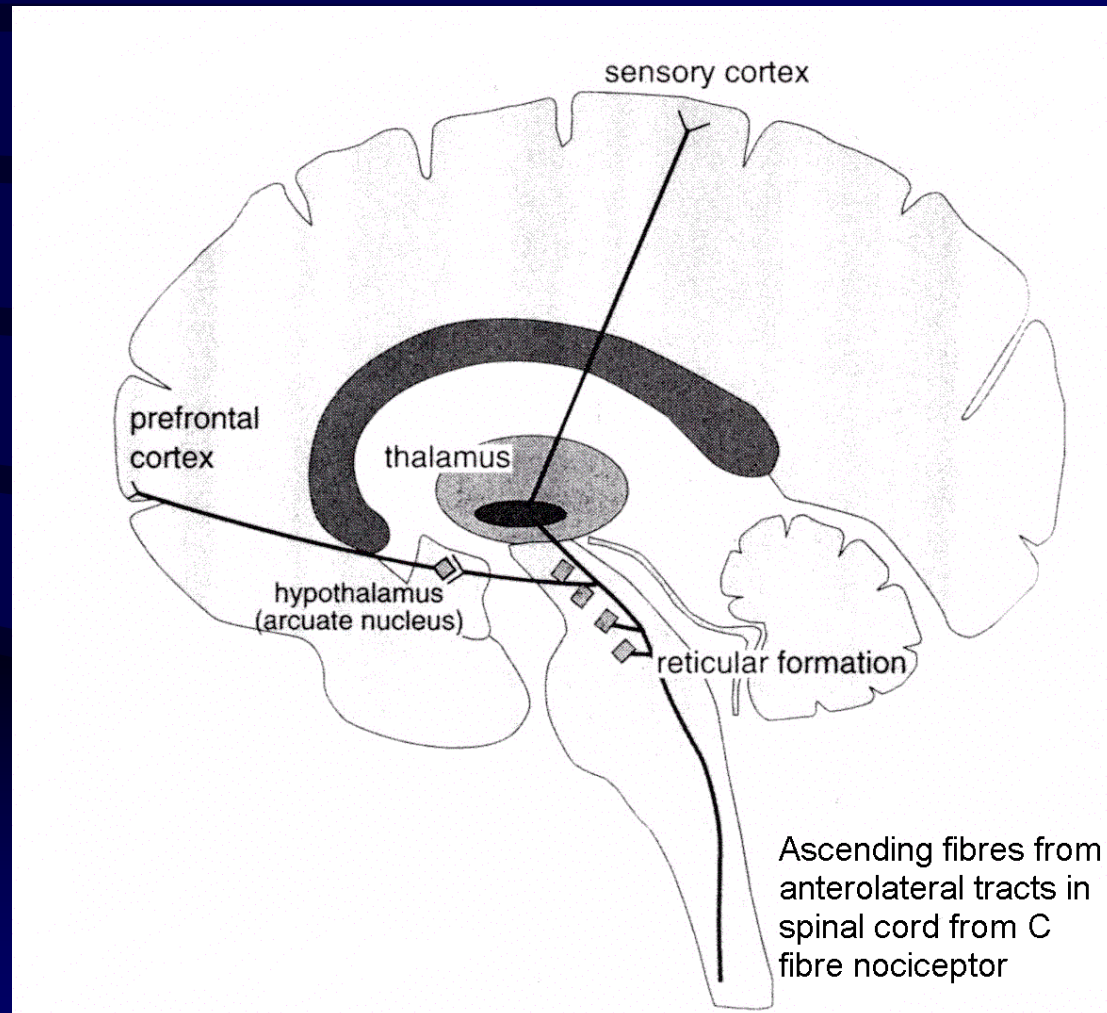
Diagram of sagittal section of the brain showing central connections of C fibre nociceptive afferents to (1) reticular formation (2) cortex diffusely (3) limbic system, including thalamus, amygdala, hippocampus, cingulate and prefrontal cortex



# Douleur aiguë: Fibres A Delta

- Répondent à stimuli nociceptifs aigus, à type de piquûre, chaleur, pression appuyée.
- Peau, tissu sous-cutané, muscles
- Localisation rapide et exact du stimulus nociceptif, peu de réponse émotionnelle

Diagram of sagittal section of the brain showing central connections of A delta fibre nociceptor afferents via thalamus to primary sensory cortex, with collaterals to reticular formation, hypothalamus (arcuate nucleus) and prefrontal cortex

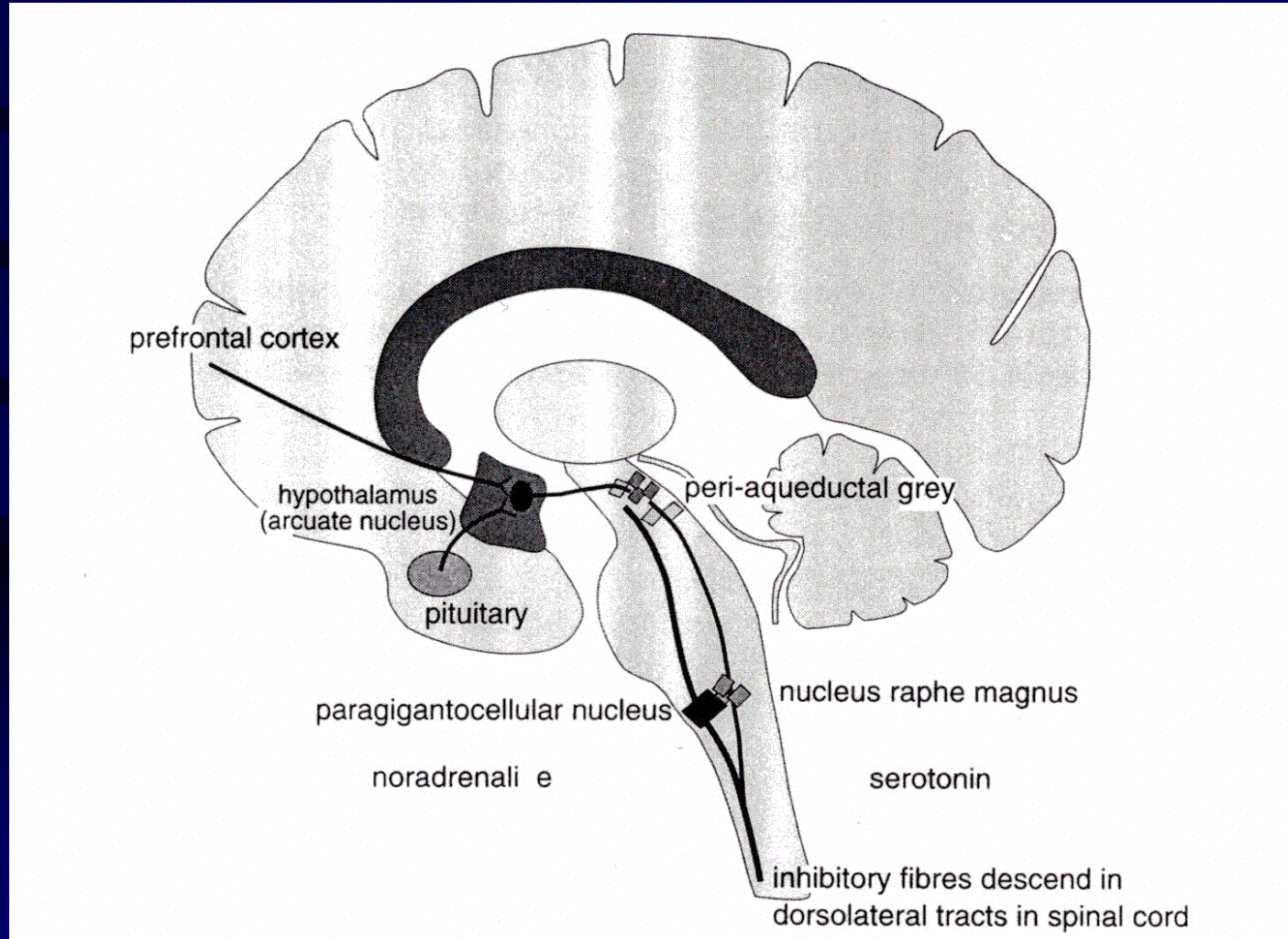




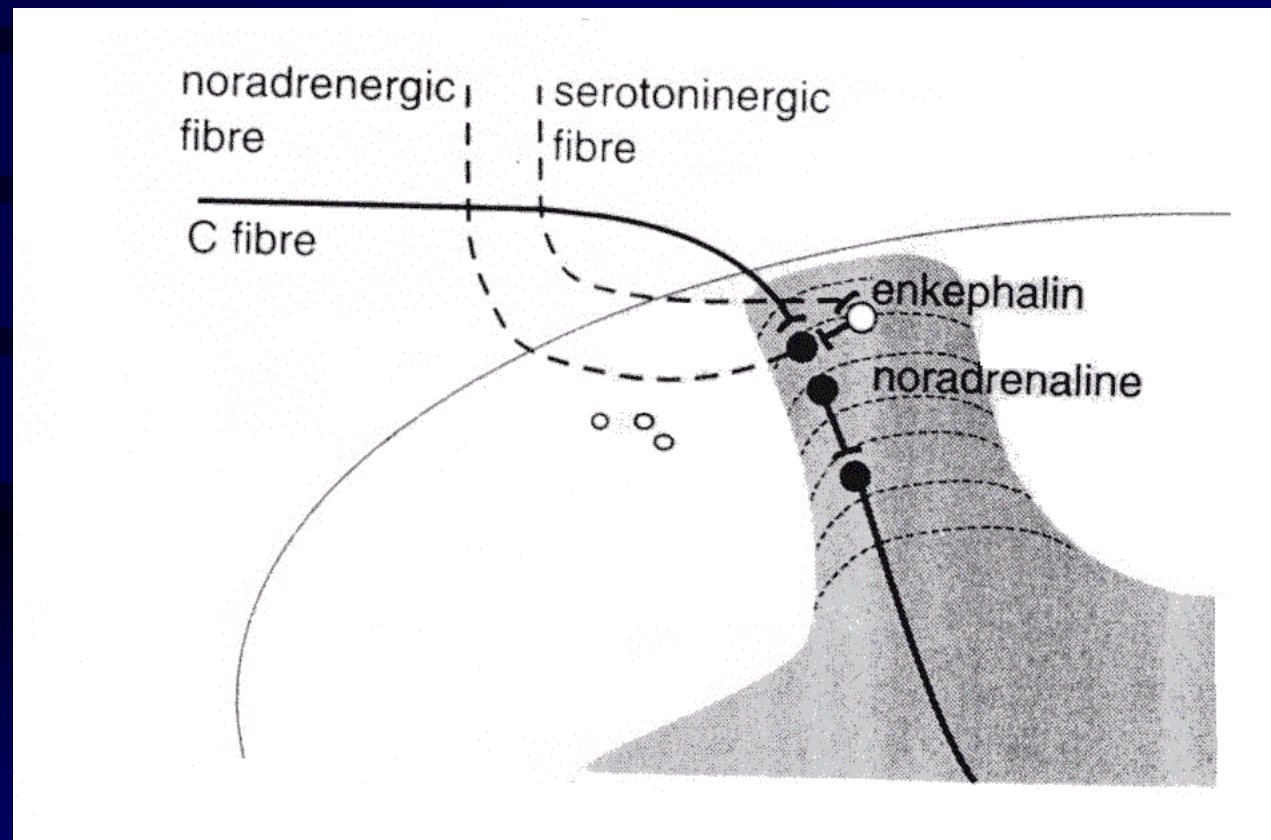
# Modulation de la douleur

- Intérêt de la modulation de la douleur dans une perspective évolutive
- Mécanismes centraux: Voies sérotoninergiques et adrénergiques
- Mécanismes segmentaires: Théorie du « Gate Control » de Melzack et Wall, ou « effet porte »

Diagram of sagittal section of the brain showing probable origin of descending inhibitory systems. The prefrontal cortex and pituitary stimulate the hypothalamus (arcuate nucleus) to activate the periaqueductal grey. From there, two descending systems are shown : midline serotonergic system, involving the raphe magnus: and noradrenergic system either side of the midline involving the paragigantocellular nucleus

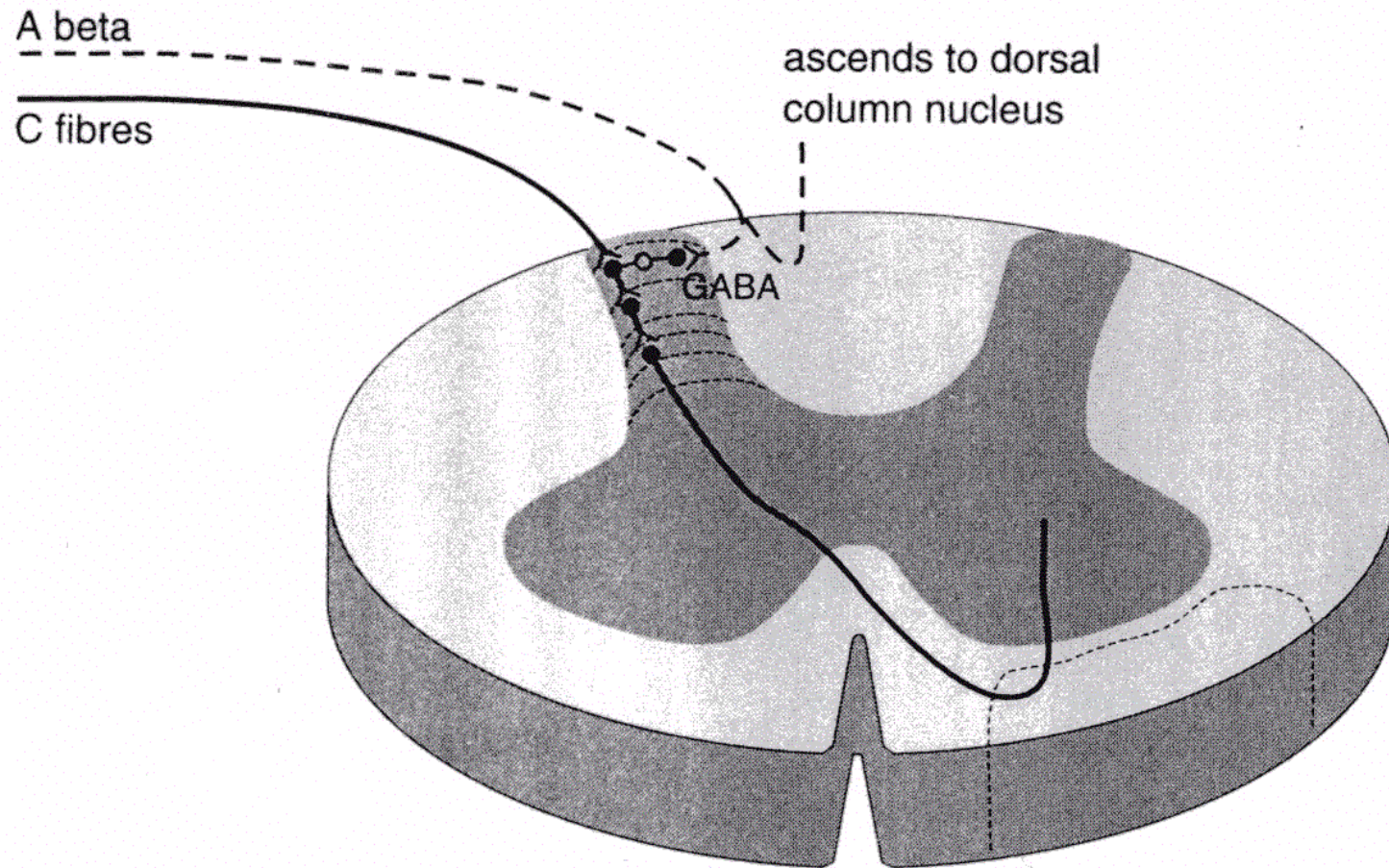


Action of descending inhibitory systems at the spinal cord level: serotonergic fibres activate interneurons to release enkephalin. Noradrenergic fibres release noradrenaline to diffuse through the dorsal horn. Both mechanisms inhibit transmission of nociceptive impulses through the substantia gelatinosa



# La théorie du Gate Control

- Il y a à tout moment au niveau de la corne postérieure un équilibre entre les stimulations dues aux afférences myélinisées de type A, qui ont un effet inhibiteur sur les messages nociceptifs, et celle dues aux afférences des fibres non myélinisées de type C.
- La douleur apparaît lorsque cet équilibre est rompu, généralement en raison d'une augmentation des afférences nociceptives



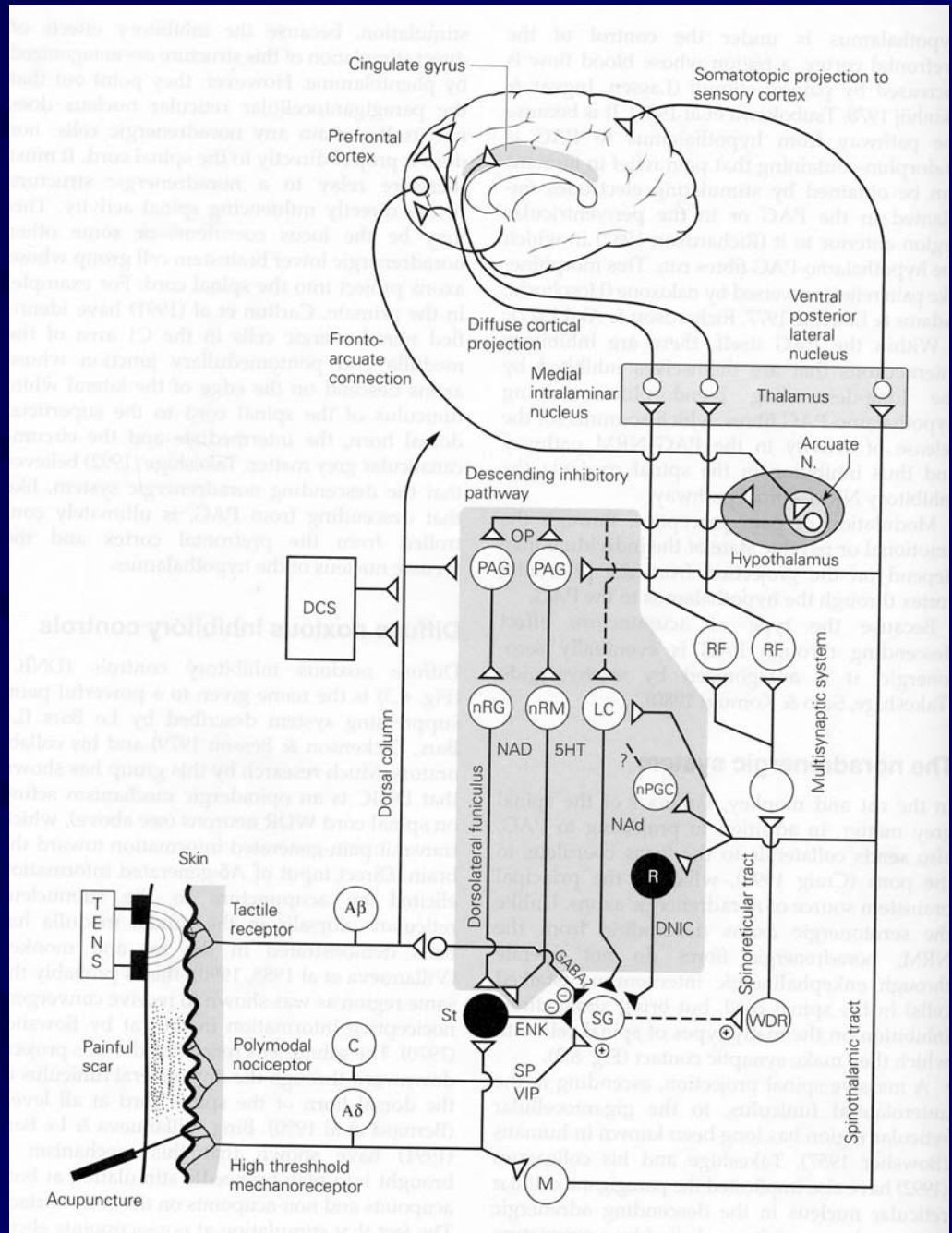
**Figure 3.5** Probable mechanism of transcutaneous electrical nerve stimulation (TENS). Diagram of spinal cord showing pathway of A beta fibres into dorsal column; collaterals pass into dorsal horn to activate GABA interneurone and thereby inhibit the substantia gelatinosa cells.

# Mécanismes d'action de l'acupuncture

- Interaction entre fibres C et A Delta
- La stimulation des fibres A Delta active des mécanismes antalgiques à plusieurs niveaux, qui vont finalement inhiber au niveau de la corne postérieure l'activité des fibres C

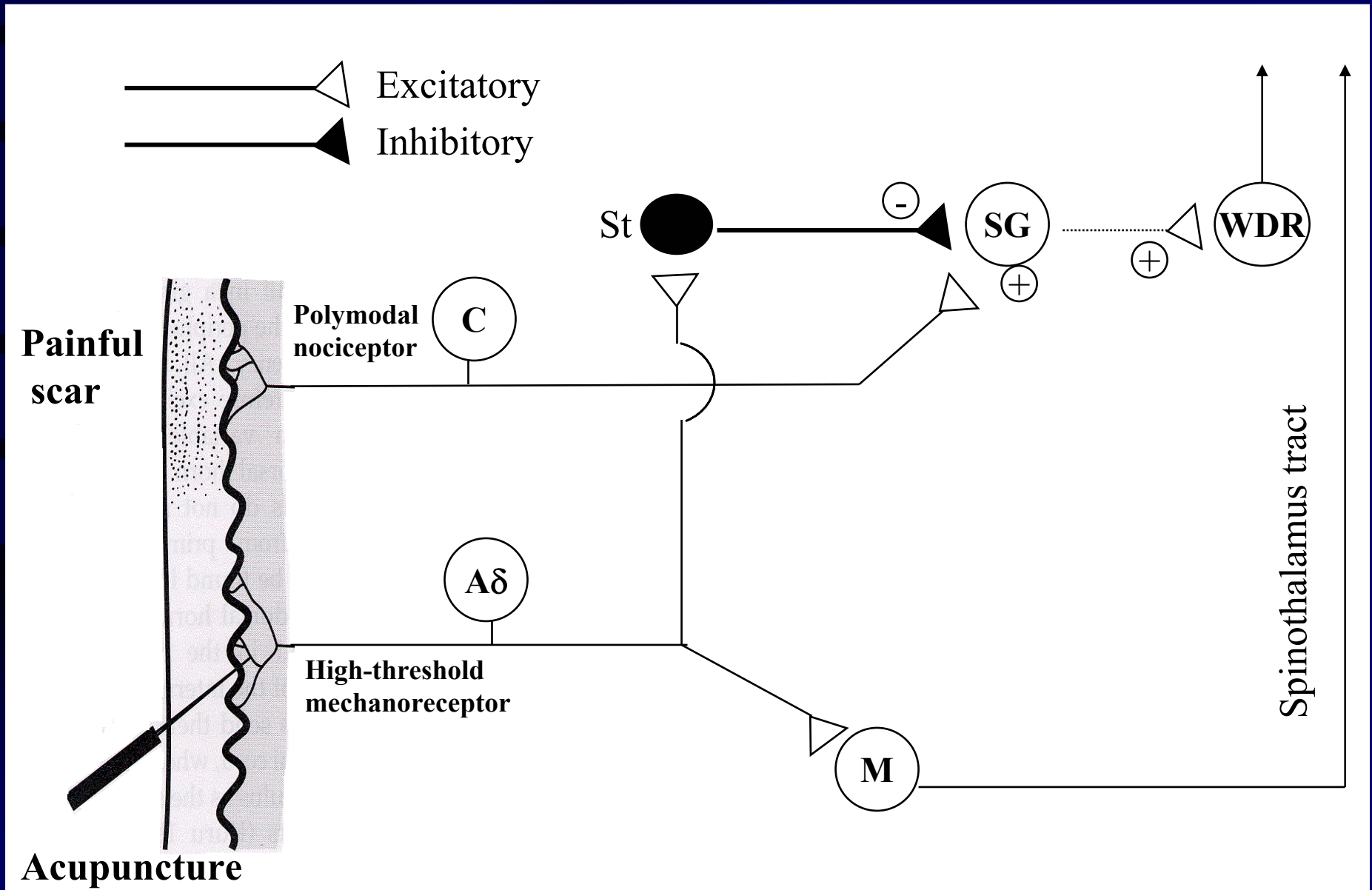
# Lieux d'action de l'acupuncture

- Segmentaire: effet porte
- Mésencéphalique: voies antalgiques descendantes
- hypothalamo-hypophysaire: libération de proopiomélanocortine, qui se scinde en Béta endorphines, ACTH et mélatonine





# Mechanism of segmental acupuncture



# Effets viscéraux de l'acupuncture:

## 1) sur la douleur

- Les afférences nociceptives viscérales se projettent au niveau de la corne postérieure sur les mêmes neurones que les fibres C provenant des zones cutanées de même origine embryologique.
- Une douleur viscérale peut être ressentie dans le territoire cutané correspondant
- À l'inverse la stimulation d'une zone cutanée peut inhiber les informations nociceptives amenées par les fibres C des viscères segmentairement reliés.

# Effets viscéraux de l'acupuncture:

## 2) sur la fonction viscérale

- Activation directe des fibres neuro-végétatives des vaisseaux et des glandes sudoripares.
- Effets hypothalamiques

# Conclusions

- Il y a un modèle neuro-physiologique cohérent pour expliquer les effets de l'acupuncture sur la douleur, et une évidence clinique qui n'est plus contestée.
- Ce modèle, qui démontre un effet de l'acupuncture au niveau de l'hypothalamus et du système limbique, rend plausibles d'autres effets revendiqués par l'acupuncture, d'ordre neuro-végétatif, endocrinien ou encore psychiques.

# Conclusions, suite

- L'existence de voies neurologiques compatibles avec ces mécanismes n'est cependant pas une preuve; seule l'évidence clinique fait foi. De nombreuses recherches restent à faire dans ce domaine.
- Pour l'instant, l'acupuncture est essentiellement pratiquée dans le secteur privé, alors que les moyens de recherche sont dans le secteur public. Une collaboration serait hautement souhaitable.