

The spinal control of ejaculation revisited. A systematic review and meta-analysis of anejaculation in spinal cord injured patients

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Introduction

After spinal cord injury (SCI) most men cannot ejaculate without medical assistance. Ejaculation comprises two successive phases:

- **emission** controlled by parasympathetic (segments **S2 to S4**) and sympathetic (segments **T12 to L2**) spinal centres
- **expulsion** controlled by somatic (segments **S2 to S4**) spinal centres

In rat, a spinal generator of ejaculation (SGE), located in third and fourth lumbar spinal segments (L3 and L4), controls emission and expulsion [1], [2]. Such a SGE have not been yet identified in man.

Clinical studies about ejaculation after SCI have been **reviewed** in order to **revisit** the **spinal control of ejaculation** and **assess** the **existence** of a **SGE** in man.

Material and Methods

Studies were identified from **Embase, PubMed, EBSCOhost** and **Cochrane** Library and considered for analysis when they specified the occurrence of antegrade ejaculation as a function of the neurological characterisation of SCI.

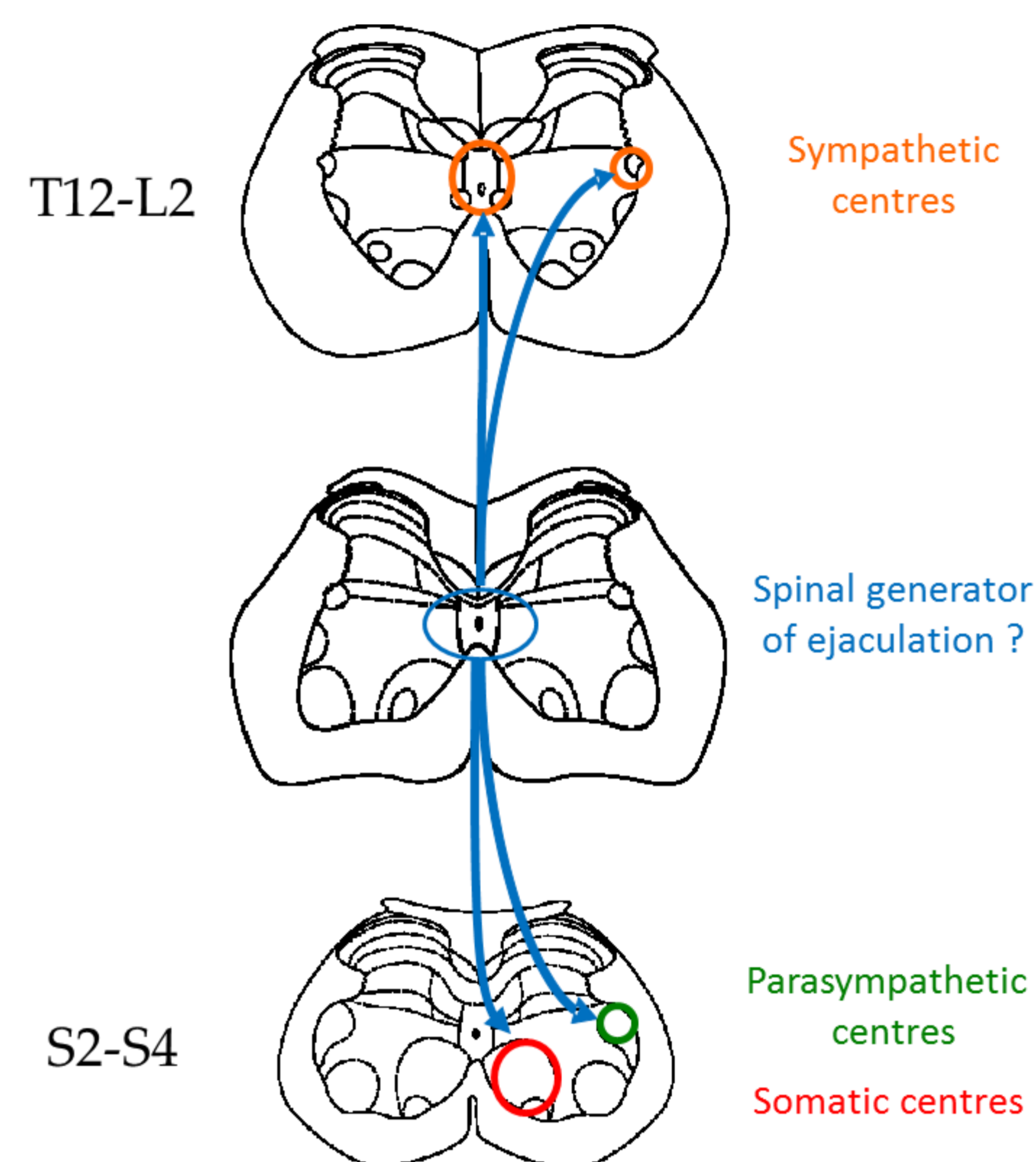
Meta-analyses were performed to assess reference ejaculation rates for each procedure used to elicit ejaculation i.e.

- **masturbation or coïtus**
- penile vibratory stimulation (**PVS**)
- acetylcholine esterase (**AchE**) **inhibitors prior to masturbation**

Subgroup analyses were performed according to the procedure used to elicit ejaculation on the

- completeness** of the SCI
- upper and lower limits** of the SCI

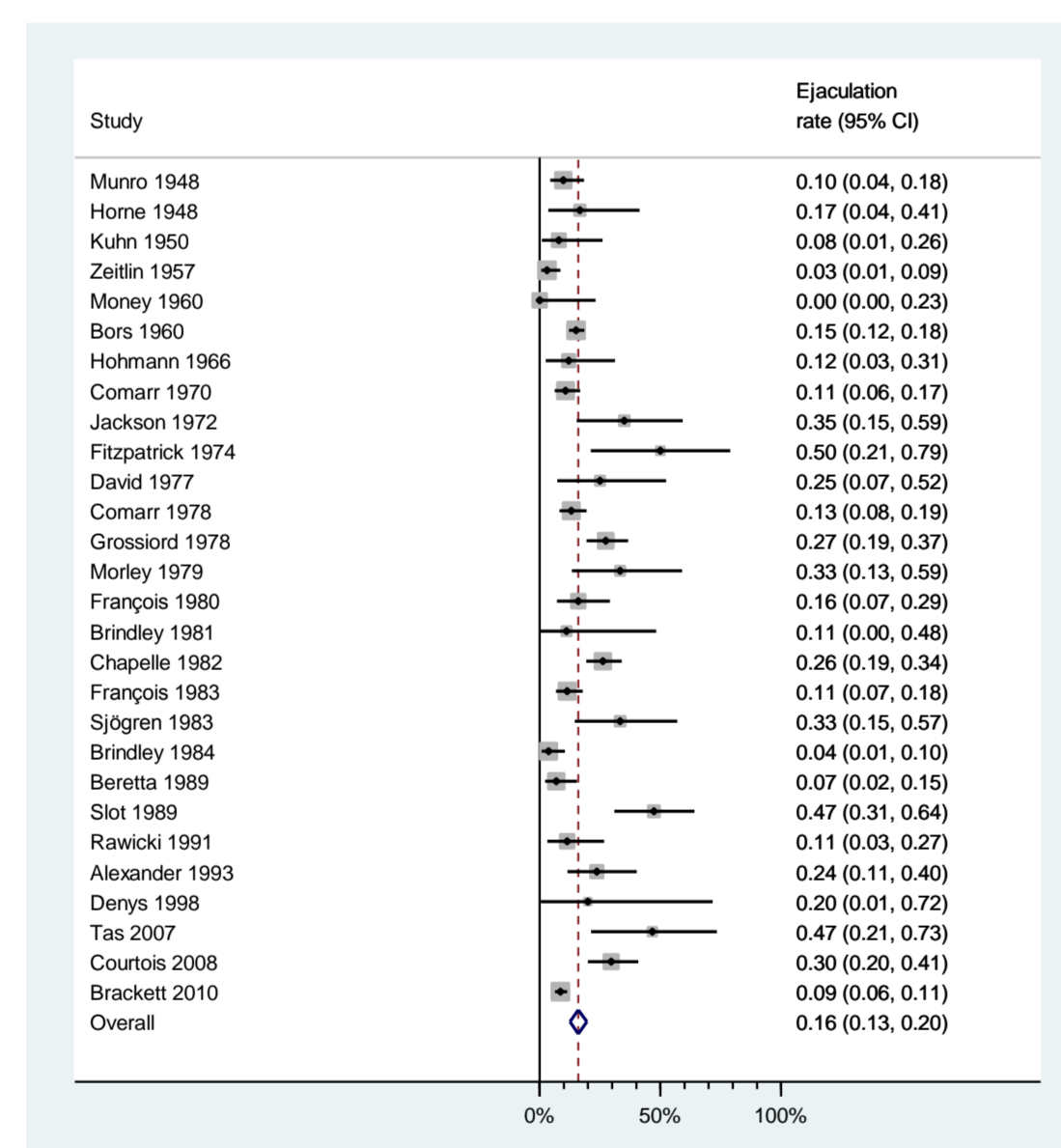
To assess the existence of SGE, the effect of concurrent lesions of different spinal segments was assessed by means of a stratified bivariate analysis



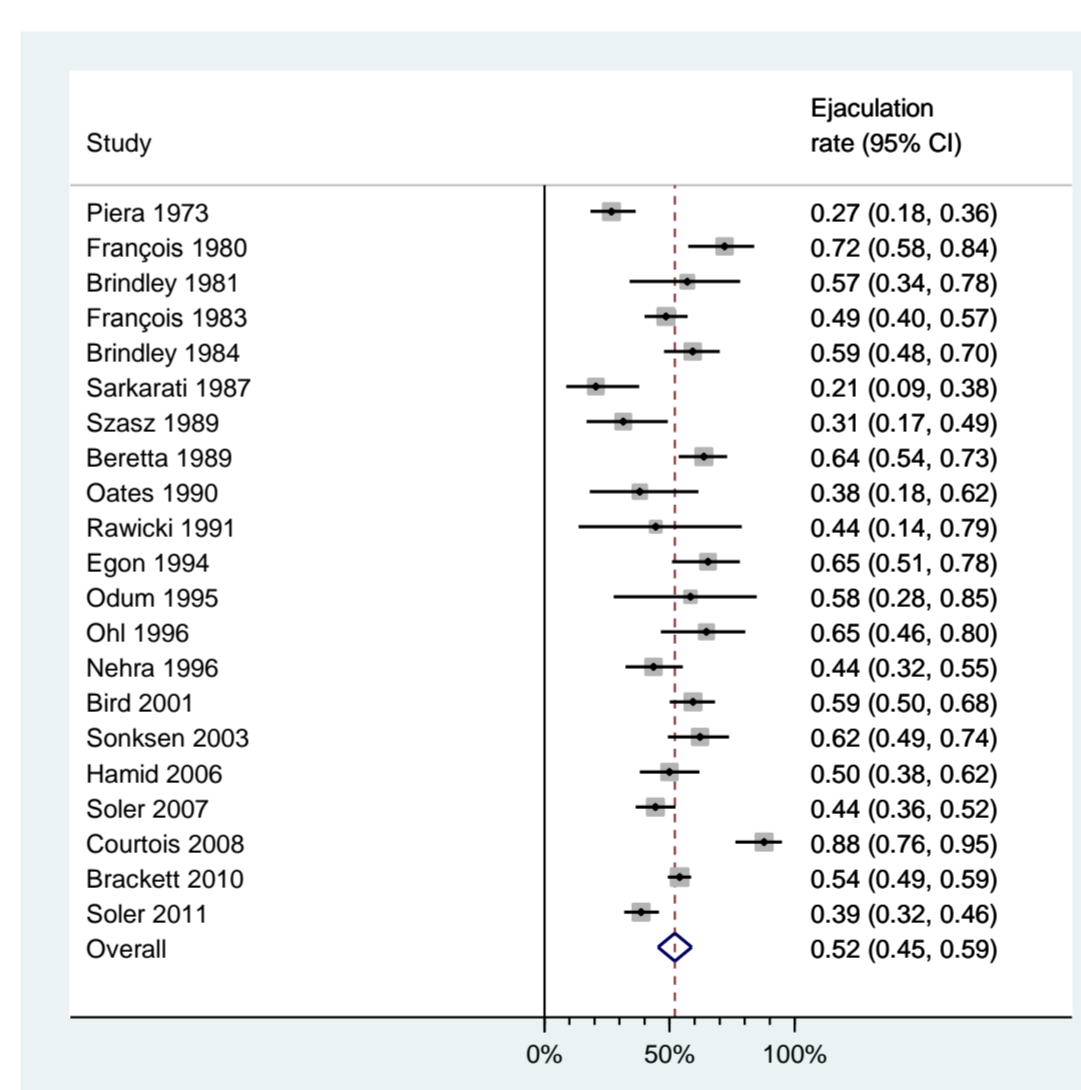
Results

45 studies were selected (including **3851 patients**). Ejaculation occurred in response to:

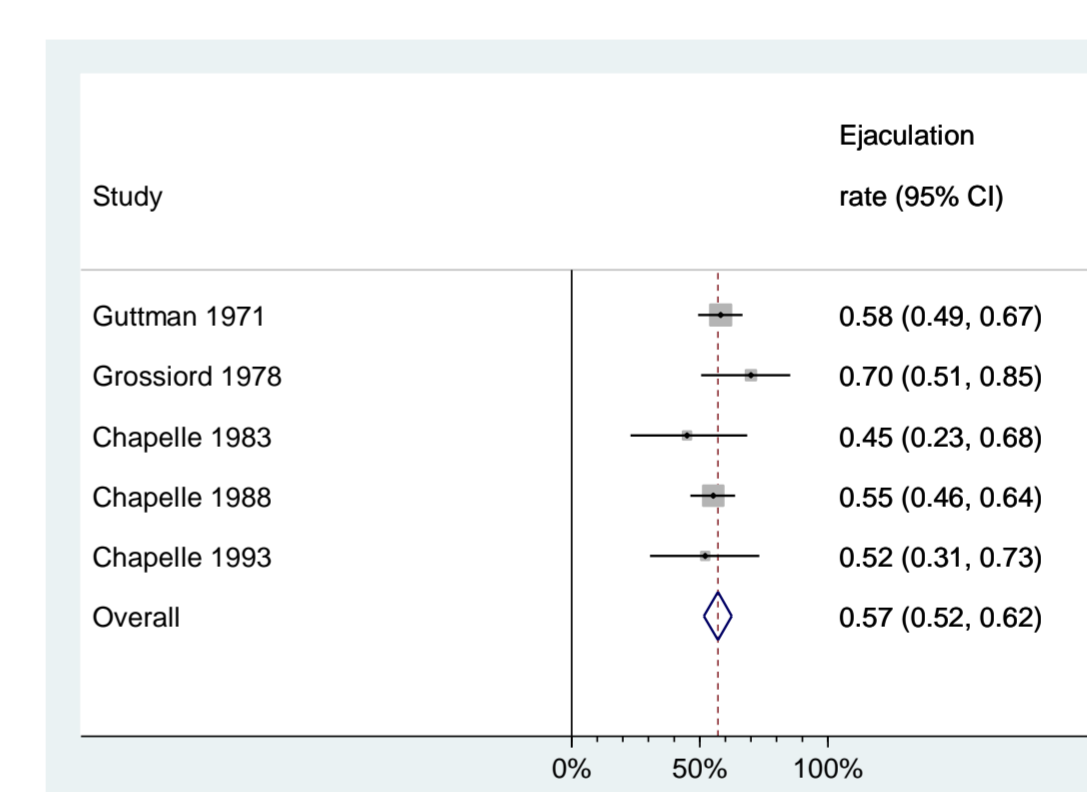
Masturbation or coïtus
16% (n=2509 patients)



Penile vibratory stimulation (PVS)
52% (n=1911 patients)



AchE inhibitors followed by masturbation
57% (n=341 patients)



Ejaculation occurred in response to PVS or AchE inhibitors followed by masturbation in: (i) 3/65 (5%) of patients with complete lesion of the sympathetic centres (T12 to L2) (ii) 8/41 (20%) of patients with complete lesion of parasympathetic and somatic centers and (iii) 0/67 (0%) of patients with complete lesion of all spinal ejaculation centres (**T12 to S5**). **Complete lesion of the S2 to S4 segments precluded** the occurrence of **rhythmic forceful ejaculation**.

Ejaculation rates, with 95% confidence intervals, during masturbation following intrathecal prostigmine or sub cutaneous physostigmine in patients with complete spinal cord injury according to the status of each spinal segment irrespective of the others :

(a) Ejaculation rate according to the upper limit of SCI

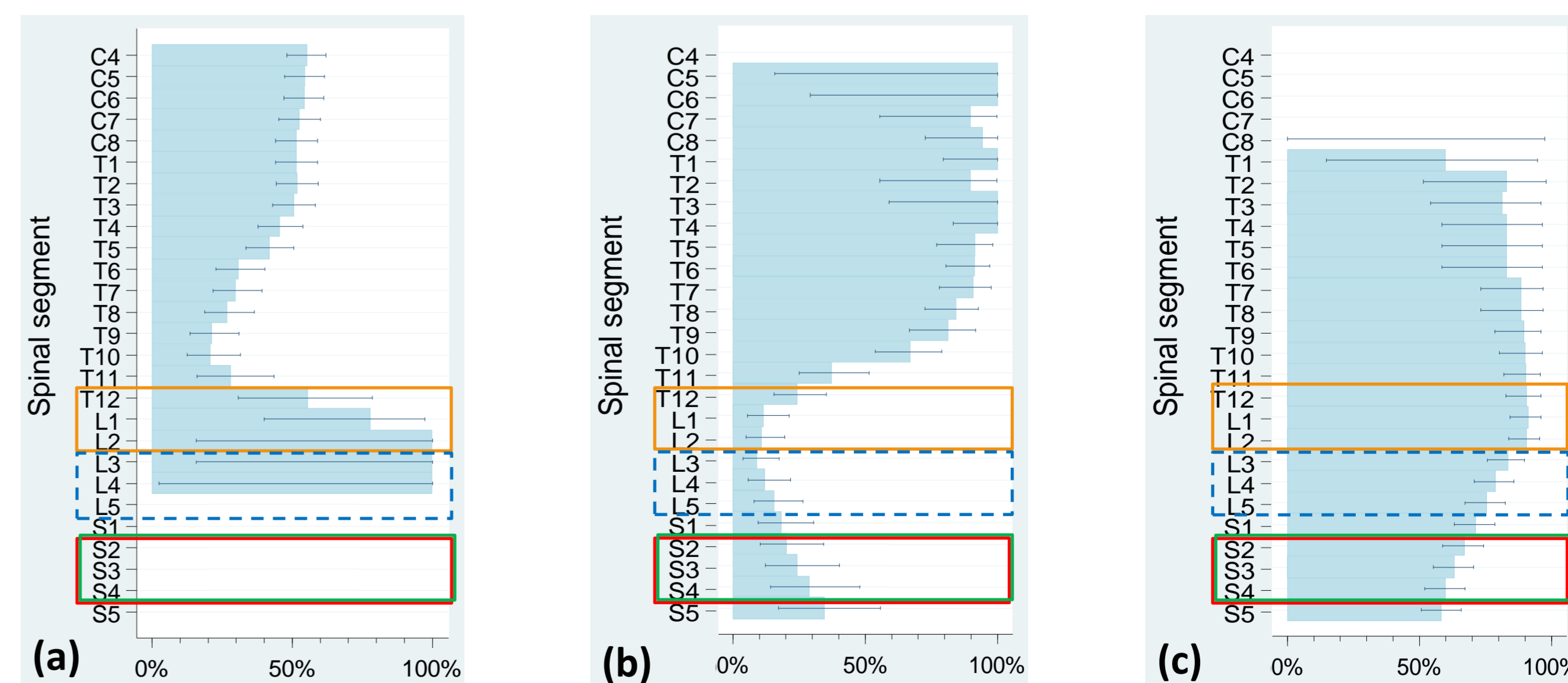
Intact lower thoracic and upper lumbar segments were associated to a high probability to ejaculate. There was a **trend for a maximal ejaculation rate** when segment **L2 and/or L3 and/or L4** were intact.

(b) Ejaculation rate according to the location of complete SCI

Complete lesion of a spinal segment **below T10** was associated with a **step decrease** in ejaculation rate with the **lowest rate** observed with complete lesion of **L3**.

(c) Ejaculation rate according to the location of the lower limit of SCI

The more cranial the lower limit of the lesion, the higher the likelihood of ejaculation with a **maximum rate** when **L2 and/or above segments** were **infra lesional**.



Controlling for the number of the injured segments between T12 and L2, **ejaculation rate sharply decreased** when the **lesion extended to the segment L3 and below**

Conclusion

The results **reinforce** the **crucial roles** of the spinal **parasympathetic** and **sympathetic** centres for **emission** and the **somatic** centre for **expulsion**. This analysis **suggests the existence** of a **SGE** in man, located in **L3-L5 segments**.

[1] Truitt WA and Coolen LM. *Science* 2002; **297**:1566-1569.

[2] Borgdorff AJ, Bernabe J, Denys P, Alexandre L and Giuliano F. et al. *Eur Urol* 2008; **54**:449-456.