Spinal cord injury-induced neurogenic detrusor overactivity

**Model’s advantages:**
- The most commonly utilised and highly informative model of a central lesion with respect to lower urinary tract function
- Used for the evaluation of drugs targeting neurogenic detrusor overactivity (NDO) but also overactive bladder whatever its etiology
- Useful to investigate the effect of mechanisms known to act on C-fiber afferents
- Useful to investigate an effect on the external urethral sphincter activity

**Species:** rat

**Pathophysiological features:**
- Mimics the voiding patterns of patients with neurogenic detrusor overactivity due to spinal cord injury
- Display neurogenic detrusor overactivity characterized by non-voiding contractions during the filling phase with increased maximal micturition pressure and increased micturition duration.
- Reduced voiding efficiency and large residual urine volume associated with detrusor-sphincter dyssynergia
- Bladder hypertrophy
- Increase in bladder afferent nerve activity, in particular through C-fibers
- BBB score impairment altered locomotor activity (reduced BBB score)

**Figure 1:** Representative cystometrograms in conscious 3 weeks SCI and sham rats. Arrows indicate the voiding contractions. Neurogenic detrusor overactivity occurred in the SCI rat but not in sham rats. (Pelvipharm, internal data)

**Figure 2:** Complete transection between vertebral T7-T8

**Summarized methodology:**
A T7-T8 laminectomy is performed and the spinal cord is cut between T7 and T8 vertebrae. A sterile gel form sponge is placed between the cut ends of the spinal cord. NDO progressively develops over time until 3-4 weeks where it is stabilized.

**Related Pelvipharm bibliography:**
- Broqueres-You, D. et al. Basic & Clinical Pharmacology & Toxicology, 107 (Suppl. 1), 192 (WorldPharma 2010)

**NB:** Pelvipharm will gladly study the feasibility to fit this experimental model in order to meet its client’s needs.
Links to applicable experimental skills:

- Administration routes / regimen
- Plasma / urine / tissue collection
- In vivo experiments – conscious animals
  * Urodynamic evaluation (conscious)
  * Urine collection – Metabolic cages
  * Eye wipe test
  * Locomotor activity evaluation (BBB score)
- In vivo experiments – anesthetized animals
  * Bladder blood flow
  * Neural firing recording
- Organ bath studies (EFS / Pharmacological studies)
  * Animal tissues
- Biochemistry (Plasma / Urine / Tissue)
  * Spectrophotometric assays
  * Protein expression and activity
- Histology
  * Histomorphology
  * Histomorphometry
  * Oxidative fluorescence
- Immunohistology / Confocal microscopy
  * Protein expression – immunohistochemistry / immunofluorescence
  * Confocal microscopy
- Neuro-anatomical tracing techniques
- Electrophysiology