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Update «bladder relaxation»

Prof. Thomas M. Kessler, MD, FEBU
Department of Neuro-Urology
Balgrist University Hospital
University of Zürich
Switzerland

Universität Zürich[UZH]

Conflicts of interest

Conflicts of interest

- Neuro-urologist

Conflicts of interest

- Neuro-urologist

- INUS President

INUS

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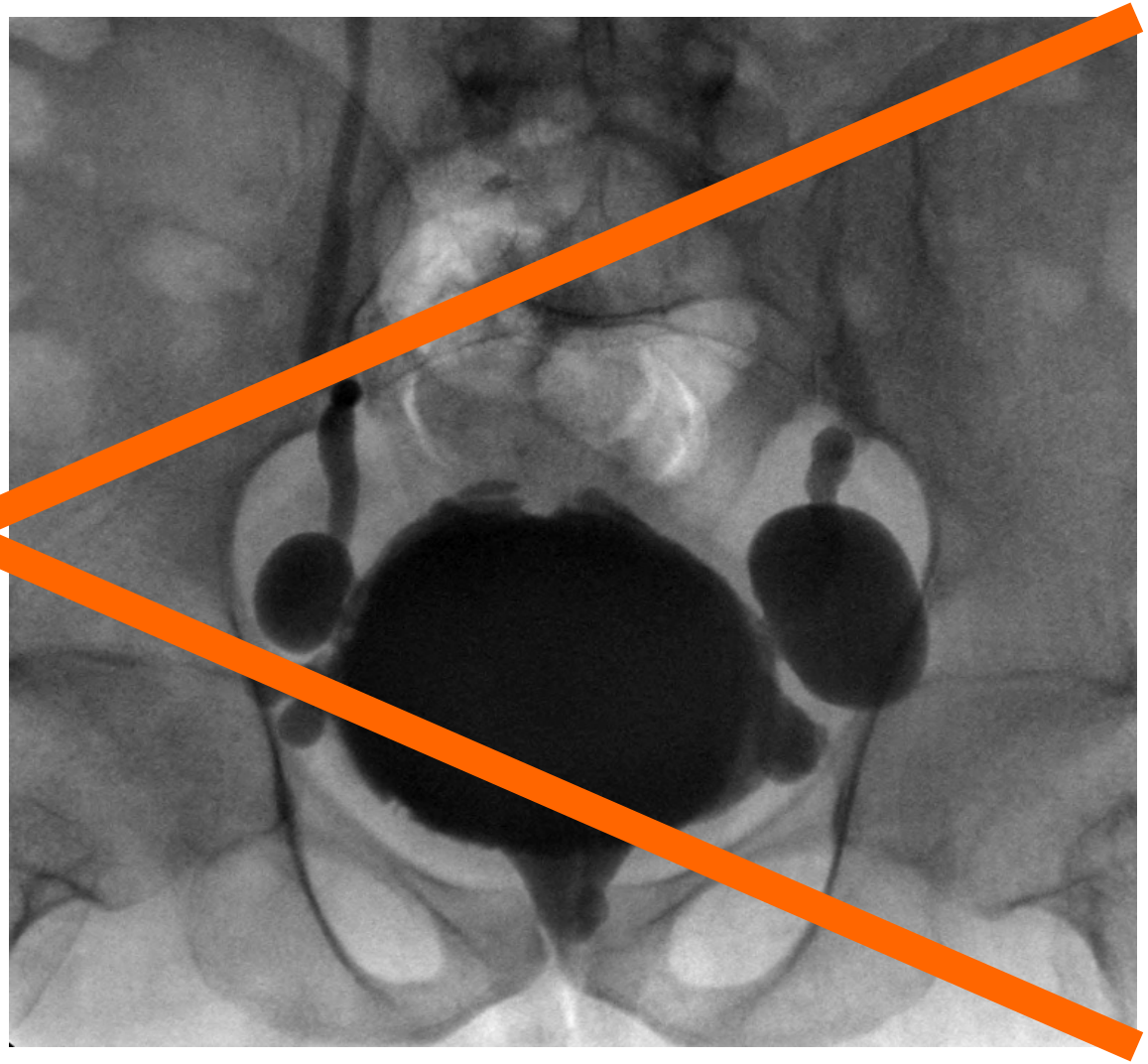
MUSS MAL!

16



Antimuscarinics

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Antimuscarinics

- Darifenacin
- Fesoterodine
- Imidafenacin
- Oxybutynin
- Propiverine
- Solifenacin
- Tolterodine
- Trospium chloride

Antimuscarinics

All antimuscarinics with similar efficacy

Herbison P et al., Neurourol Urodyn 2019

Beta-3 agonists

- Mirabegron
- Vibegron

Intravesical oxybutynin

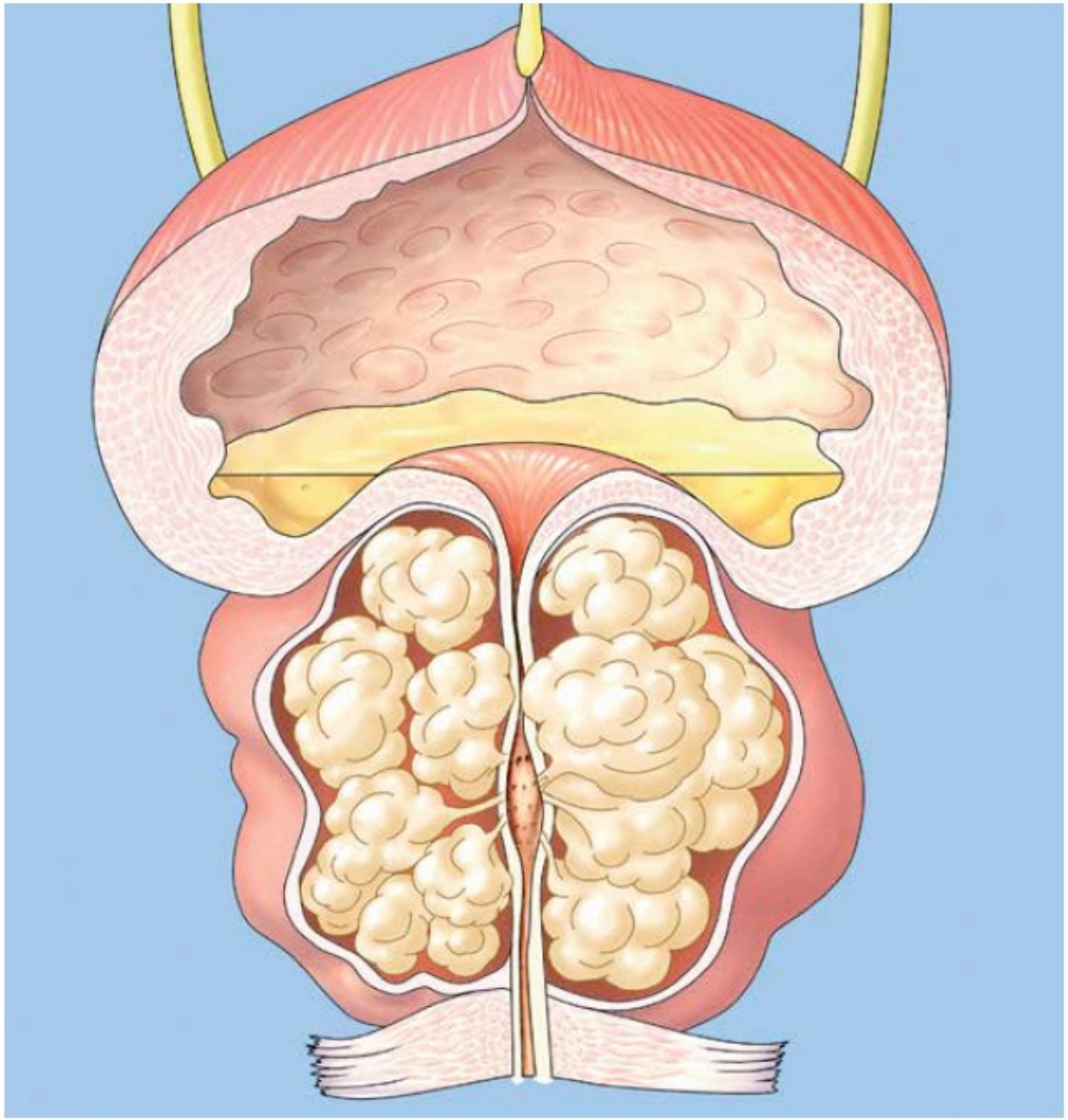

Illustration: Alain Blank

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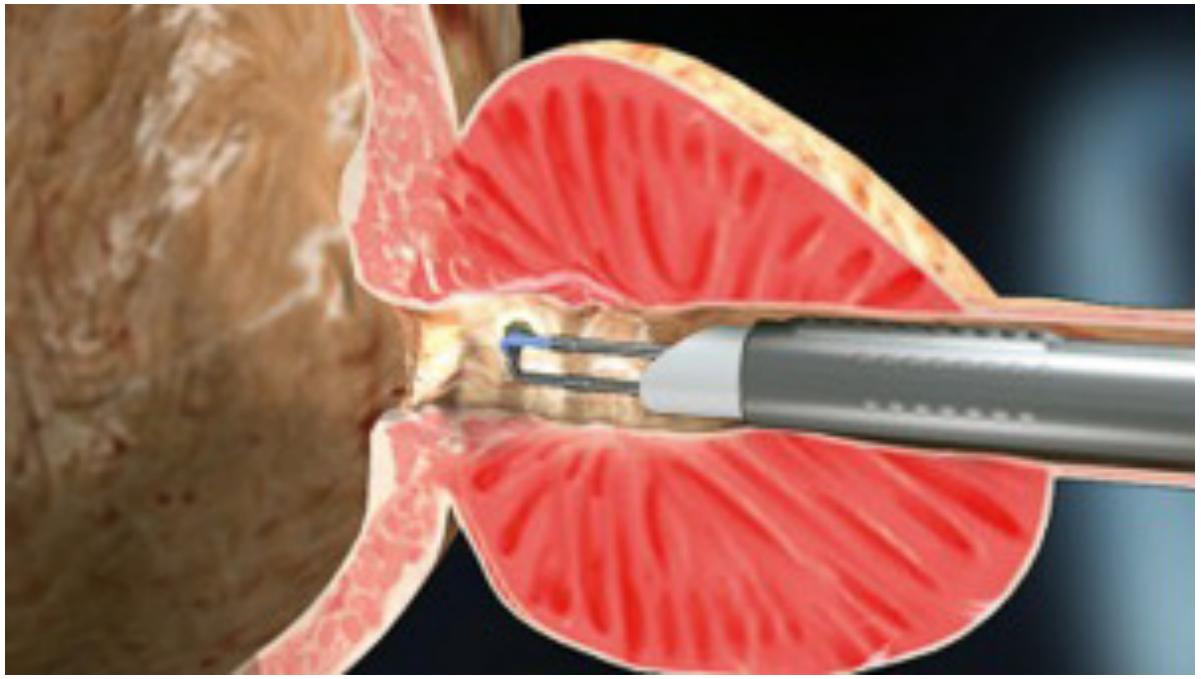
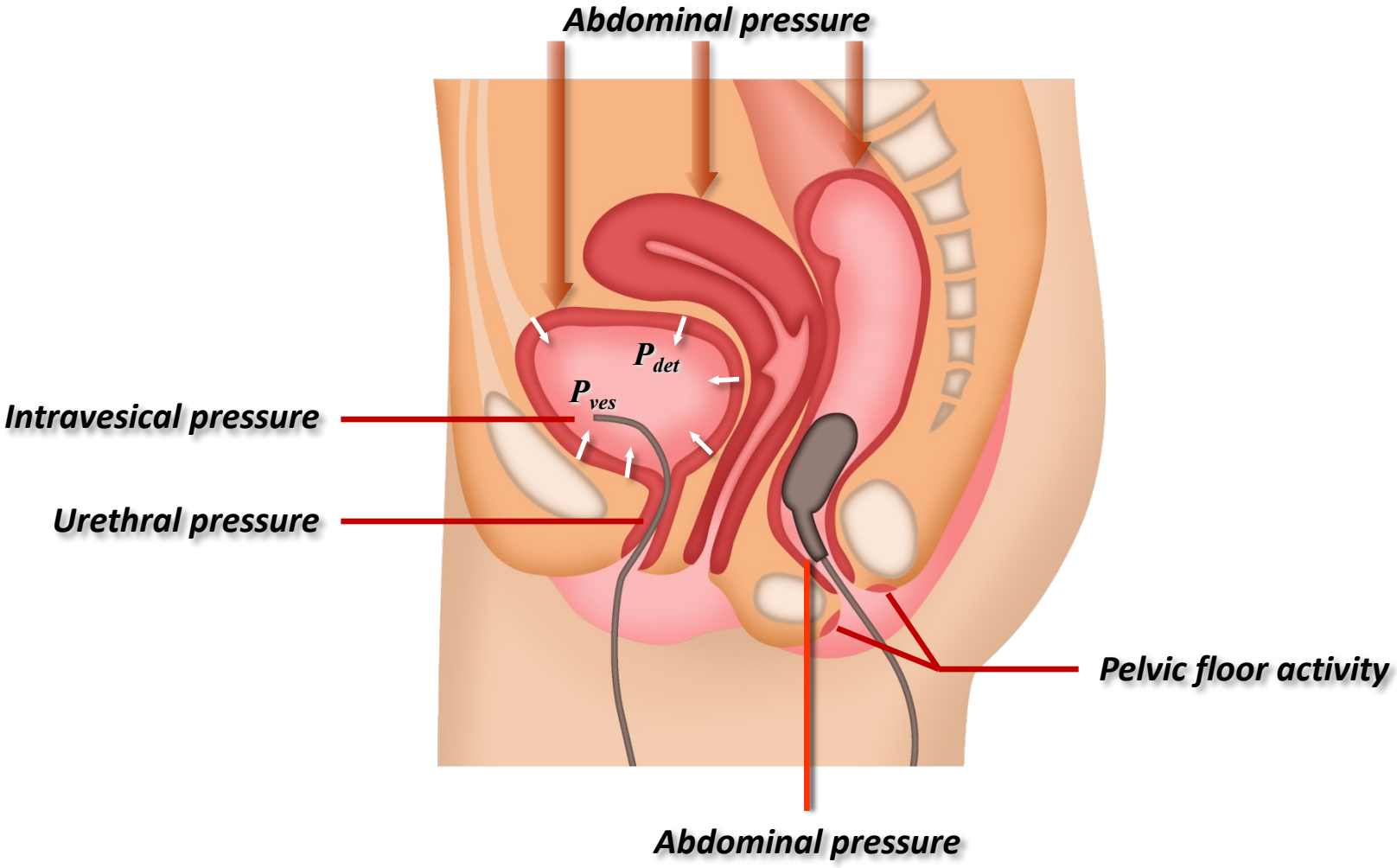
Transurethral resection of the prostate?



Urodynamics



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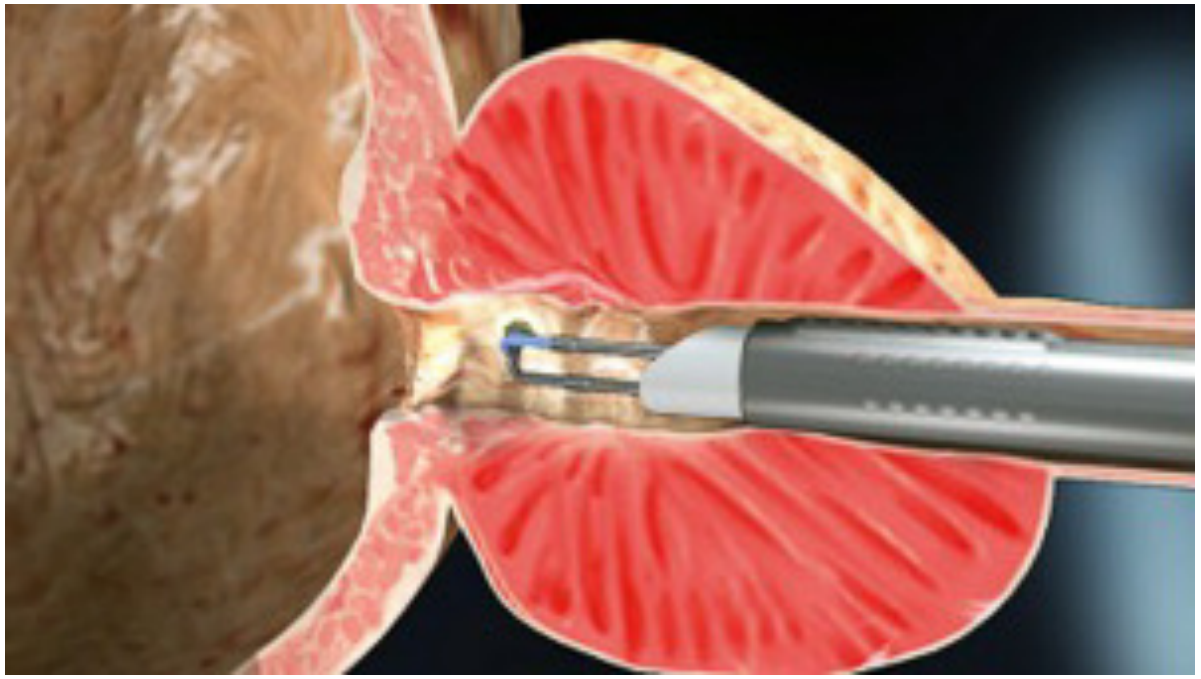
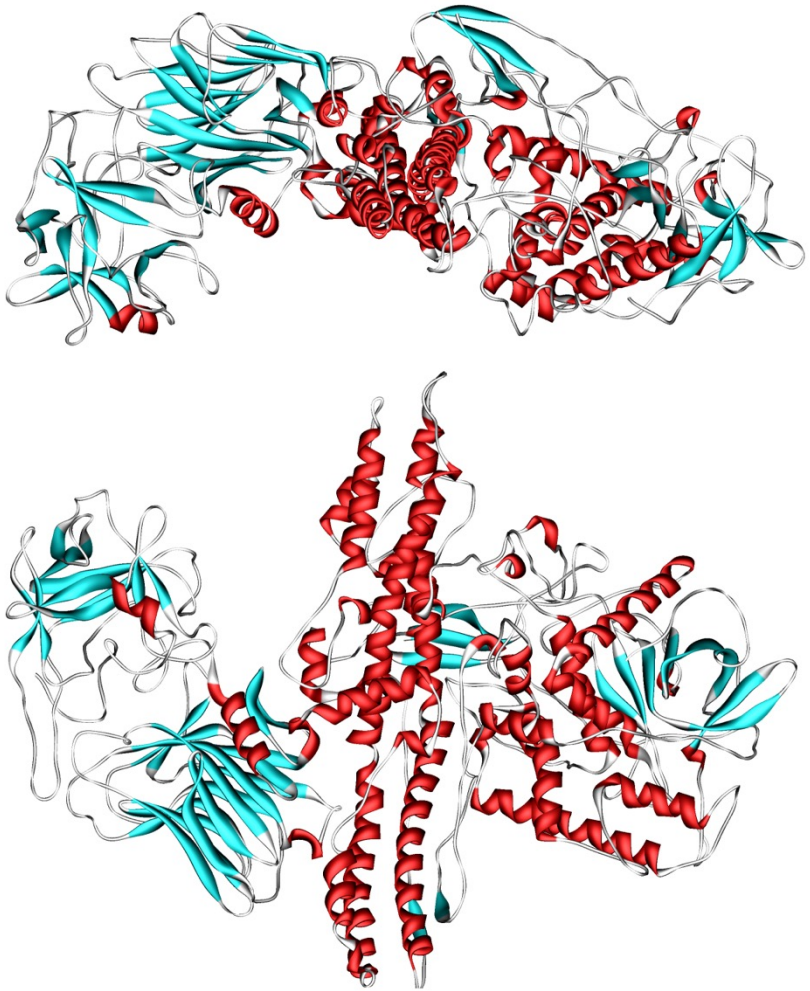
Transurethral resection of the prostate

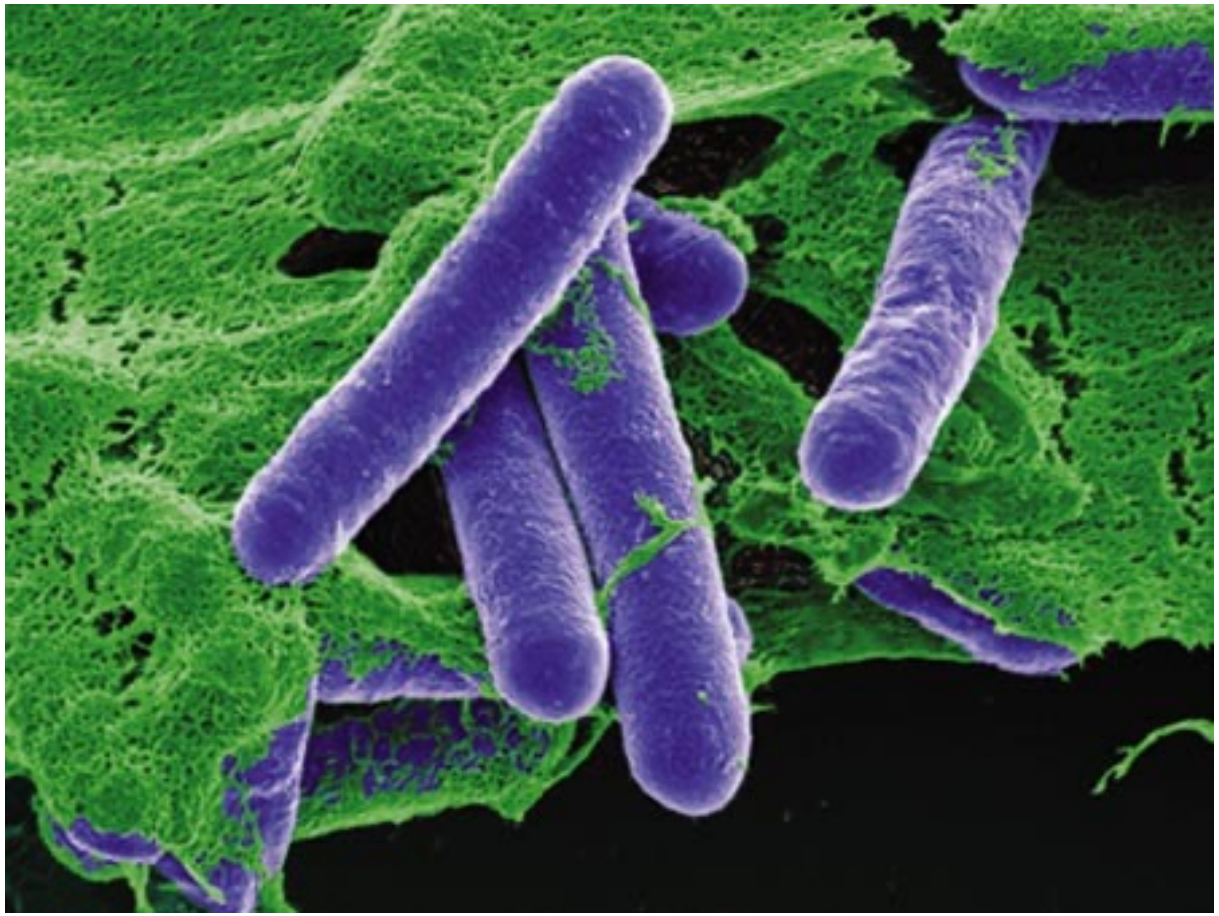


Pay attention to urethral sphincter function!

Schubert M et al., 4th International Neuro-Urology Meeting 2015

Botulinum toxin





Lacy DB et al., Nat Struct Biol 1998

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0022-5347/00/1643-0692/0
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Vol. 164, 692–697, September 2000
Printed in U.S.A.

BOTULINUM-A TOXIN FOR TREATING DETRUSOR HYPERREFLEXIA IN SPINAL CORD INJURED PATIENTS: A NEW ALTERNATIVE TO ANTICHOLINERGIC DRUGS? PRELIMINARY RESULTS

B. SCHURCH,* M. STÖHRER, G. KRAMER, D. M. SCHMID, G. GAUL AND D. HAURI

From the Swiss Paraplegic Centre, University Hospital Balgrist and Departments of Urology, University Hospital, Zurich and BG Unfallklinik, Murnau, Switzerland

"Penicillin of the 21st century!"

The NEW ENGLAND JOURNAL of MEDICINE

Treatment of neurogenic incontinence with botulinum toxin A.
Schurch B, Schmid DM, Stöhrer M. NEJM 2000; 342: 665.

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Eugène Delacroix, La liberté guidant le people, 1830

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Botulinum toxin

7 serotypes: A, B, C, D, E, F, G

Botulinum toxin

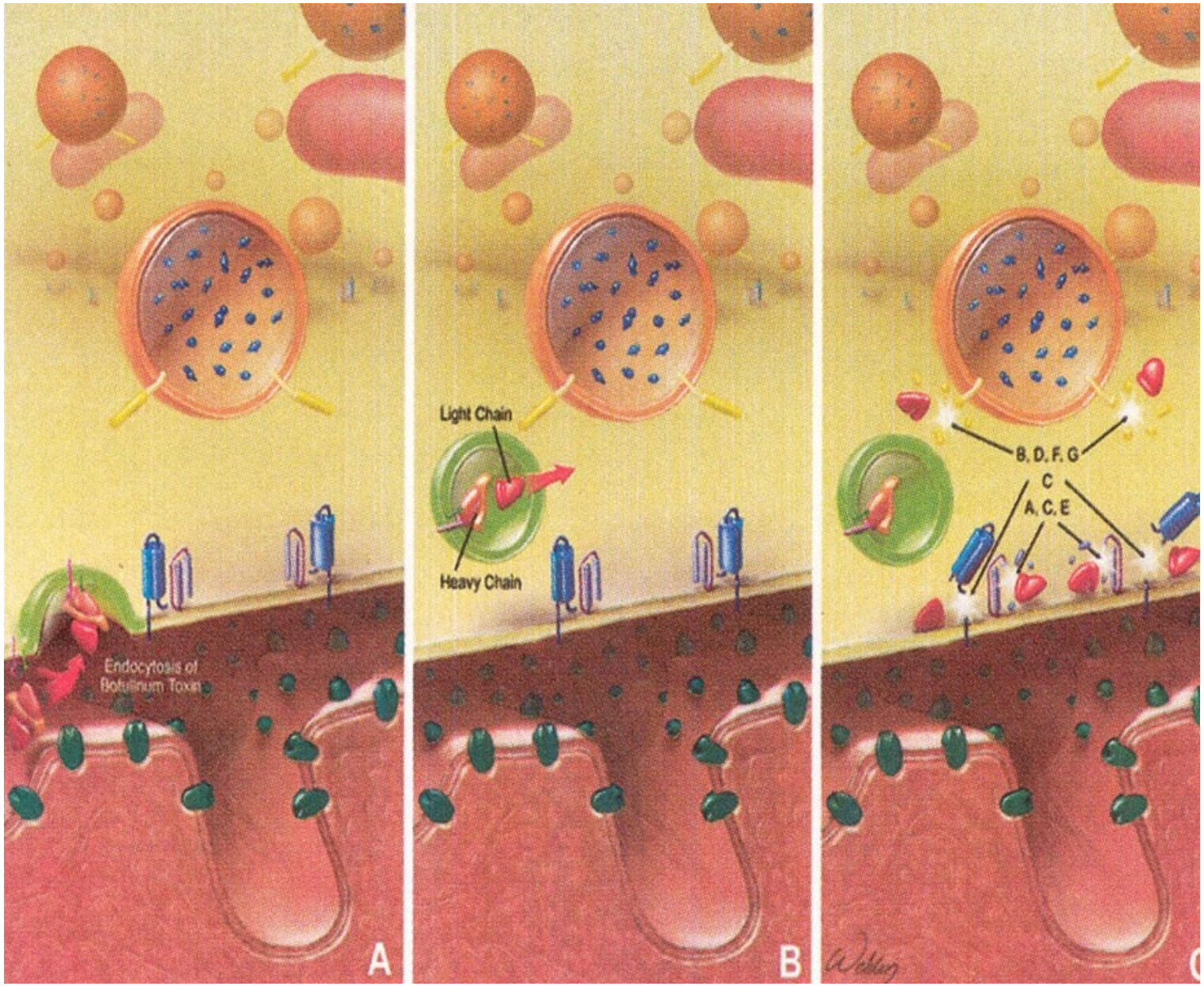
7 serotypes: A, B, C, D, E, F, G

Botulinum toxin

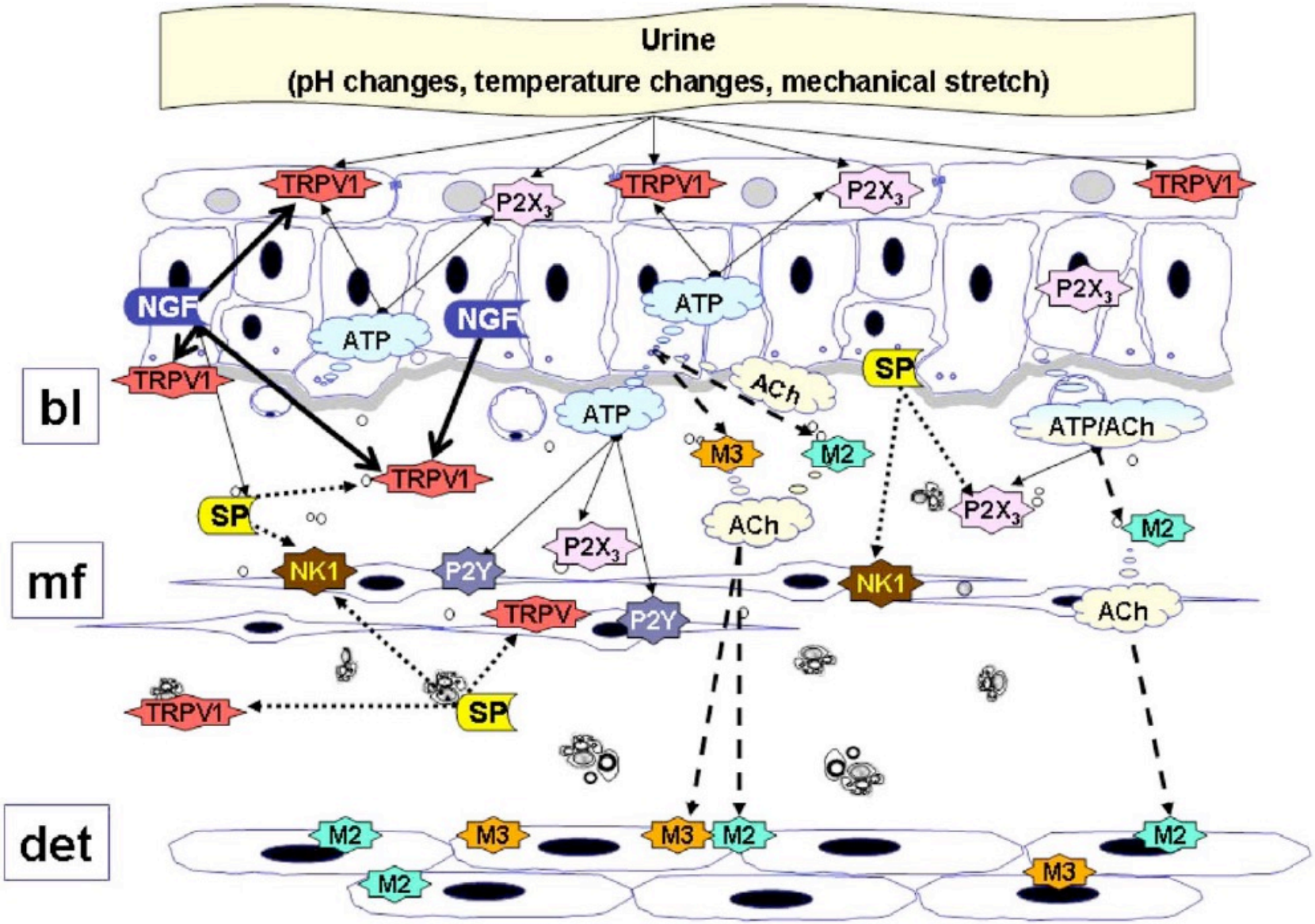
OnabotulinumtoxinA: Botox® (Allergan → AbbVie)

AbobotulinumtoxinA: Dysport® (Ipsen)

IncobotulinumtoxinA: Xeomin® (Merz)



Smith CP et al., J Urol 2004



Apostolidis A et al., Eur Urol 2006

Milestone

FDA approval:

Refractory neurogenic detrusor overactivity incontinence 08/2011

Milestone

FDA approval:

Refractory idiopathic overactive bladder 01/2013

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Points of Technique

A minimally invasive technique for outpatient local anaesthetic administration of intradetrusor botulinum toxin in intractable detrusor overactivity

M. HARPER, R.B. POPAT, R. DASGUPTA, C.J. FOWLER and P. DASGUPTA*
*Department of Uro-Neurology, National Hospital for Neurology and Neurosurgery, and *Department of Urology, Guy's and St Thomas' Hospital, London, UK*

Harper M et al., BJUI 2003

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Wöllner J et al., BJUI 2011

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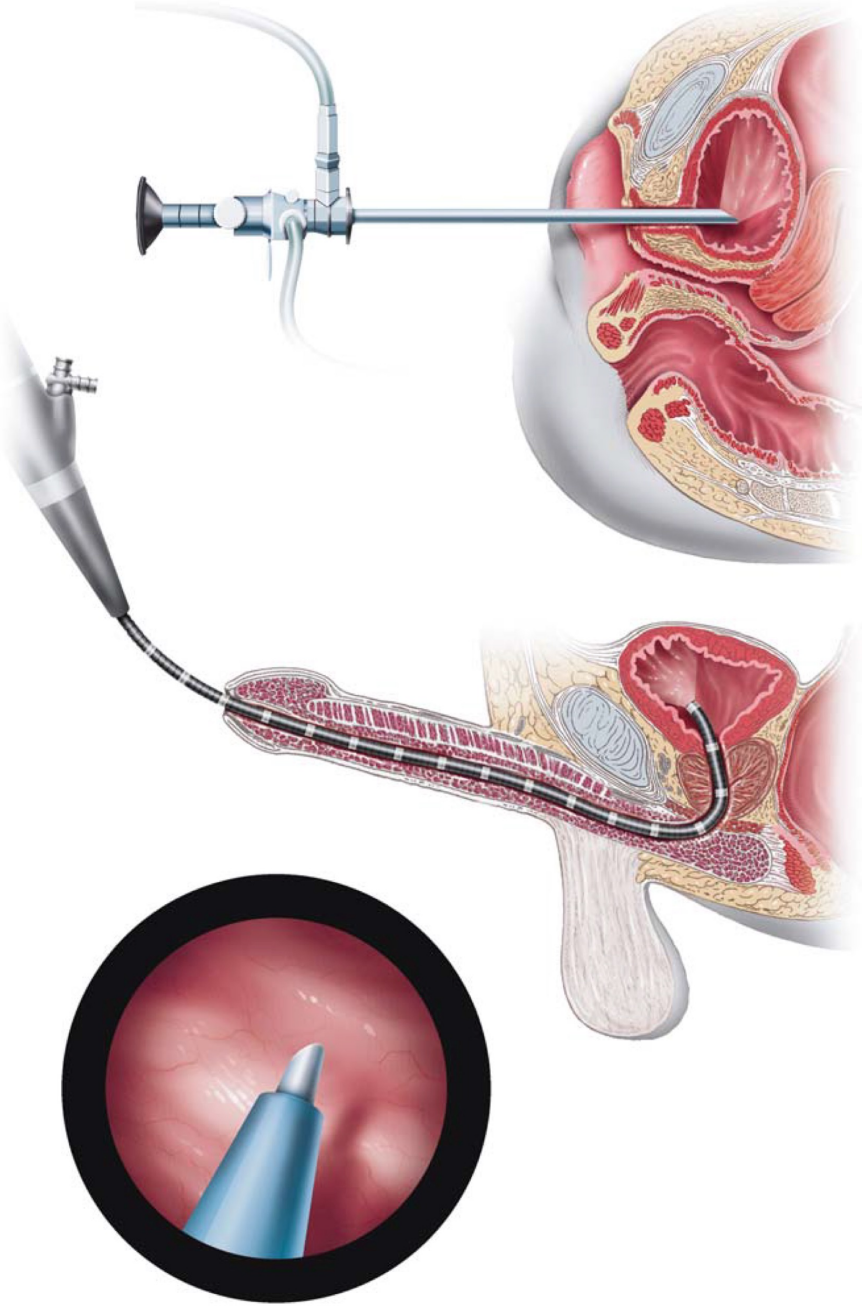
BJUI
BJU INTERNATIONAL

Surgery Illustrated – Surgical Atlas
Botulinum toxin injections into the detrusor

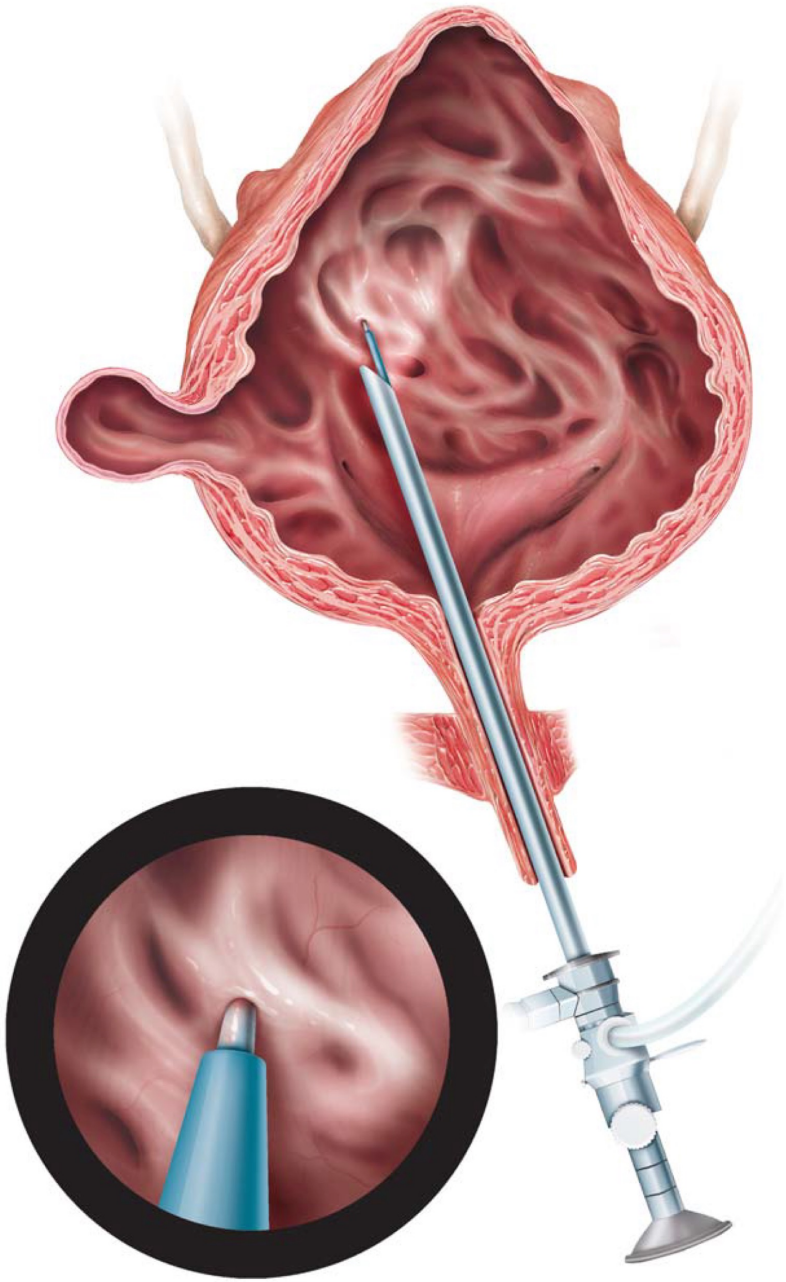
Jens Wöllner*† and Thomas M. Kessler*
**Neuro-Urology, Spinal Cord Injury Center and Research, University of Zürich, Balgrist University Hospital, Switzerland and †Department of Urology, University Medical Center, University of Mainz, Germany*

BJUI 2011; 108: 1528-37

Universität Zürich[UZH]



Wöllner J et al., BJUI 2011



Wöllner J et al., BJUI 2011

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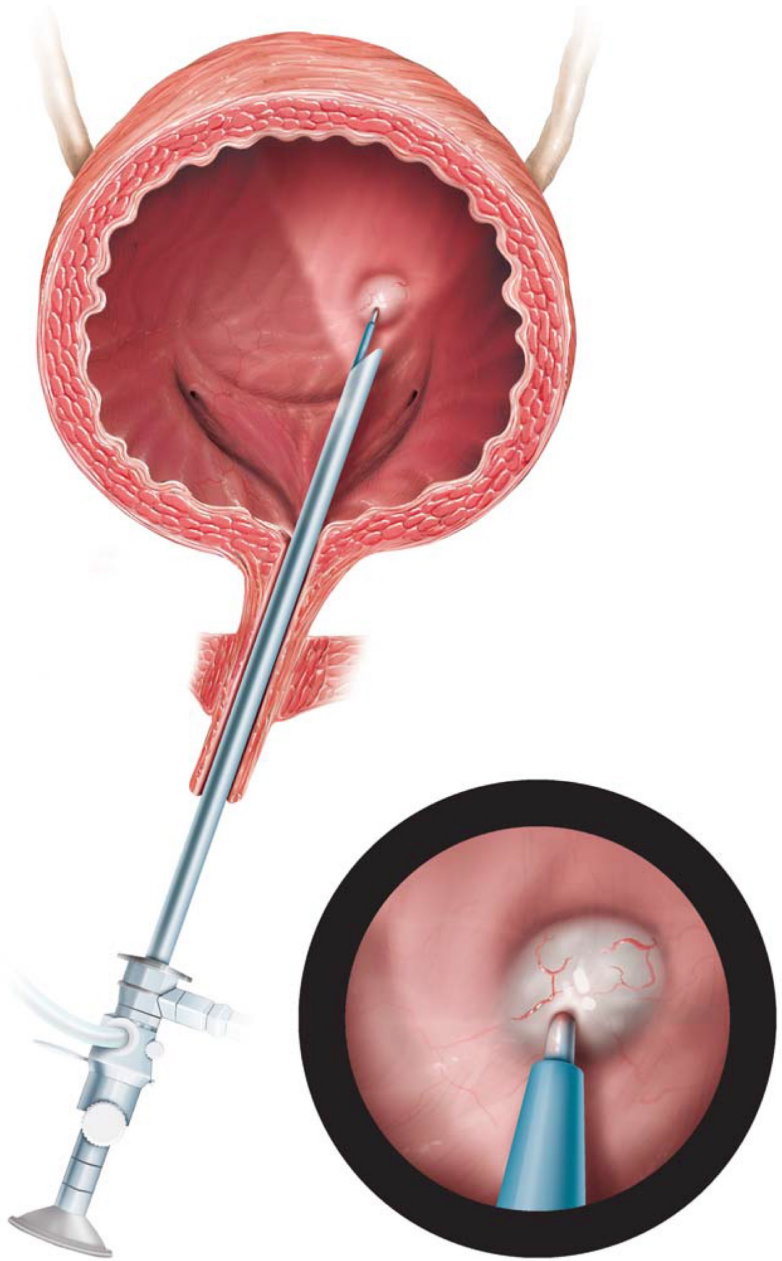

Wöllner J et al., BJUI 2011

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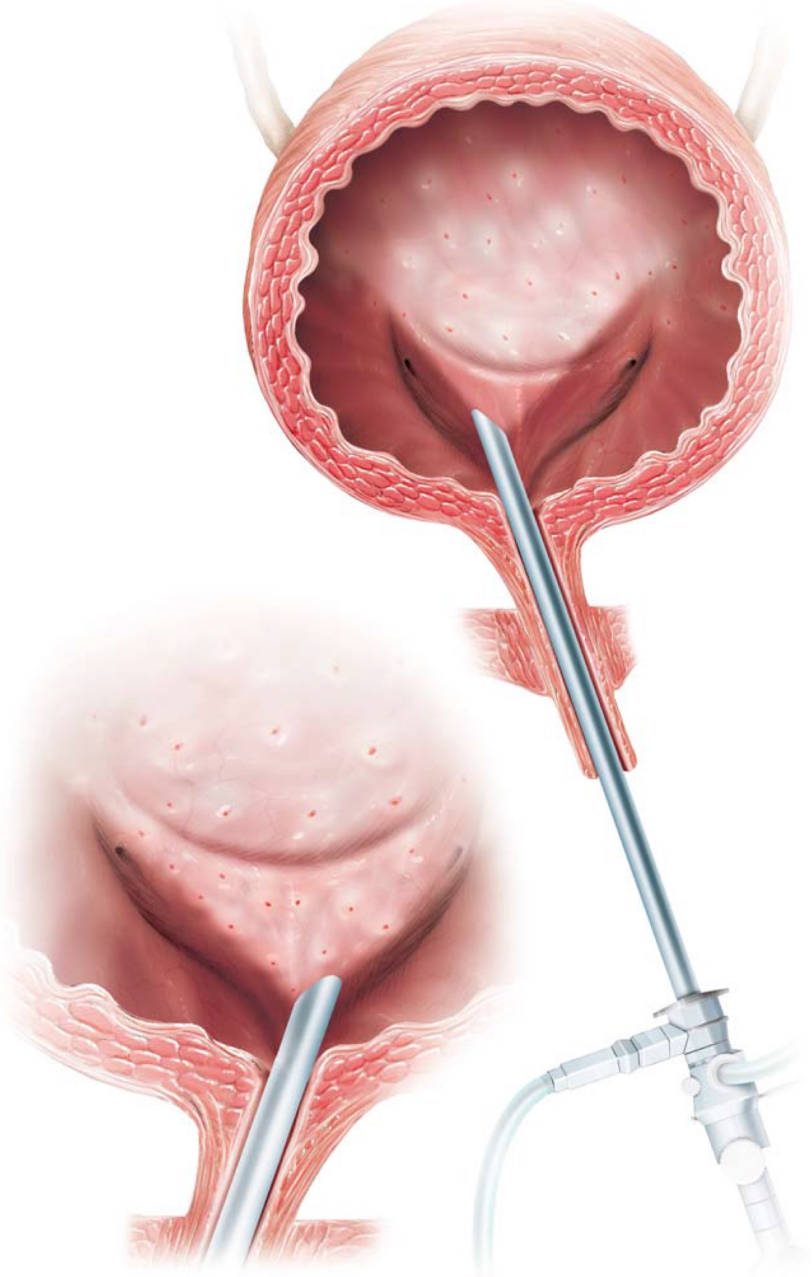


Wöllner J et al., BJUI 2011

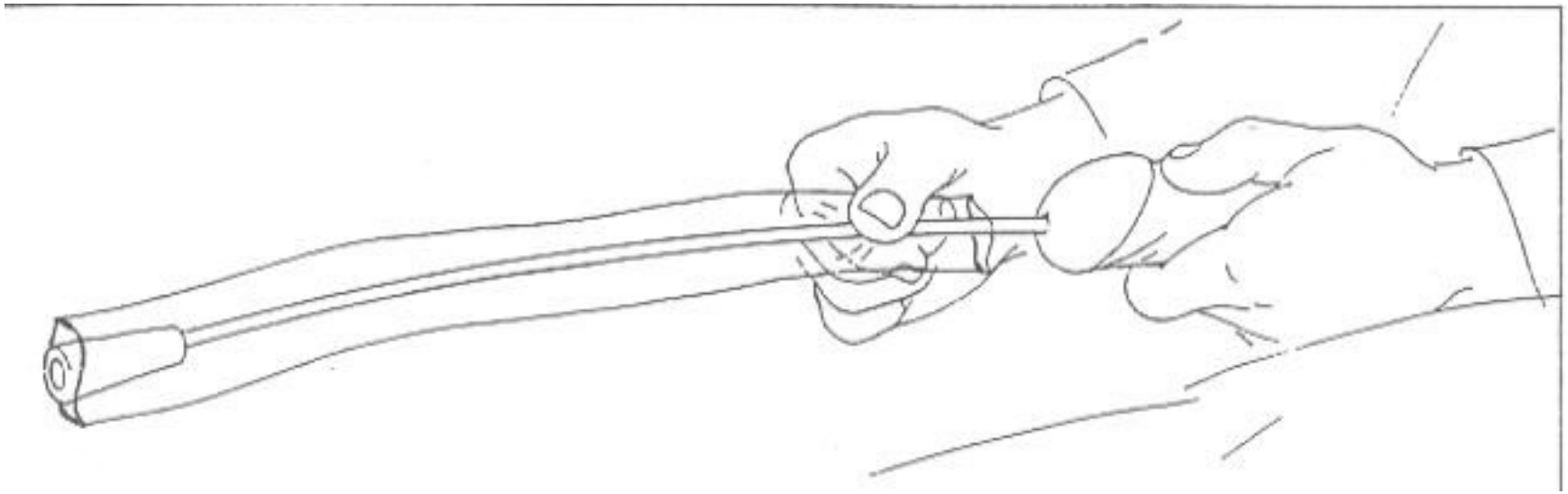
Efficacy

Neurogenic OAB: about 9 months

Idiopathic OAB: about 7.5 months

Nitti V et al., Medicine 2023

Adverse events



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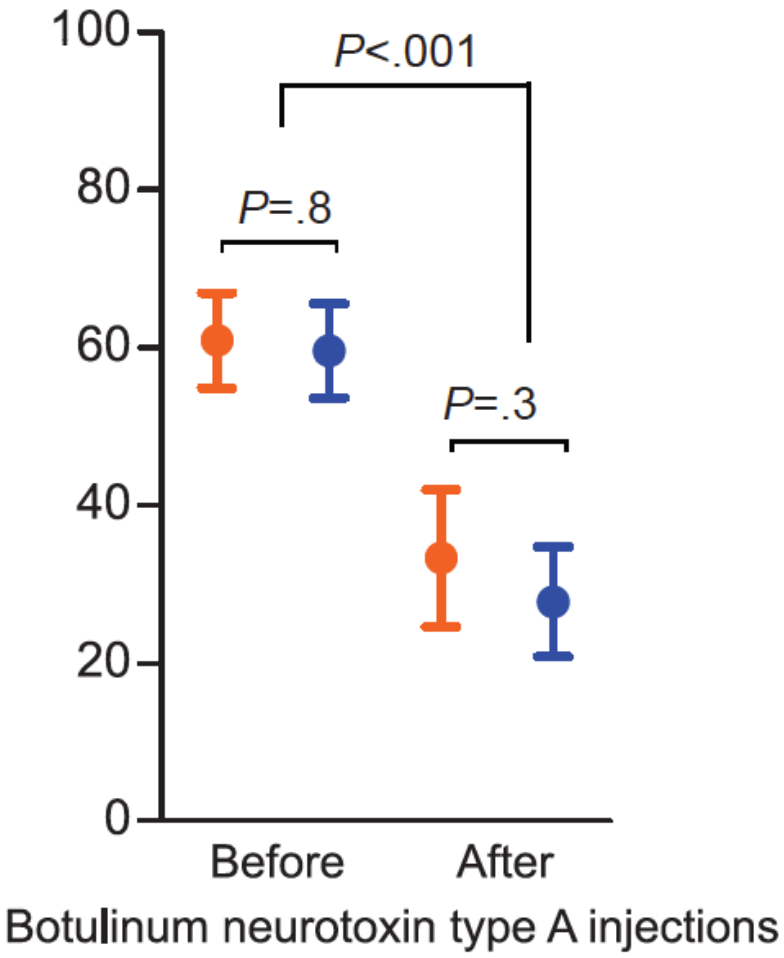
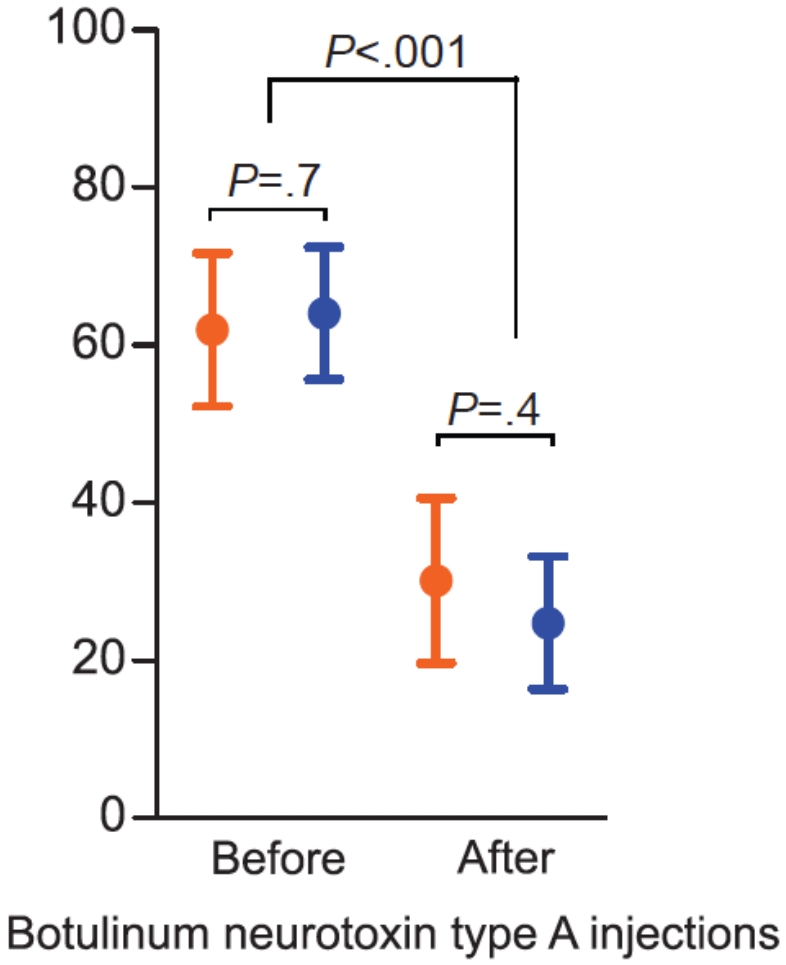
UDI-6



IIQ-7



Intermittent catheterisation

Spontaneous voiders

Kessler TM et al., Obstet Gynecol 2009

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Adverse events

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EUROPEAN UROLOGY 53 (2008) 613–619

available at www.sciencedirect.com
journal homepage: www.europeanurology.com

European Association of Urology

Neuro-urology

Botulinum Toxin A Detrusor Injections in Patients with Neurogenic Detrusor Overactivity Significantly Decrease the Incidence of Symptomatic Urinary Tract Infections

Xavier Gamé [a,], Evelyne Castel-Lacanal [b], Youssef Bentaleb [a], Isabelle Thiry-Escudié [b], Xavier De Boissezon [b], Bernard Malavaud [a], Philippe Marque [b], Pascal Rischmann [a]*

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SCIENTIFIC REPORTS

OPEN

Antibiotic prophylaxis may not be necessary in patients with asymptomatic bacteriuria undergoing intradetrusor onabotulinumtoxinA injections for neurogenic detrusor overactivity

Received: 06 June 2016
Accepted: 19 August 2016
Published: 12 September 2016

Lorenz Leitner[1,2,*], Ulla Sammer[1,*], Matthias Walter[1], Stephanie C. Knüpfer[1], Marc P. Schneider[1,3], Burkhardt Seifert[4], Jure Tornic[1], Ulrich Mehnert[1] & Thomas M. Kessler[1]

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Treatment discontinuation

EUROPEAN UROLOGY 70 (2016) 522–528

available at www.sciencedirect.com
journal homepage: www.europeanurology.com

European Association of Urology

Neuro-urology

More Than 15 Years of Experience with Intradetrusor OnabotulinumtoxinA Injections for Treating Refractory Neurogenic Detrusor Overactivity: Lessons to Be Learned

Lorenz Leitner[a,b,†], *Sharmistha Guggenbühl-Roy*[a,†], *Stephanie C. Knüpfer*[a], *Matthias Walter*[a], *Marc P. Schneider*[a,c], *Jure Tornic*[a], *Ulla Sammer*[a], *Ulrich Mehnert*[a], *Thomas M. Kessler*[a,*]

40%

Long-Term Discontinuation of Botulinum Toxin A Intradetrusor Injections for Neurogenic Detrusor Overactivity: A Multicenter Study

CrossMark

J Urol 2019

Maximilien Baron,* Benoit Peyronnet,*,†,‡ Annabelle Aublé, Juliette Hascoet, Evelyne Castel-Lacanal, Gabriel Miget, Sabine Le Doze, Thomas Prudhomme, Andrea Manunta,‡ Jean-Nicolas Cornu‡ and Xavier Gamé§

50%

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Post-interventional care

- Outpatient setting
- Effect after 5-10 days (not immediately)
- Spontaneous voiders: PVR after 2 weeks
    - Catheterization: PVR >150mL & LUTS

Post-interventional care

- Follow-up urodynamics
    - In selected patients (high-pressure, reflux, neurological)
    - Before repeat injections

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BJUI
BJU International
2017

Intradetrusor onabotulinumtoxinA injections for refractory neurogenic detrusor overactivity incontinence: do we need urodynamic investigation for outcome assessment?

Miriam Koschorke*†, Lorenz Leitner*‡, Helen Sadri*, Stephanie C. Knüpfer*, Ulrich Mehnert* and Thomas M. Kessler*

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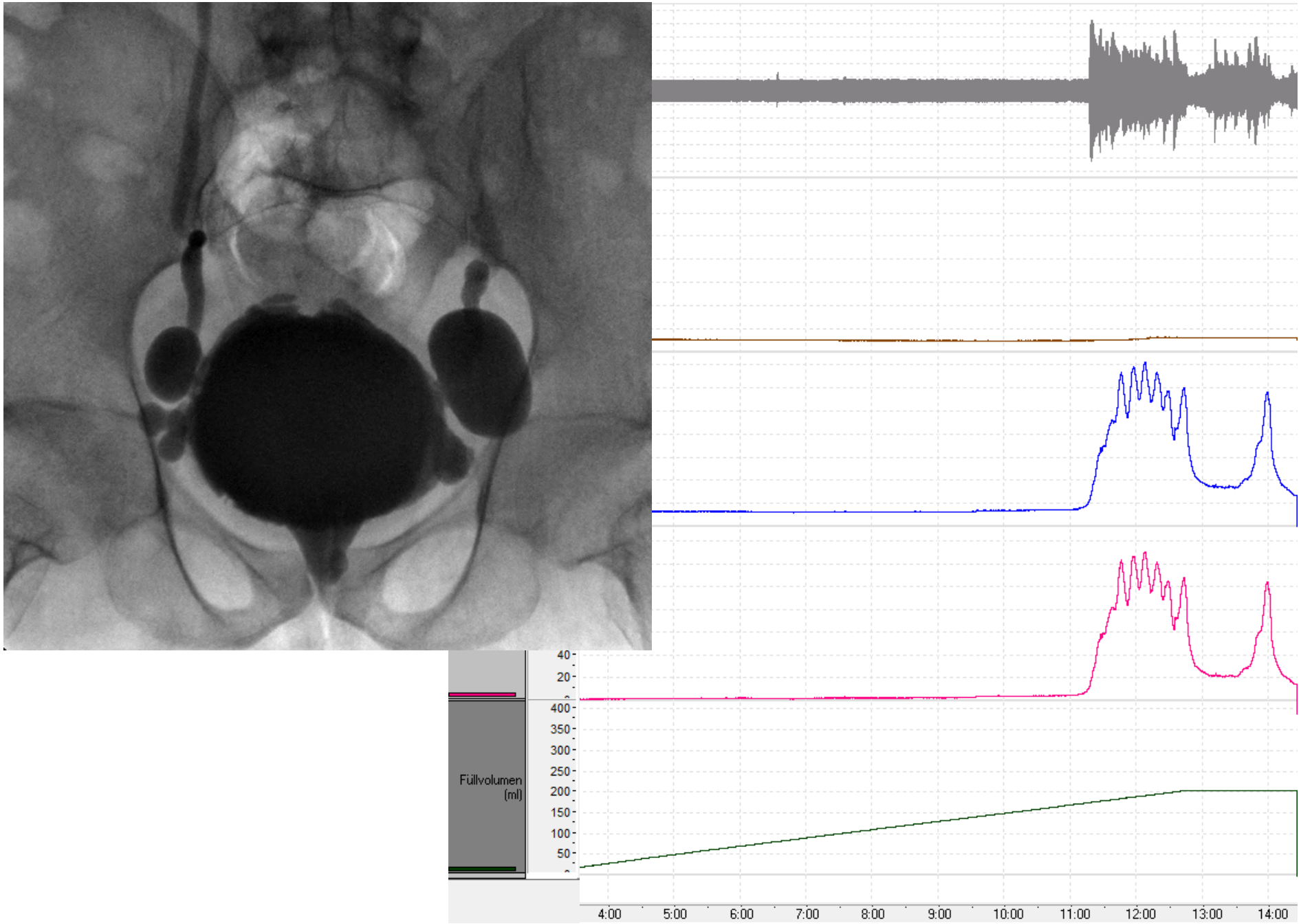

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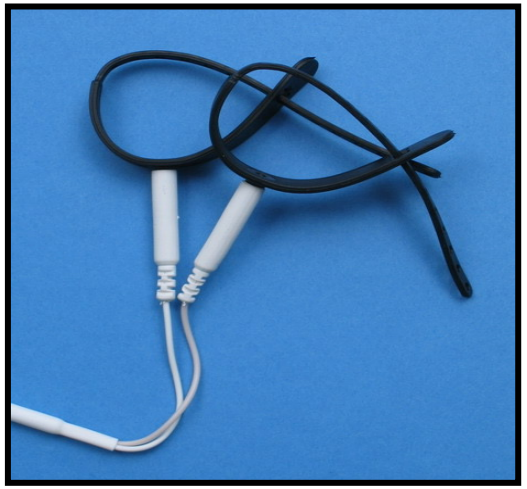
Tips & tricks

- Caution: potentiated effect in case of
    - aminoglycoside antibiotics
    - neuromuscular blockers

Tips & tricks

- Caution: autonomic dysreflexia
    - continous cardiovascular monitoring
    - anesthesiological stand-by

TENS



Tellenbach M et al., World J Urol 2012

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available at www.sciencedirect.com
journal homepage: www.europeanurology.com

European Association of Urology

Guidelines

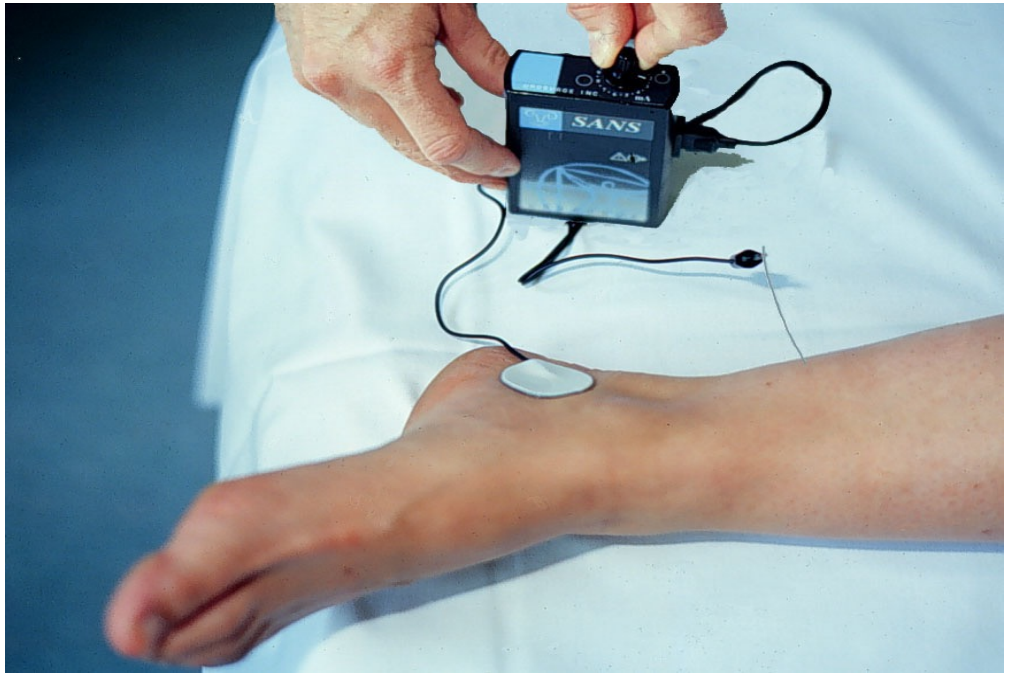
Transcutaneous Electrical Nerve Stimulation for Treating Neurogenic Lower Urinary Tract Dysfunction: A Systematic Review

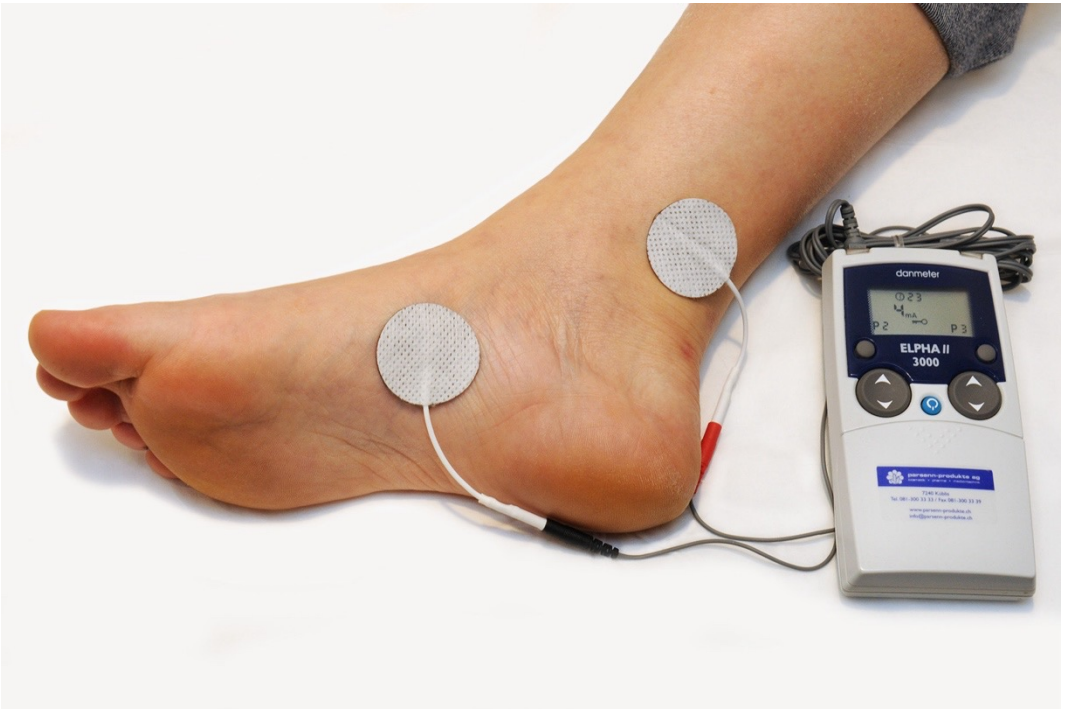
Tobias Gross [a,†], Marc P. Schneider [b,c,†], Lucas M. Bachmann [d], Bertil F.M. Blok [e], Jan Groen [e], Lisette A. 't Hoen [e], David Castro-Diaz [f], Bárbara Padilla Fernández [f], Giulio Del Popolo [g], Stefania Musco [g], Rizwan Hamid [h], Hazel Ecclestone [h], Gilles Karsenty [i], Véronique Phé [j], Jürgen Pannek [k], Thomas M. Kessler [b,]*

Eur Urol 2016; 69: 1102-11

Universität Zürich[UZH]

Tibial nerve stimulation





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available at www.sciencedirect.com
journal homepage: www.europeanurology.com

European Association of Urology

Review – Neuro-urology

Tibial Nerve Stimulation for Treating Neurogenic Lower Urinary Tract Dysfunction: A Systematic Review

Marc P. Schneider[a,b,†], Tobias Gross[c,†], Lucas M. Bachmann[d], Bertil F.M. Blok[e], David Castro-Diaz[f], Giulio Del Popolo[g], Jan Groen[e], Rizwan Hamid[h], Gilles Karsenty[i], Jürgen Pannek[j], Lisette 't Hoen[e], Thomas M. Kessler[a,]*

Eur Urol 2015; 68: 859-67

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BJU Int 2023; **132:** 343–352 doi:10.1111/bju.16081

BJUI
BJU International

Original Article

bTUNED: transcutaneous tibial nerve stimulation for neurogenic lower urinary tract dysfunction

Stephanie A. Stalder[1], Oliver Gross[1], Collene E. Anderson[1,4], Lucas M. Bachmann[2], Sarah Baumann[1], Veronika Birkhäuser[1], Mirjam Bywater[5], Giulio del Popolo[9], Daniel S. Engeler[6], Enrico Finazzi Agrò[10], Susanne Friedl[3], Nuno Grilo[7], Stephan Kiss[5], Miriam Koschorke[1], Lorenz Leitner[1], Martina D. Liechti[1], Ulrich Mehnert[1], Stefania Musco[9], Helen Sadri[1], Lara Stächele[1], Jure Tornic[8], Stéphanie van der Lely[1], Stephen Wyler[5] and Thomas M. Kessler[1]

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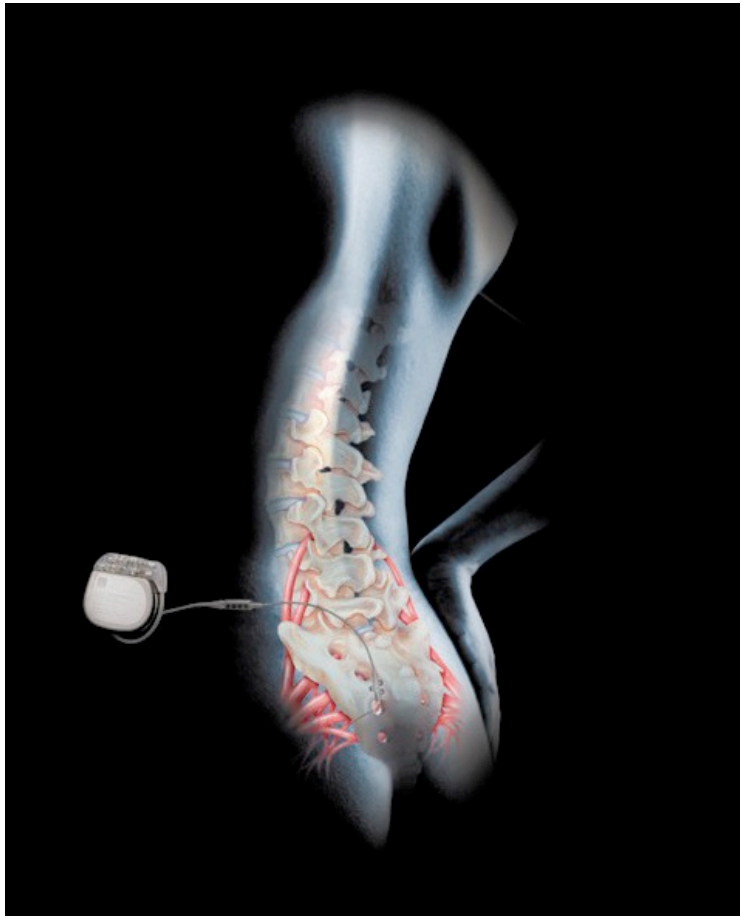
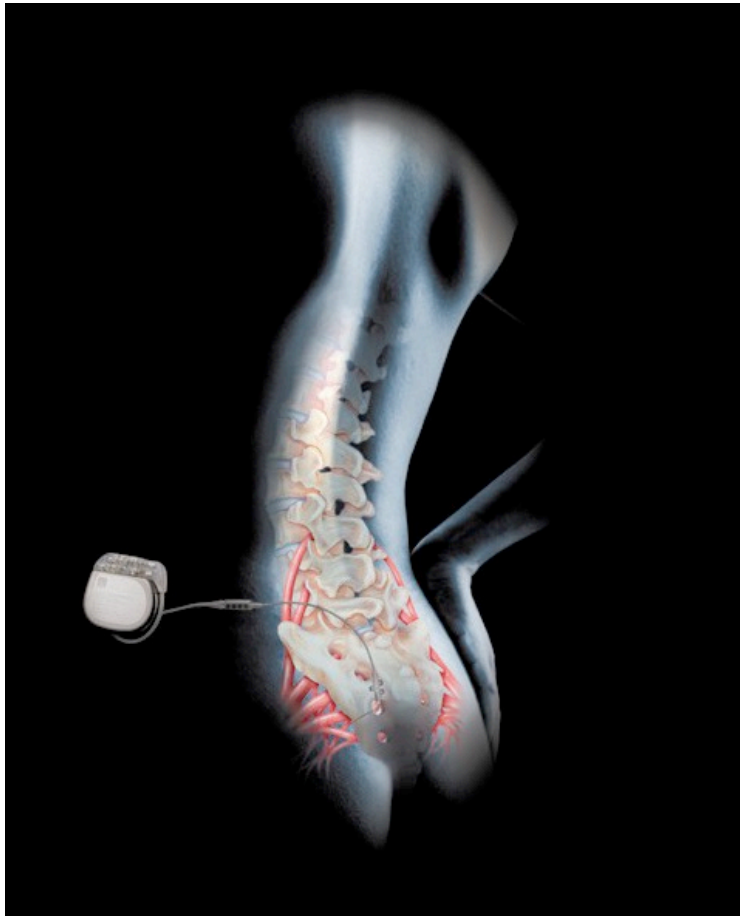
Sacral neuromodulation



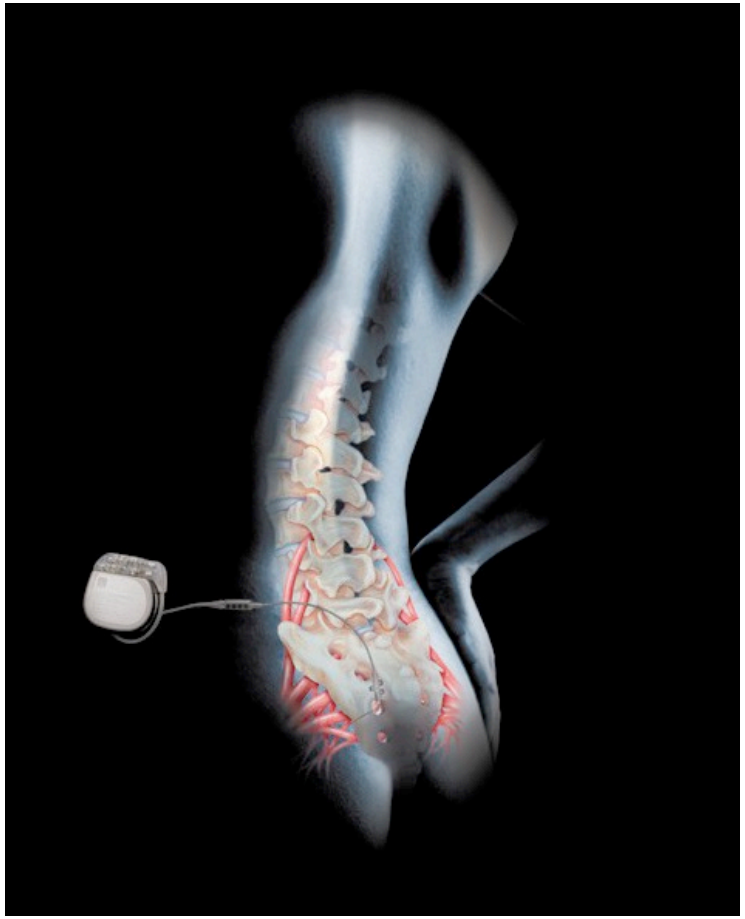
Tanagho EA et al., Urology 1982

Sacral neuromodulation



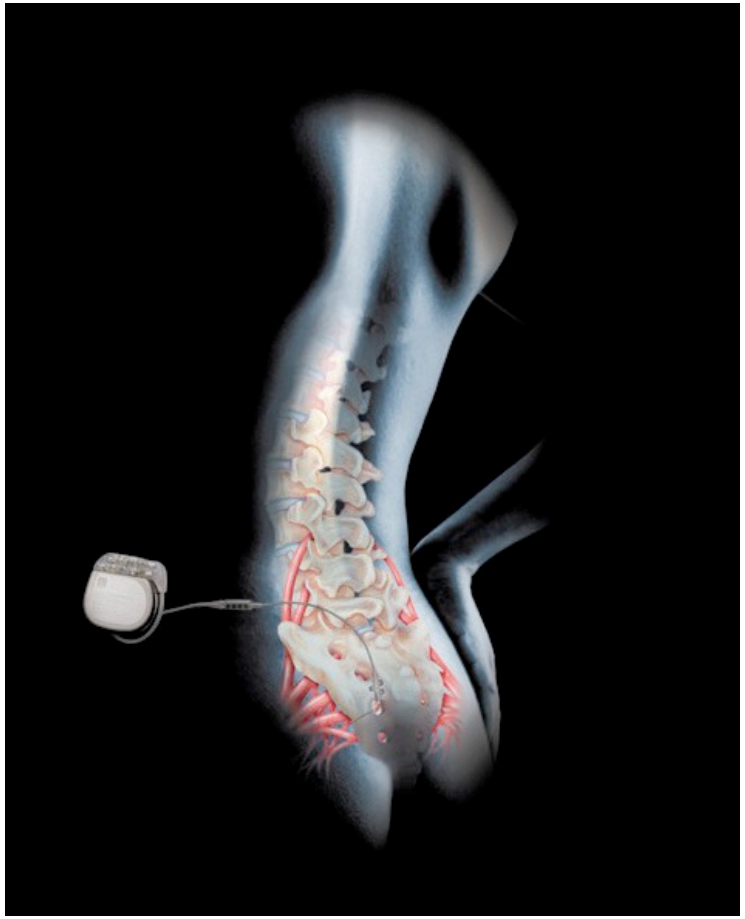
Tanagho EA et al., Urology 1982

Sacral neuromodulation



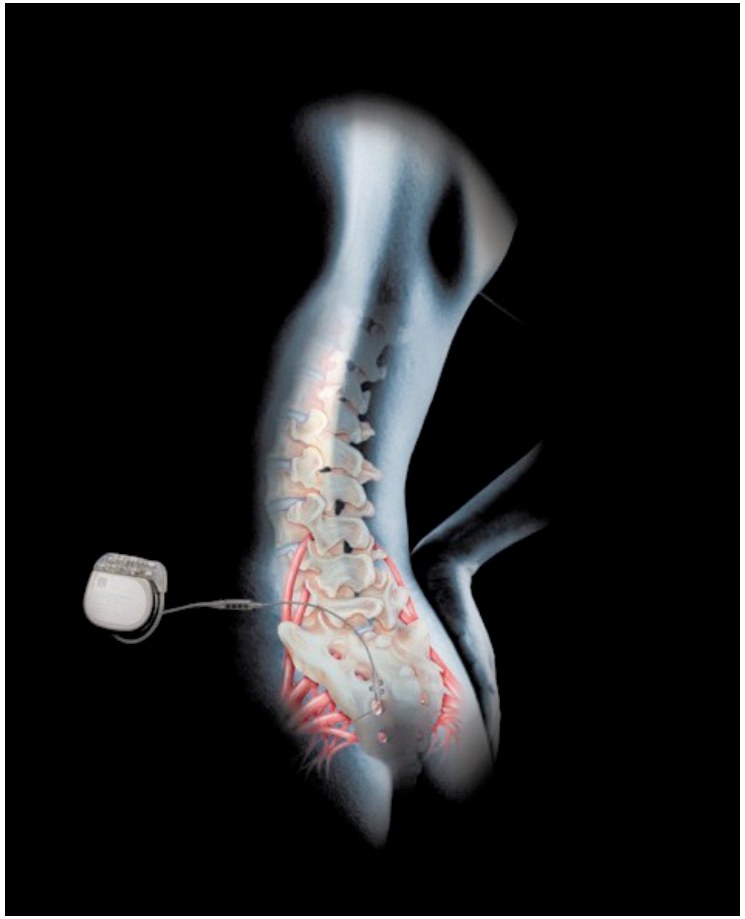
Tanagho EA et al., Urology 1982

Sacral neuromodulation

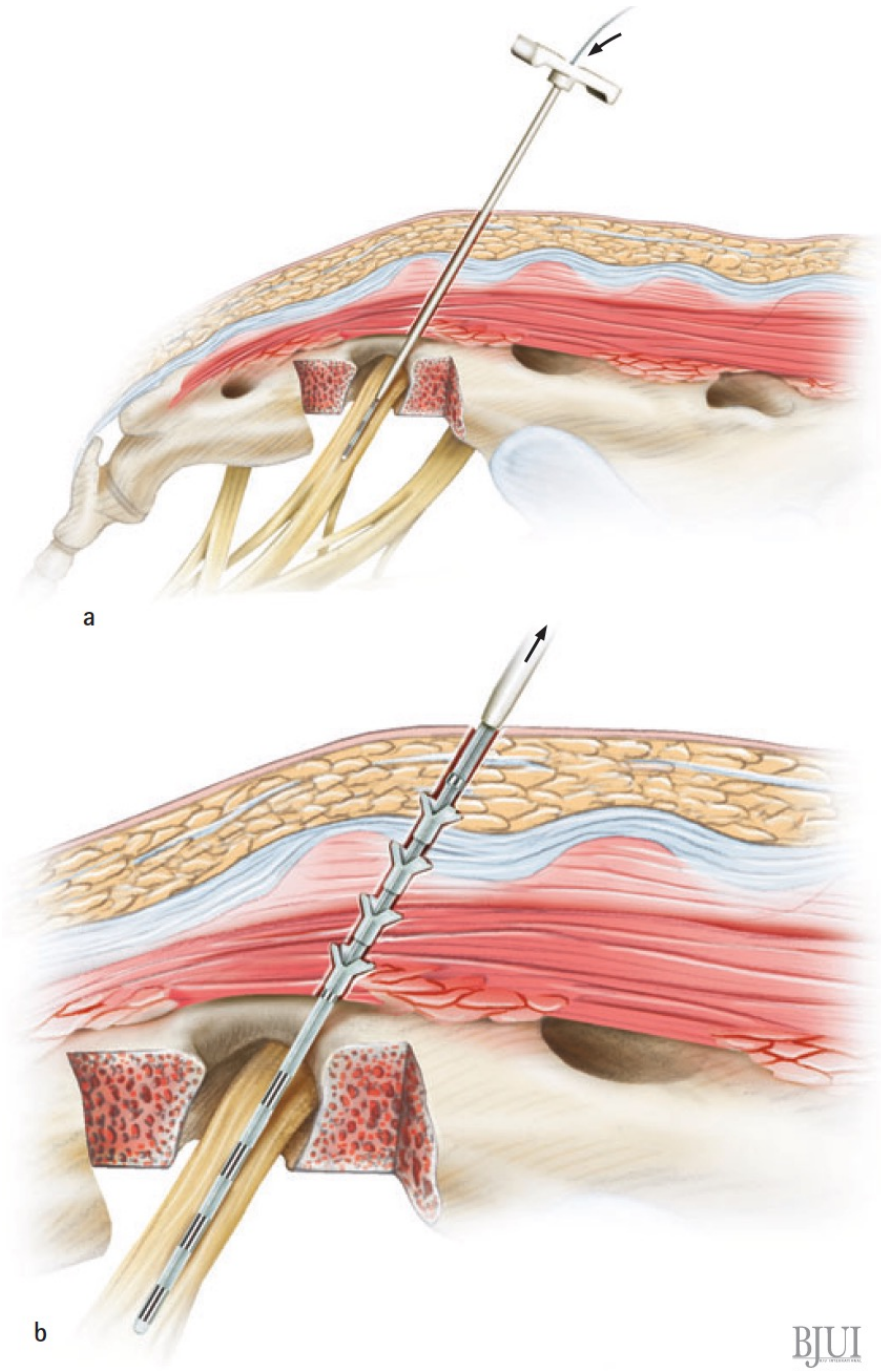


Tanagho EA et al., Urology 1982

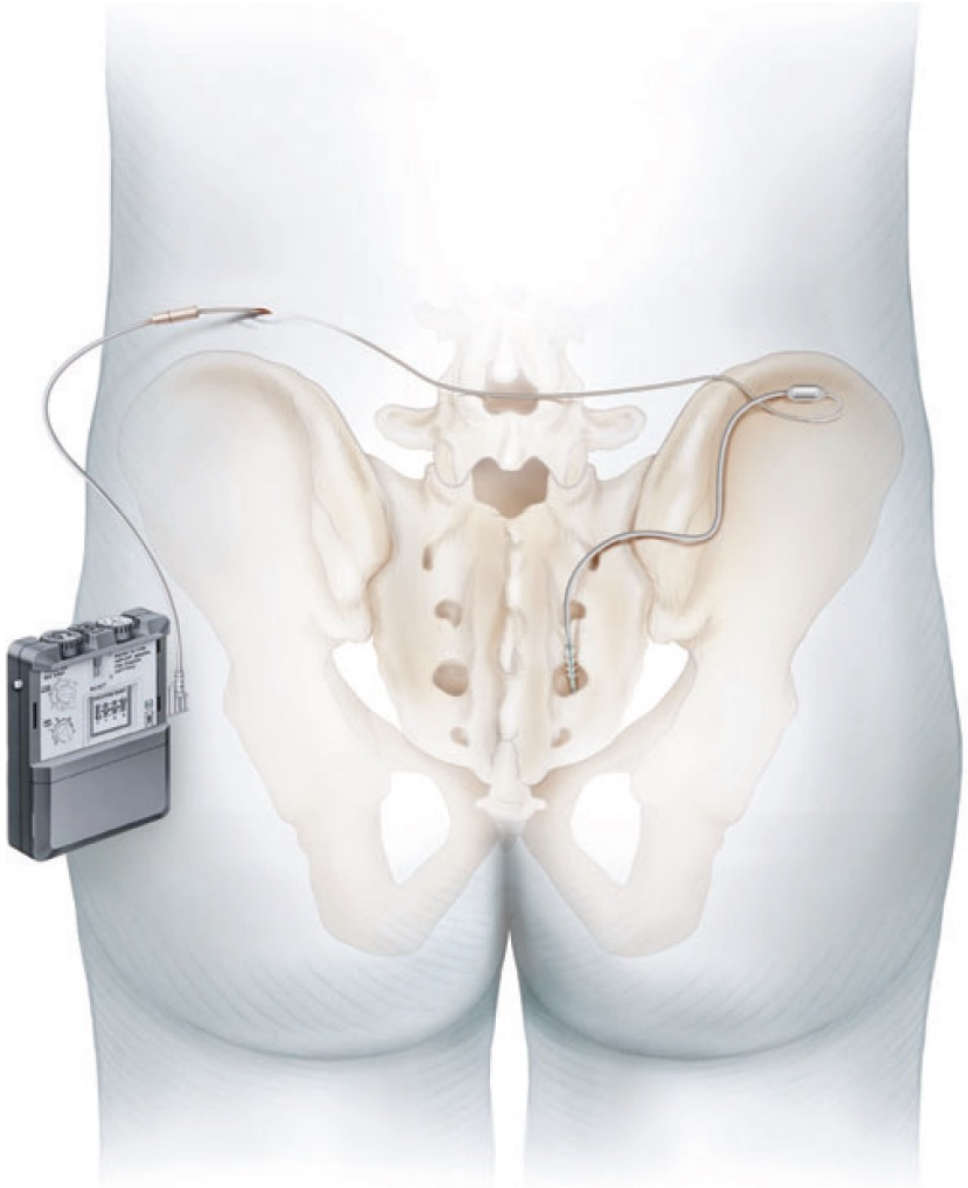
Sacral neuromodulation



Tanagho EA et al., Urology 1982



Wöllner J et al., BJUI 2012



Wöllner J et al., BJUI 2012

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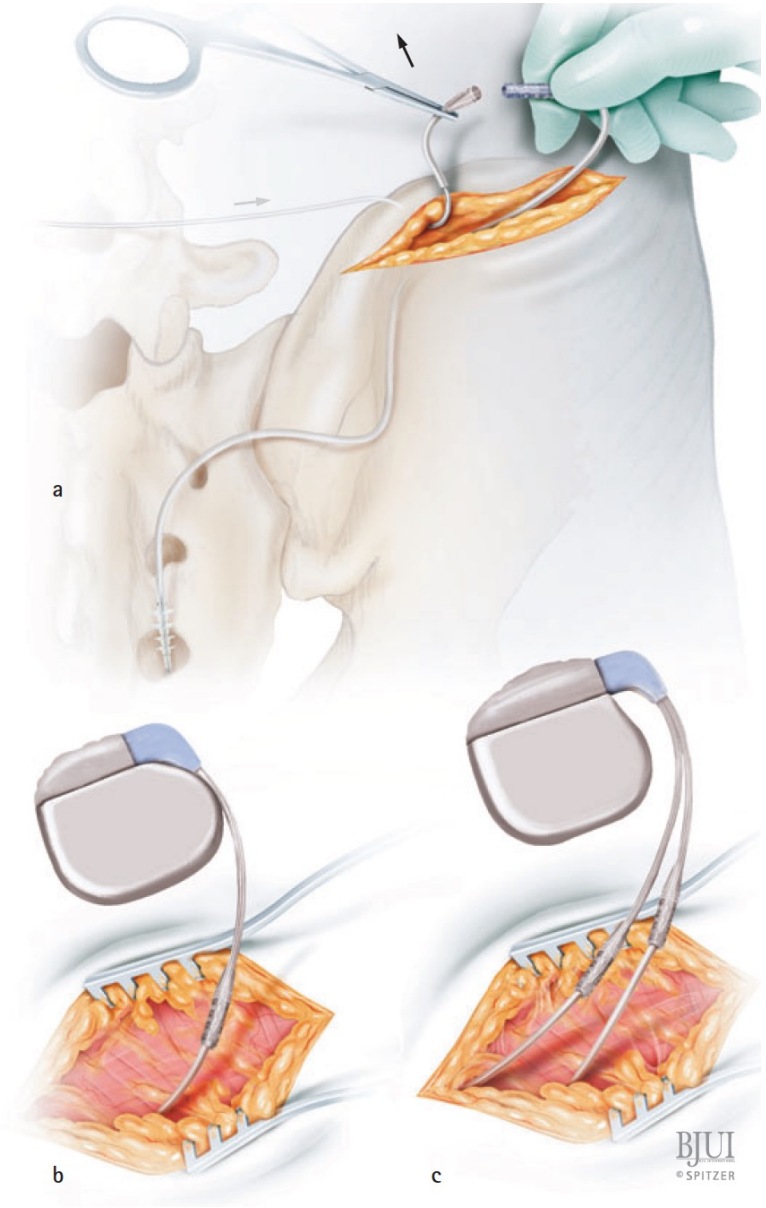

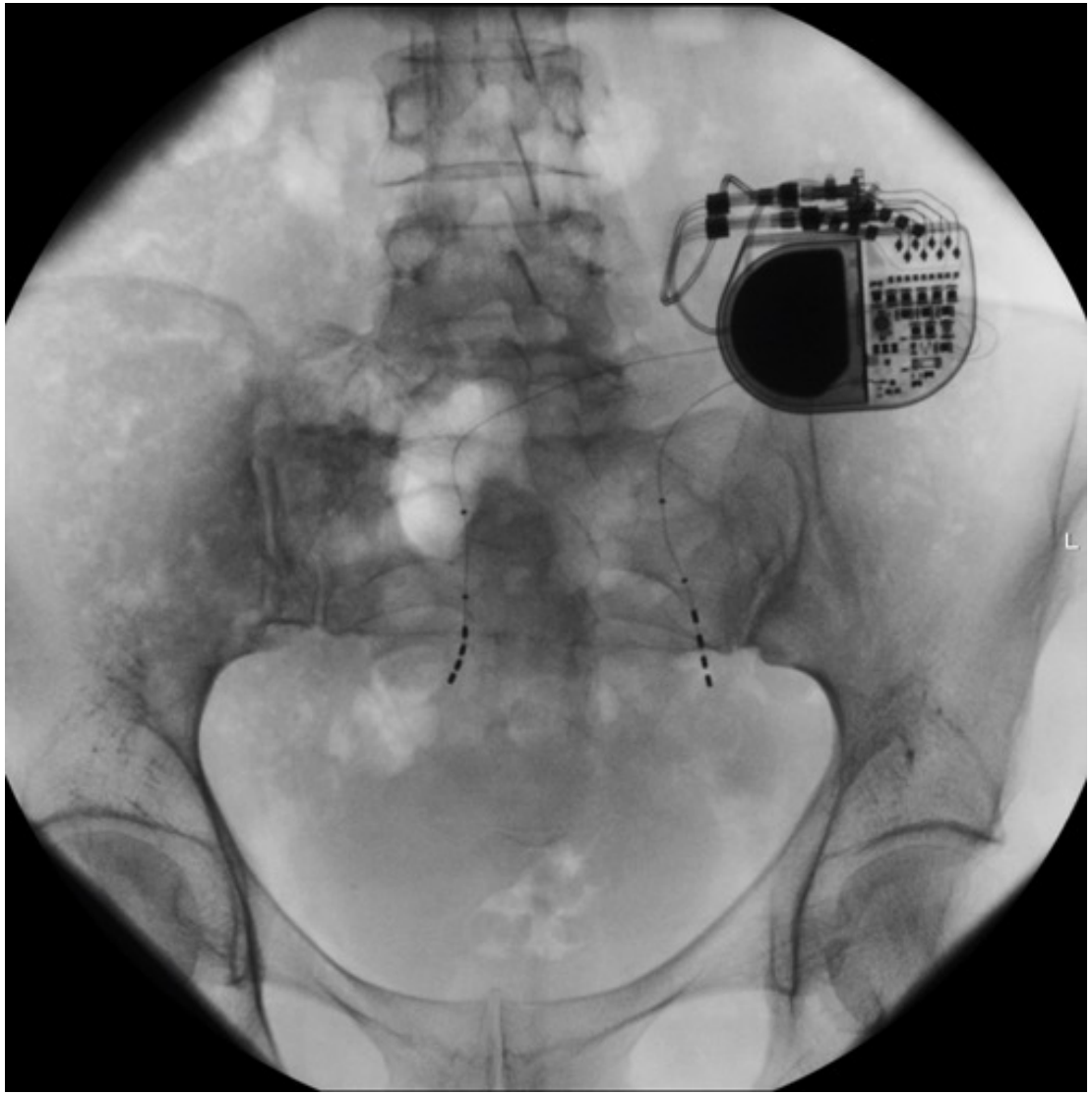

Wöllner J et al., BJUI 2012

3058
Medtronic
INTERSTIM® II
SN NJY112648H
Medtronic
InterStim Micro

Axonics
REF 4101
SN AX1T000014
Axonics
SN AX1H150361
2
EURO

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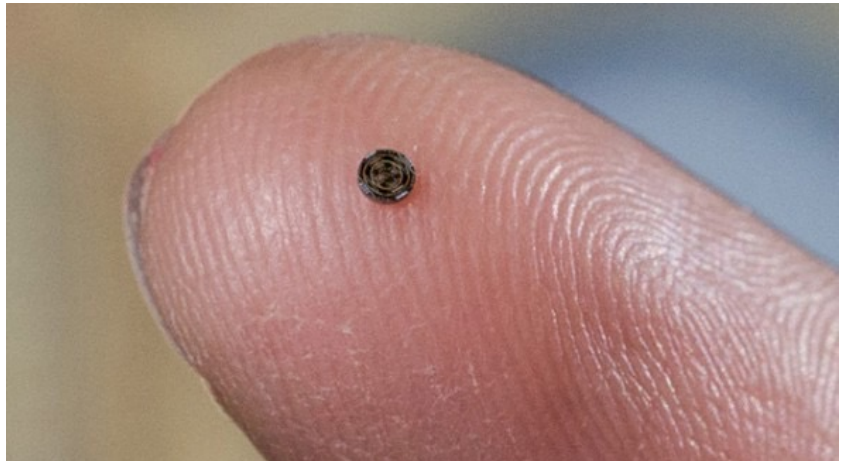

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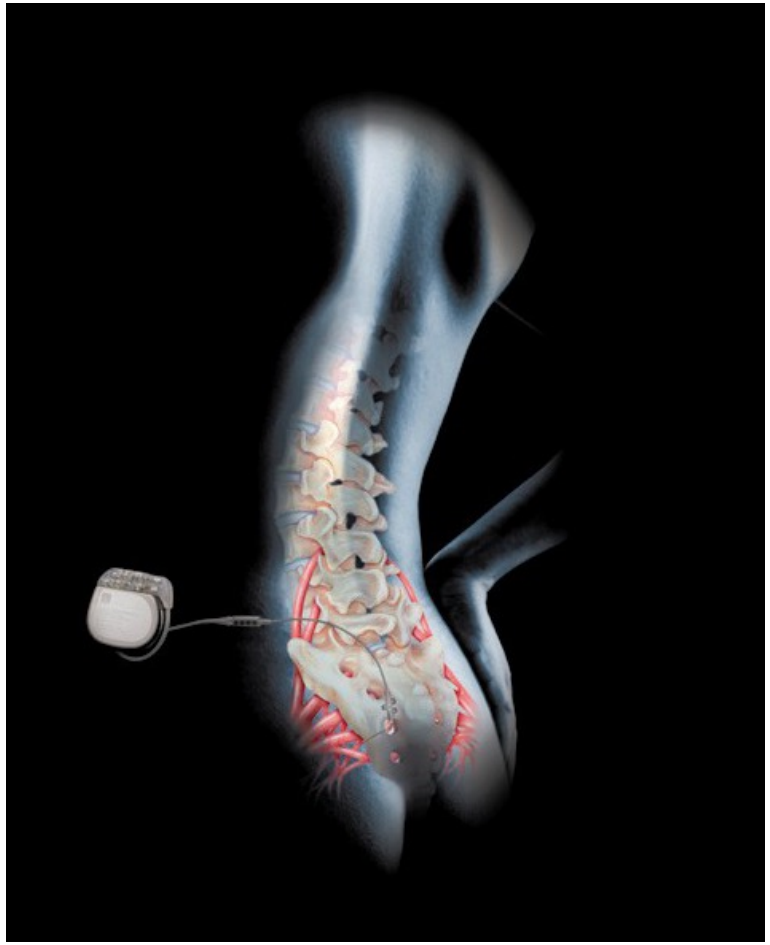

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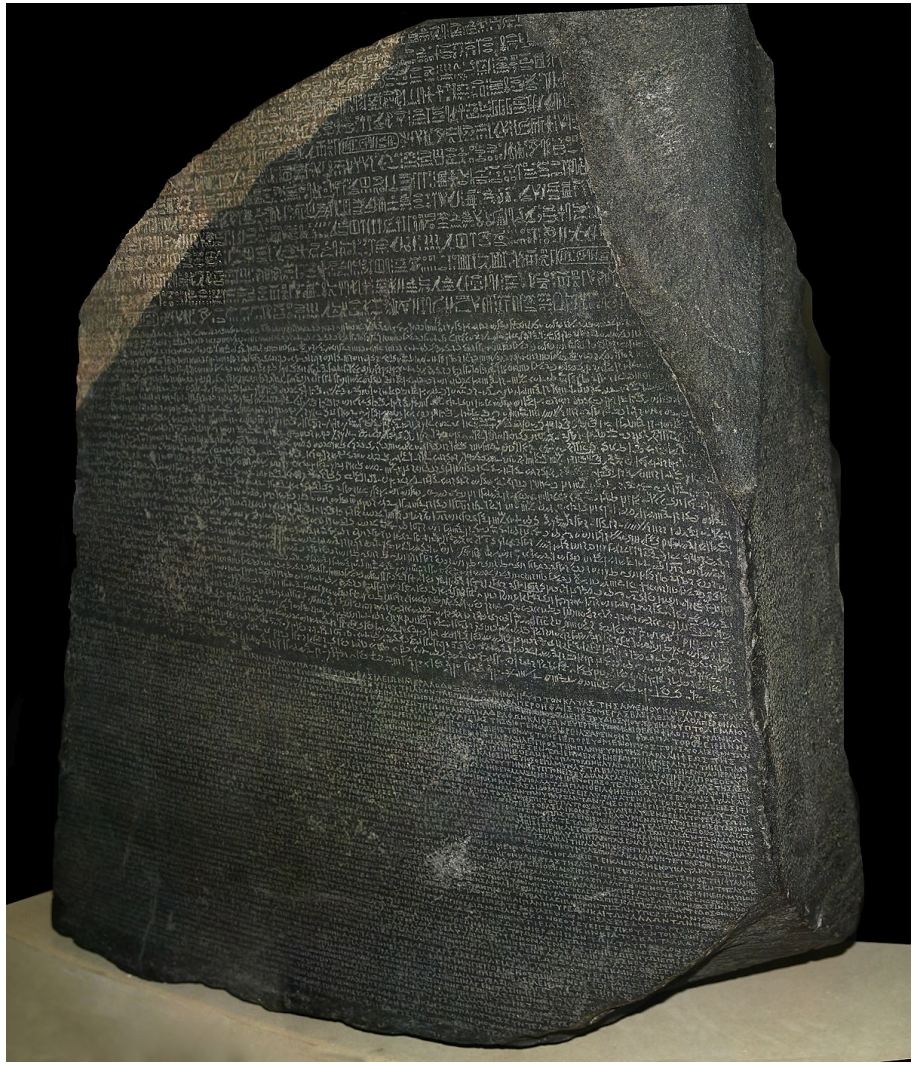

Refractory **O**veractive bladder: **S**acral n**E**uromodulation versus bo**T**ulinum **T**oxin **A**ssessment (**ROSETTA**) (NCT01502956)

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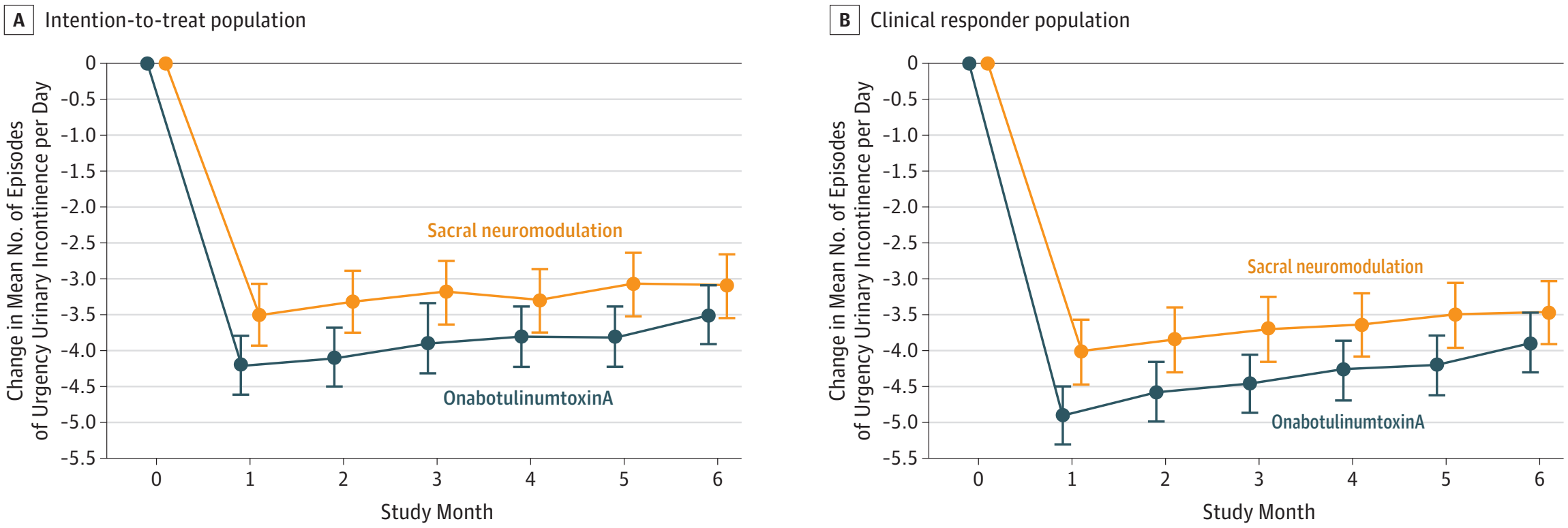
Figure 2. Change From Baseline in Urgency Urinary Incontinence Episodes per Day by Treatment Group by Month



Amundsen CL et al., JAMA 2016

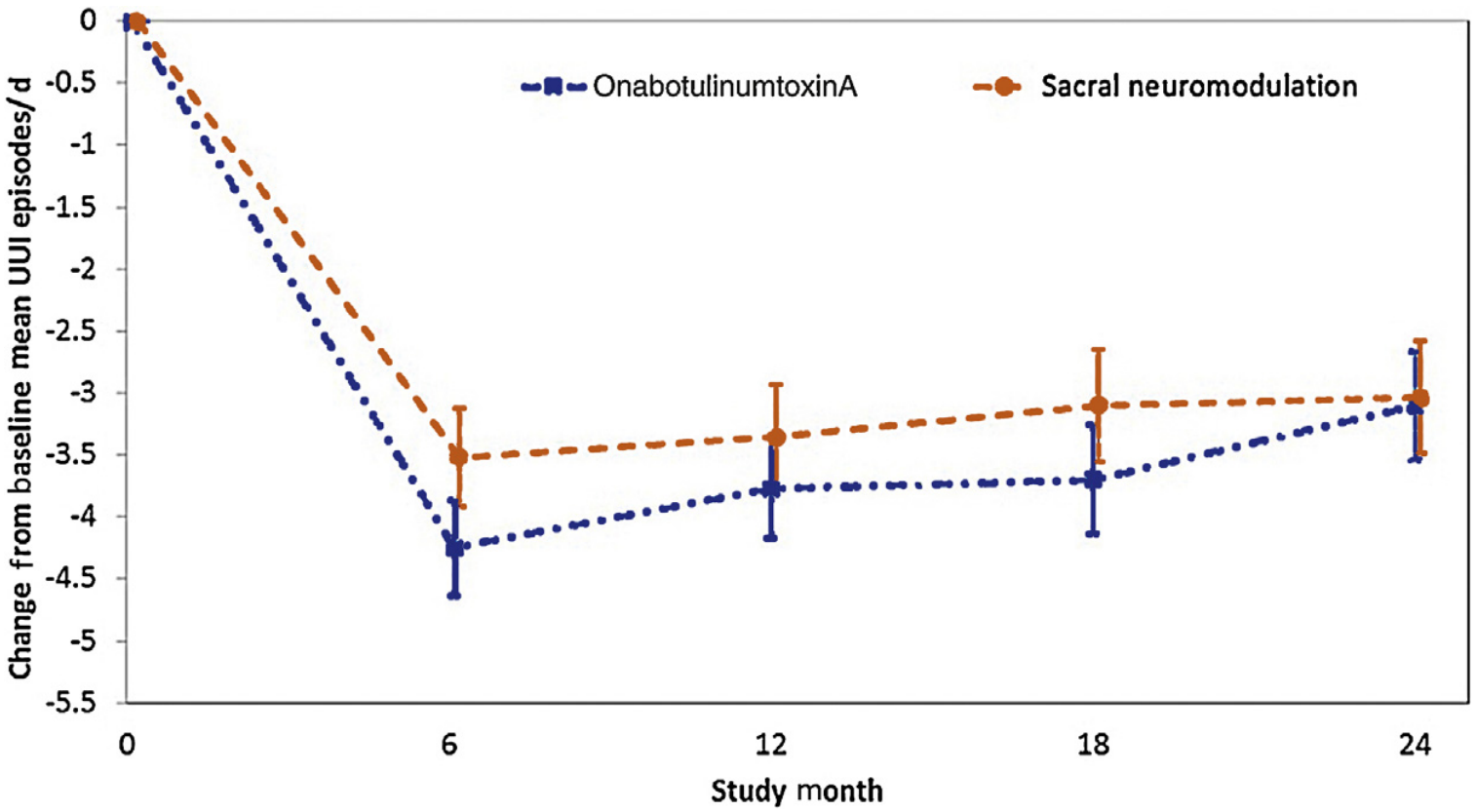


Fig. 2 – Change from baseline in urgency urinary incontinence episode per day in clinical responder population.
UUI = urgency urinary incontinence.
Values in the graph include adjusted mean estimates and associated 95% confidence intervals (indicated by error bars).

Amundsen CL et al., Eur Urol 2018

EUROPEAN UROLOGY 58 (2010) 865–874

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European Association of Urology

Review – Neuro-urology

Sacral Neuromodulation for Neurogenic Lower Urinary Tract Dysfunction: Systematic Review and Meta-analysis

Thomas M. Kessler[a,*], *David La Framboise*[b], *Sven Trelle*[c], *Clare J. Fowler*[d], *Gustav Kiss*[e], *Jürgen Pannek*[f], *Brigitte Schurch*[g], *Karl-Dietrich Sievert*[h], *Daniel S. Engeler*[i]

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Adv Ther (2021) 38:1987–2006
https://doi.org/10.1007/s12325-021-01650-9

ORIGINAL RESEARCH

Systematic Literature Review and Meta-Analysis of Sacral Neuromodulation (SNM) in Patients with Neurogenic Lower Urinary Tract Dysfunction (nLUTD): Over 20 Years' Experience and Future Directions

Arndt van Ophoven · Stefan Engelberg · Helen Lilley · Karl-Dietrich Sievert

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NEJM Evidence

Published July 7, 2022

DOI: 10.1056/EVIDoa2200071

ORIGINAL ARTICLE

Sacral Neuromodulation for Neurogenic Lower Urinary Tract Dysfunction

Martina D. Liechti, Ph.D.,[1,*] Stéphanie van der Lely, Ph.D.,[1,*] Stephanie C. Knüpfer, M.D., Ph.D.,[1,2] Dominik Abt, M.D.,[3,4] Bernhard Kiss, M.D.,[5] Lorenz Leitner, M.D.,[1] Livio Mordasini, M.D.,[3,6] Jure Tornic, M.D.,[1,7] Jens Wöllner, M.D.,[8] Ulrich Mehnert, M.D., Ph.D.,[1] Lucas M. Bachmann, M.D., Ph.D.,[9] Fiona C. Burkhard, M.D.,[5] Daniel S. Engeler, M.D.,[3] Jürgen Pannek, M.D.,[5,8] and Thomas M. Kessler, M.D.[1]

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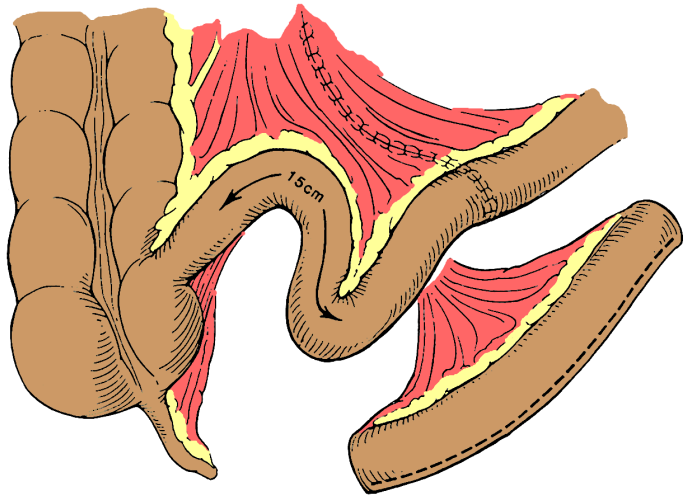
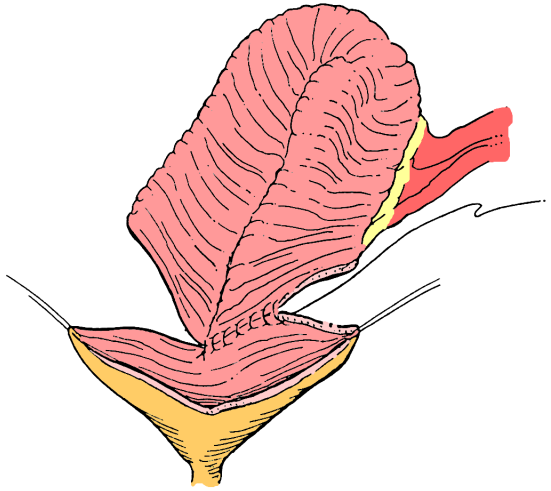
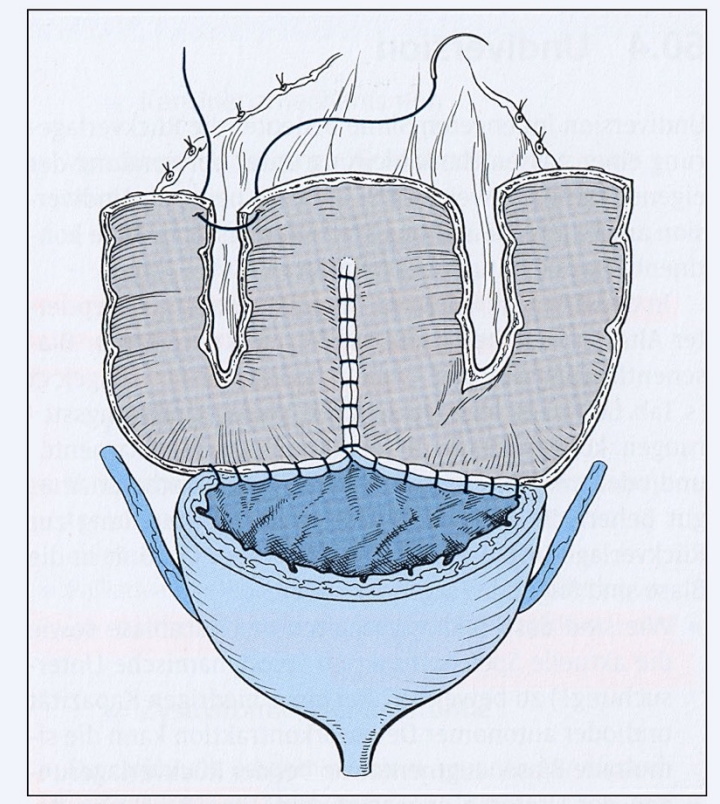
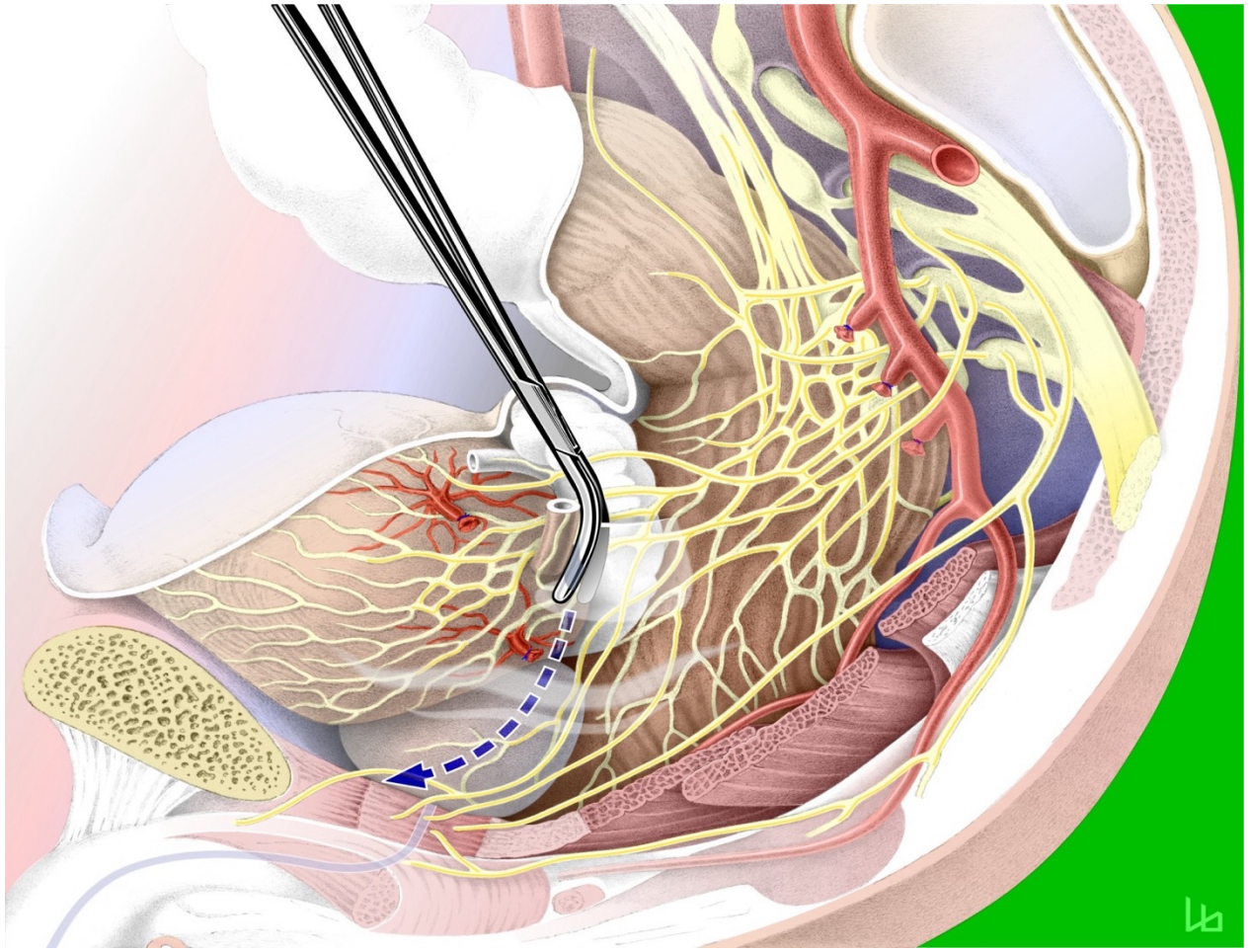
Bladder augmentation



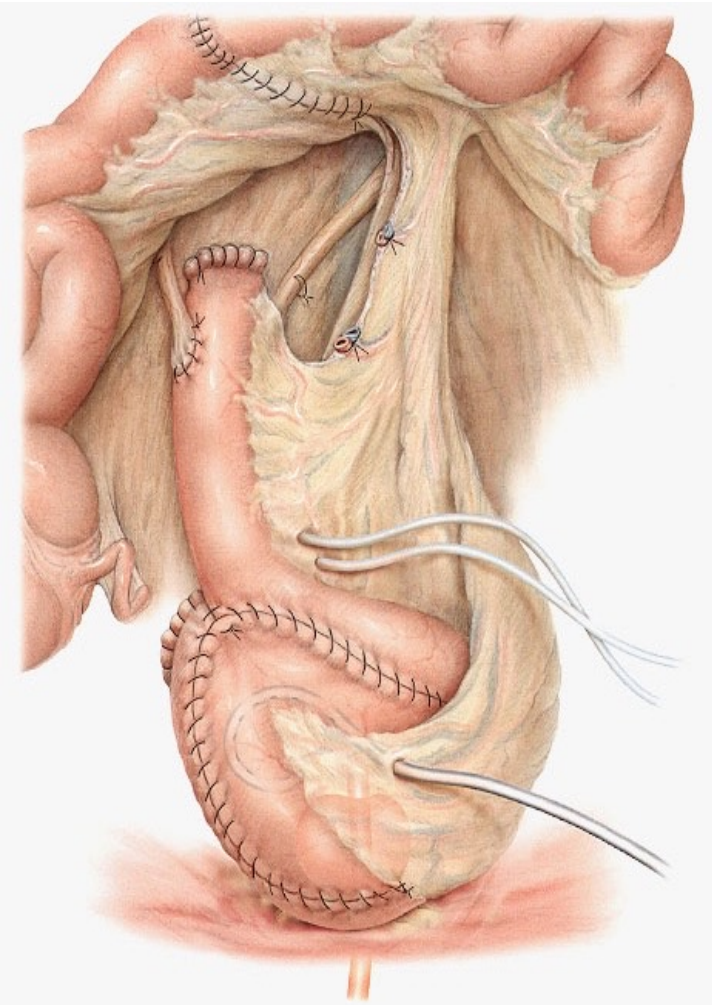




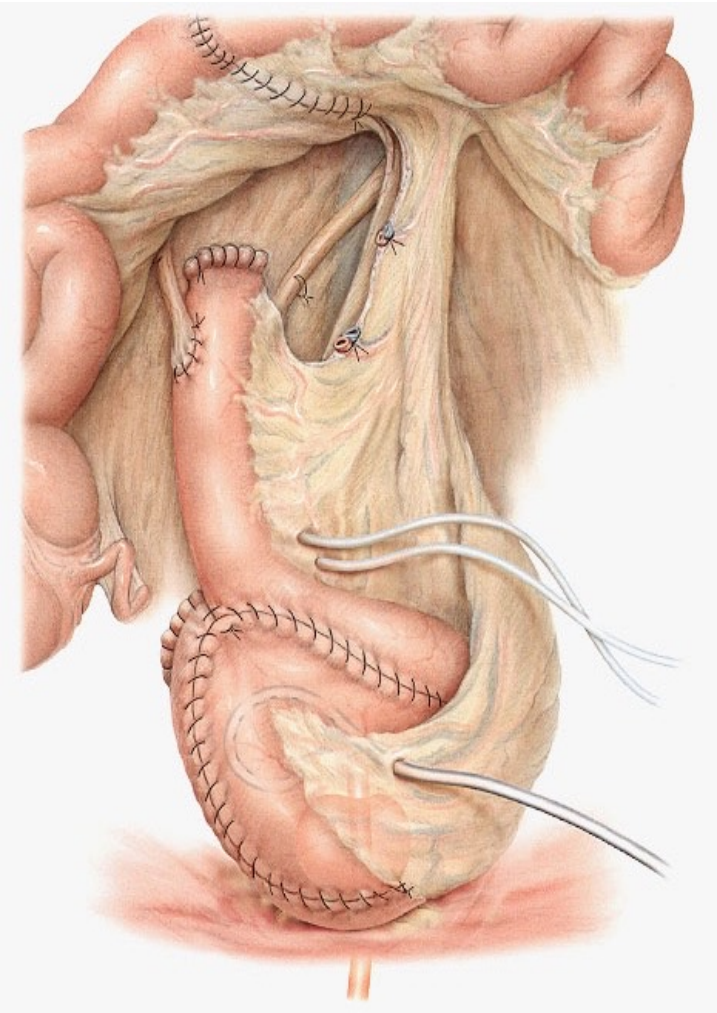
Cystectomy

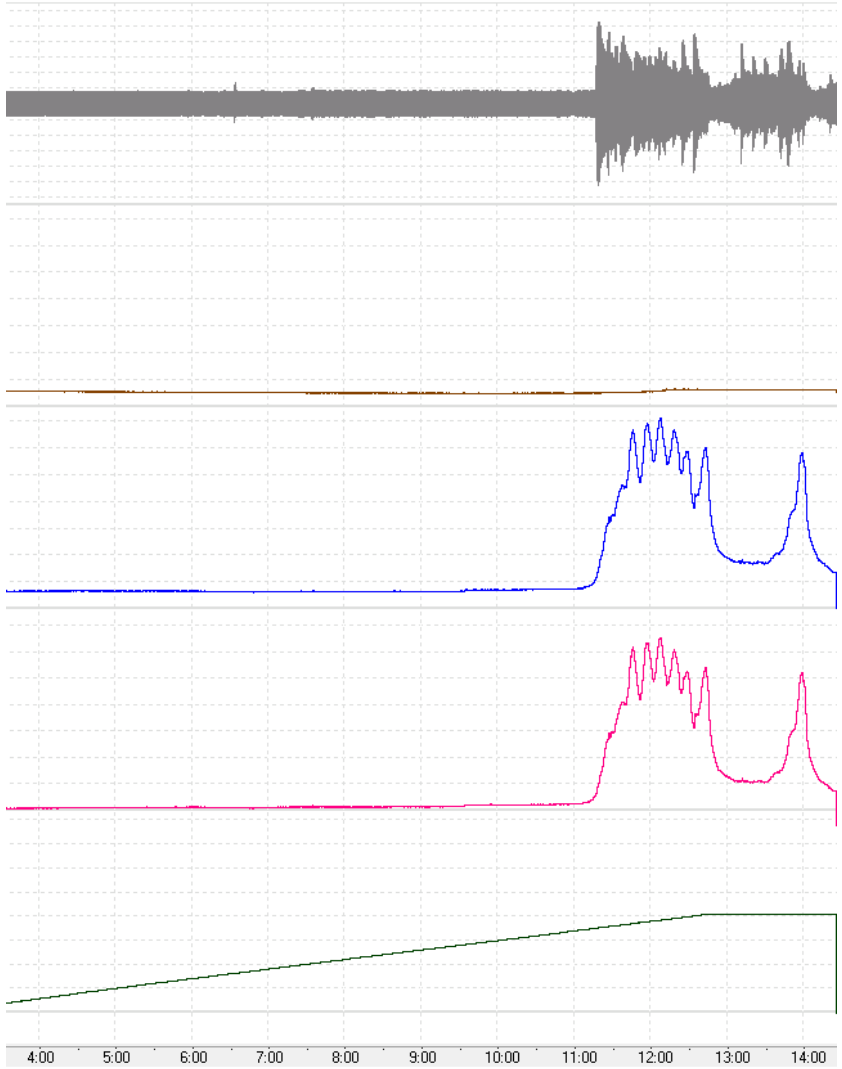


Kessler TM et al., Urol Clin N Am 2005



Studer UE et al., BJUI 2004





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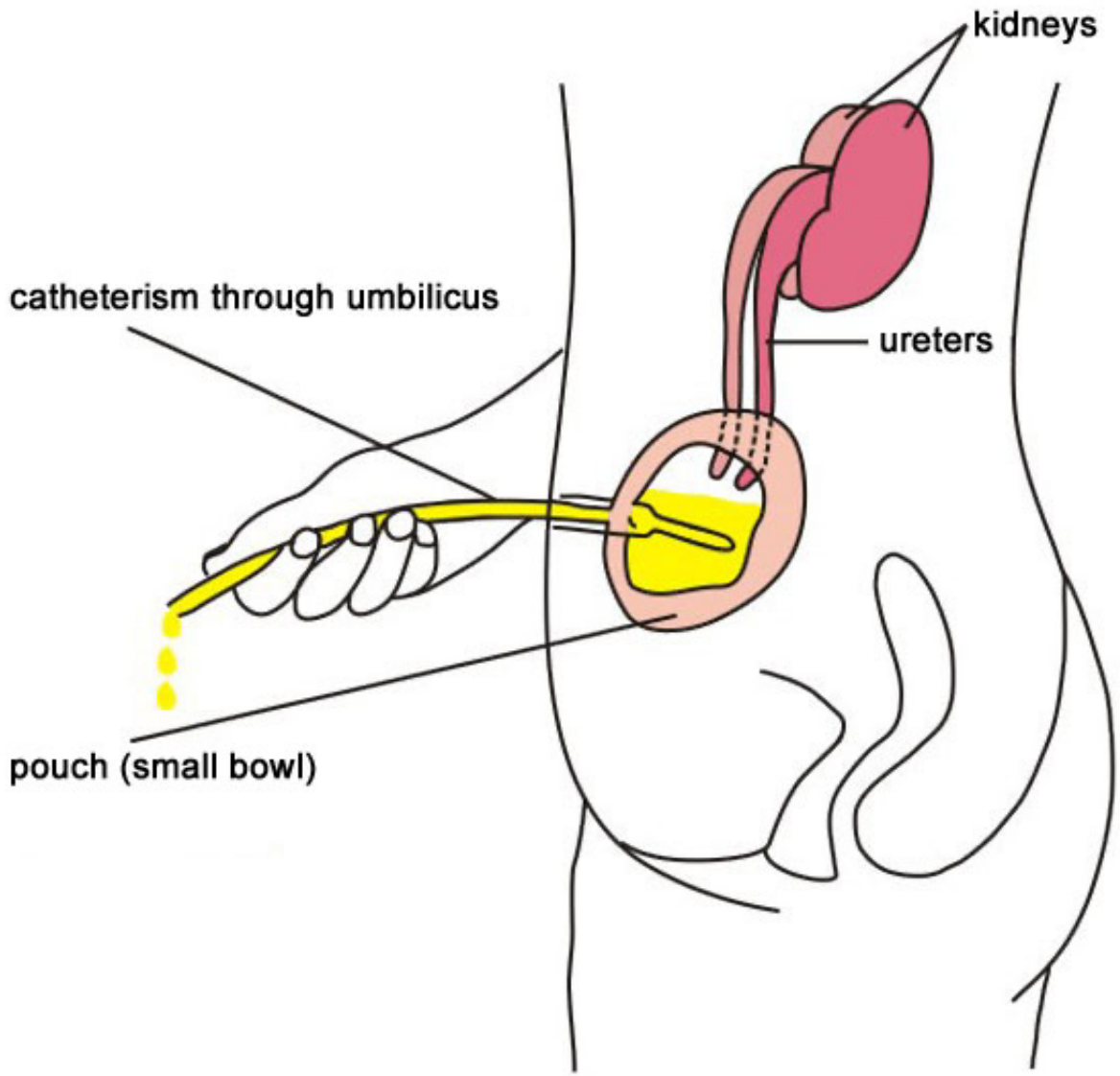
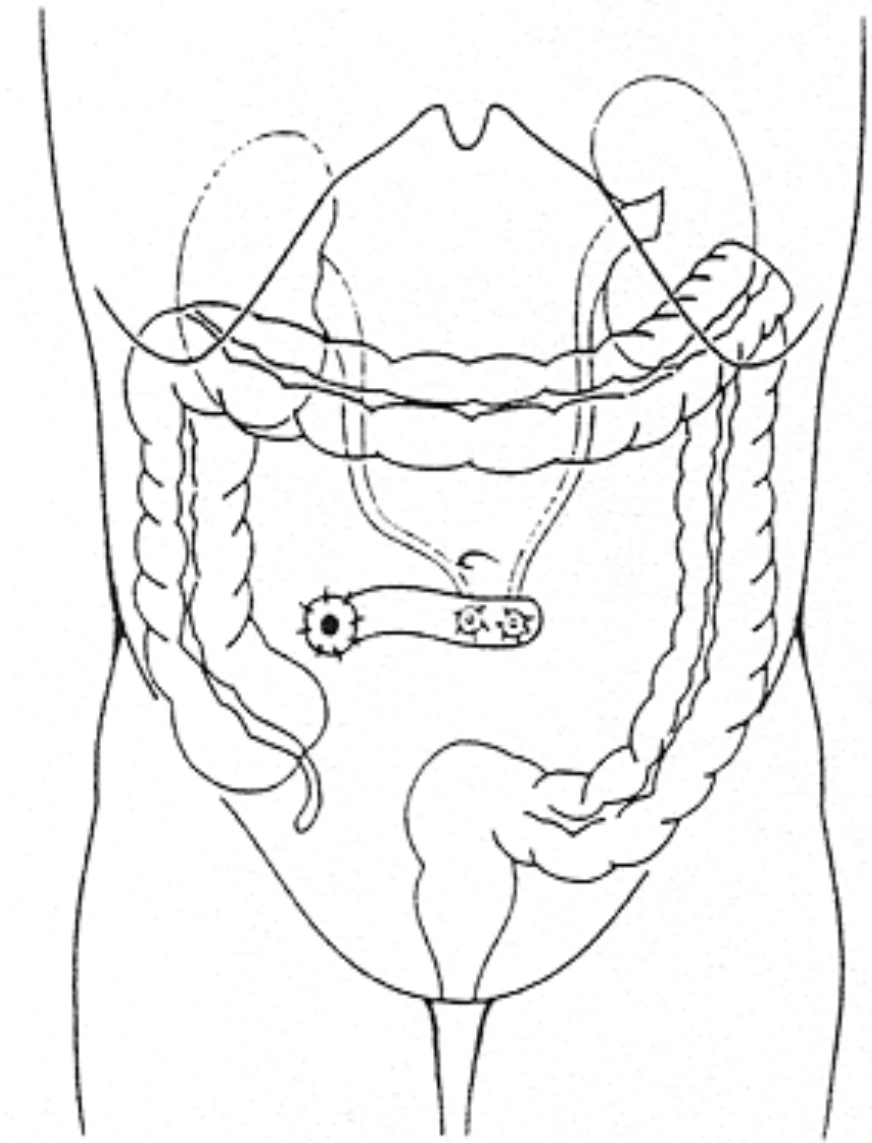


Courtesy of Fiona C. Burkhard



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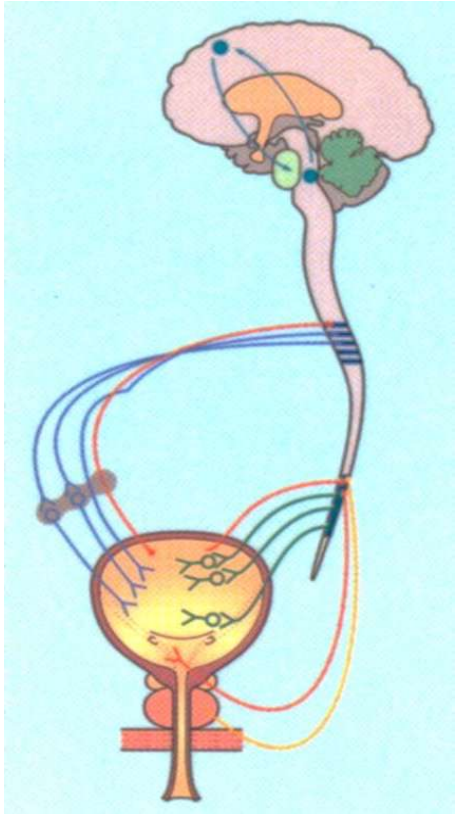
Deep brain stimulation



Jörg E et al., Parkinsonism Relat Disord 2020

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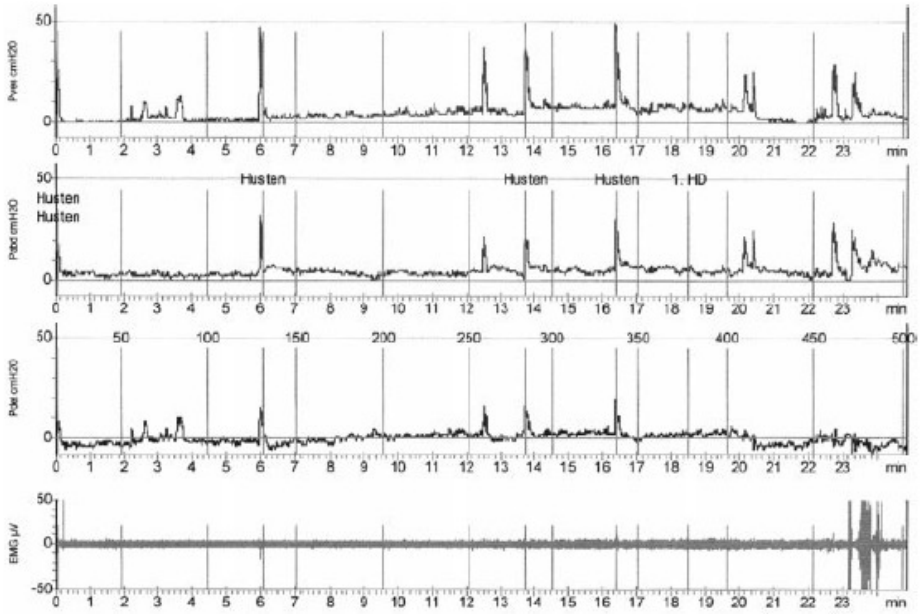
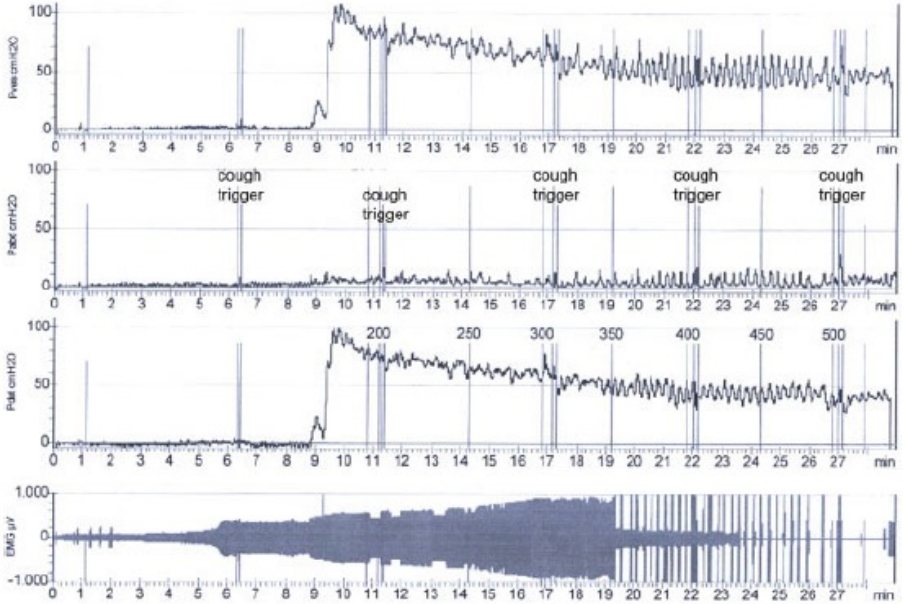
Early Sacral Neuromodulation Prevents Urinary Incontinence After Complete Spinal Cord Injury

Karl-Dietrich Sievert, MD,[1] Bastian Amend, MD,[1] G. Gakis, MD,[1]
P. Toomey,[1] A. Badke, MD,[2] H.P. Kaps, MD,[2] and Arnulf Stenzl, MD[1]

ANN NEUROL 2010;67:74–84



Sacral neuromodulation



Without sacral neuromodulation

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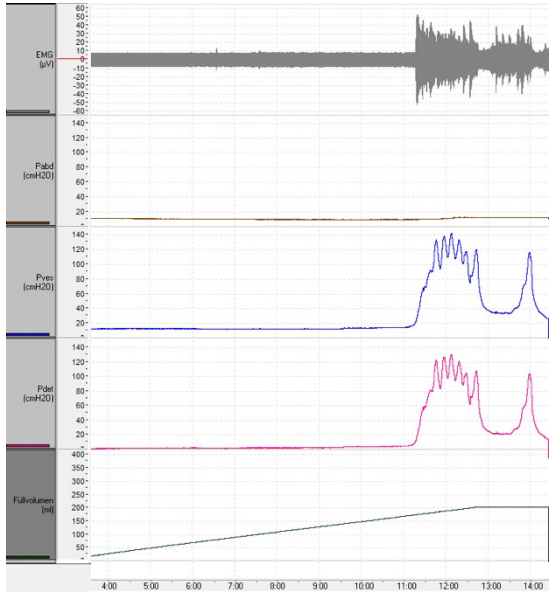
Open access Protocol

BMJ Open
2020

TASCI—transcutaneous tibial nerve stimulation in patients with acute spinal cord injury to prevent neurogenic detrusor overactivity: protocol for a nationwide, randomised, sham-controlled, double-blind clinical trial



Veronika Birkhäuser ,[1] Martina D Liechti ,[1] Collene E Anderson ,[2,3] Lucas M Bachmann,[4] Sarah Baumann,[1] Michael Baumberger,[5] Lori A Birder,[6] Sander M Botter,[7] Silvan Büeler,[1] Célia D Cruz,[8,9] Gergely David ,[1,10] Patrick Freund,[10] Susanne Friedl,[10] Oliver Gross,[1] Margret Hund-Georgiadis,[11] Knut Husmann,[7] Xavier Jordan,[12] Miriam Koschorke,[1] Lorenz Leitner,[1] Eugenia Luca,[12] Ulrich Mehnert ,[1] Sandra Möhr,[11] Freschta Mohammadzada,[10] Katia Monastyrskaya,[13] Nikolai Pfender,[10] Daniel Pohl ,[14] Helen Sadri,[1] Andrea M Sartori ,[1,15] Martin Schubert,[10] Kai Sprengel,[16] Stephanie A Stalder ,[1] Jivko Stoyanov,[2,3] Cornelia Stress,[1] Aurora Tatu,[14] Cécile Tawadros,[12] Stéphanie van der Lely ,[1] Jens Wöllner,[17] Veronika Zubler,[18] Armin Curt,[10] Jürgen Pannek ,[17,19] Martin W G Brinkhof ,[2,3] Thomas M Kessler [1]

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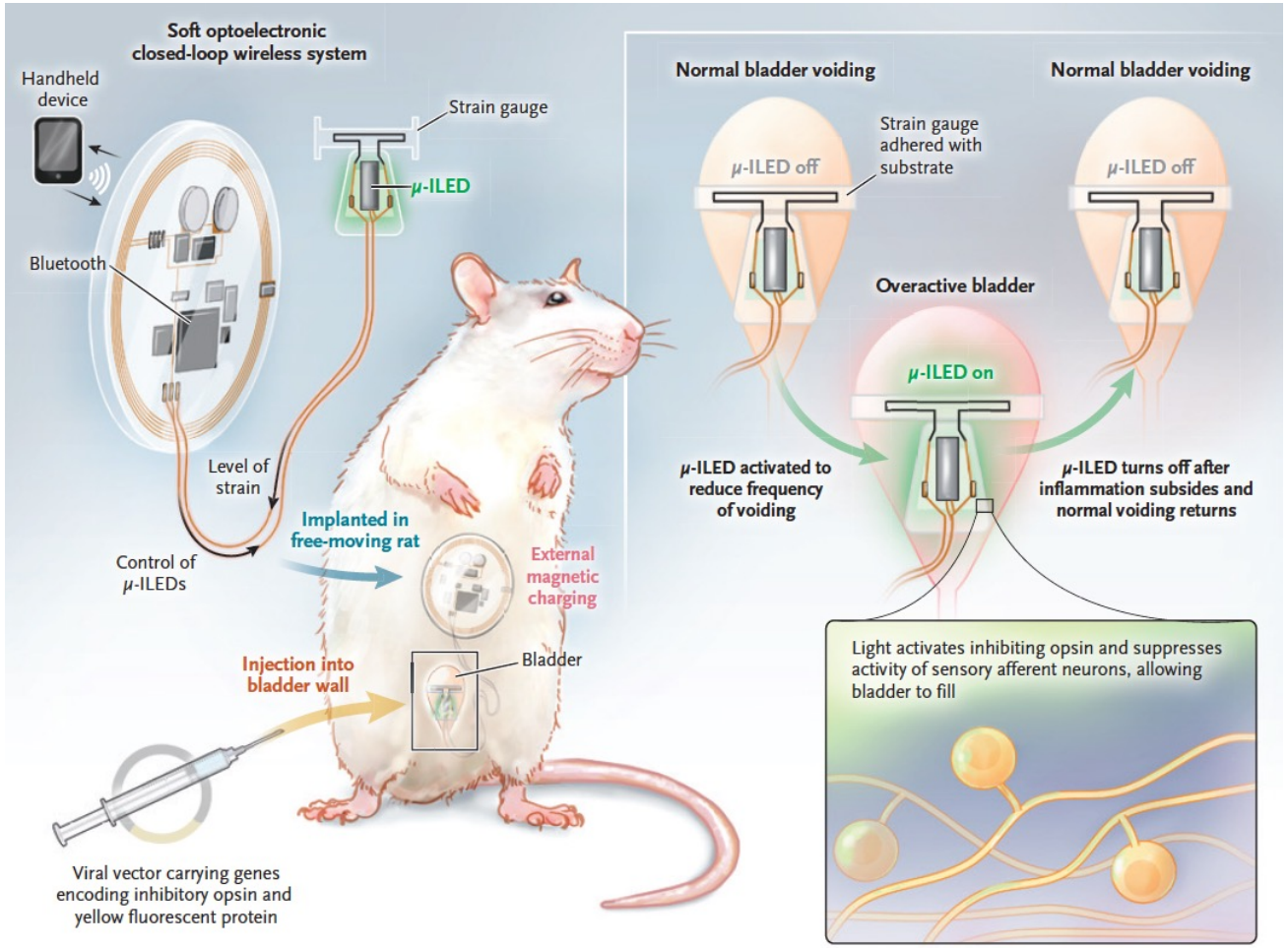
Optogenetic neuromodulation



Kessler TM et al., NEJM 2019

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Faust
Eine Tragödie

„And here, poor fool, I stand once more,
No wiser than I was before.“

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