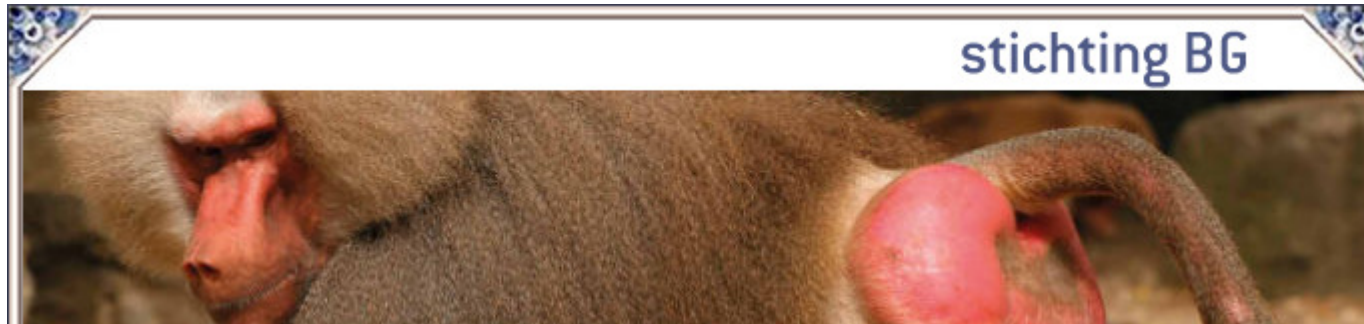
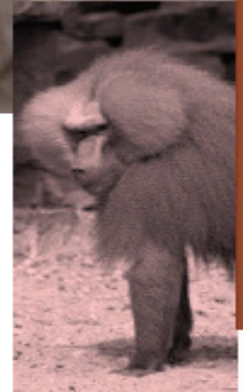


# Biofeedback training en obstipatie?



**Marc Benninga**

**Emma Children's Hospital / AMC, Amsterdam / The Netherlands**



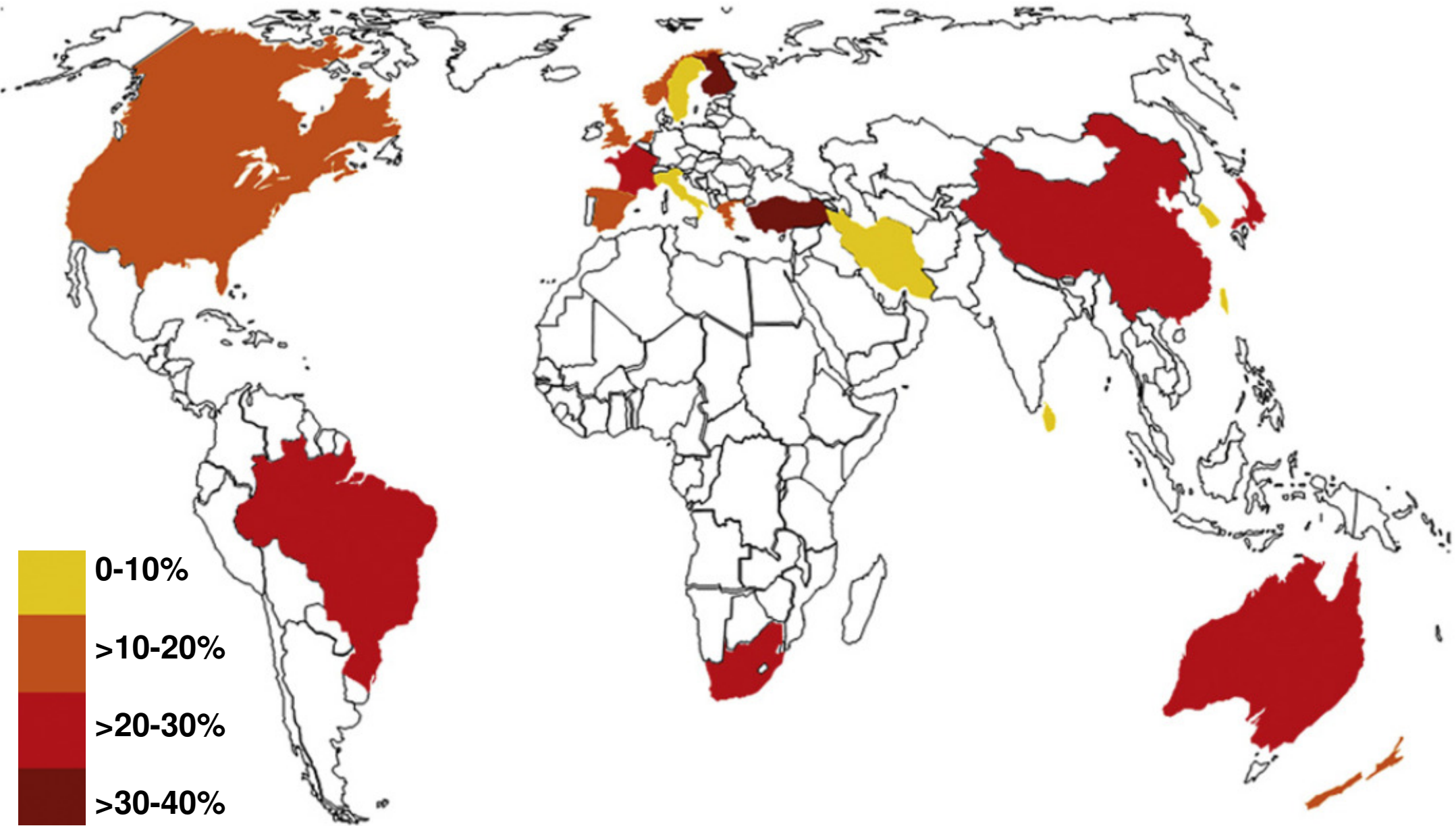
Disclosure belangen spreker

(potentiële) belangenverstrengeling	Geen / Zie hieronder
Voor bijeenkomst mogelijk relevante relaties met bedrijven	Bedrijfsnamen
<ul style="list-style-type: none"><li>• Sponsoring of onderzoeksgeld</li><li>• Honorarium of andere (financiële) vergoeding</li></ul>	<ul style="list-style-type: none"><li>• Shire</li><li>• Sucampo</li><li>• Astra Zeneca</li><li>• Nutricia</li><li>• Zeria</li></ul>

# Functional Constipation

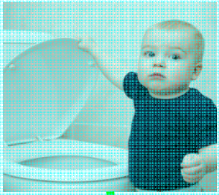
**At least a 2 month history of:**

- 1) 2 or fewer defecations/wk;**
- 2) At least one episode of fecal incontinence/wk;**
- 3) Retentive posturing or excessive volitional stool retention;**
- 4) History of painful or hard bowel movements;**
- 5) History of large diameter stools which may obstruct the toilet;**
- 6) Presence of a large fecal mass in the rectum**



Mugie SM, et al. Best Pract & Res Clin Gastroenterol 2011

# Behavior

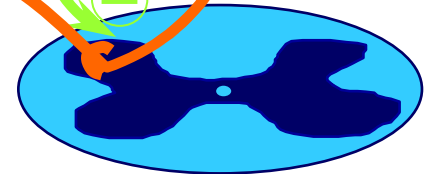
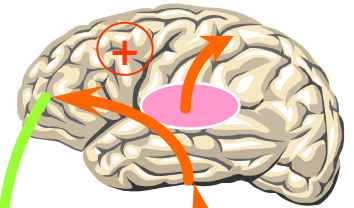
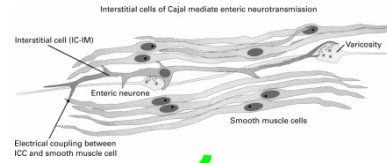


# Mechanisms of Constipation

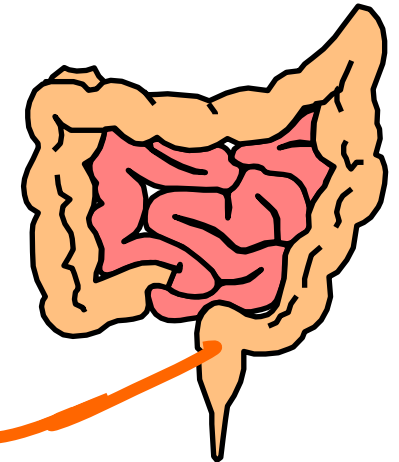
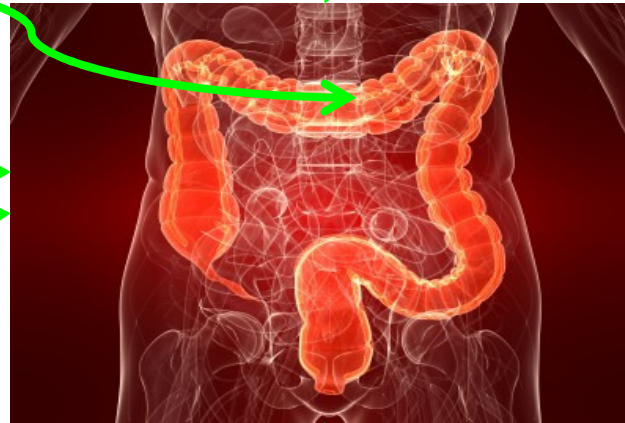


# Abuse

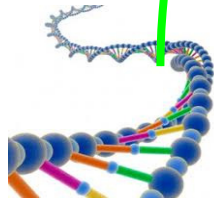
# Nerves, muscles, ICCs



# Stress

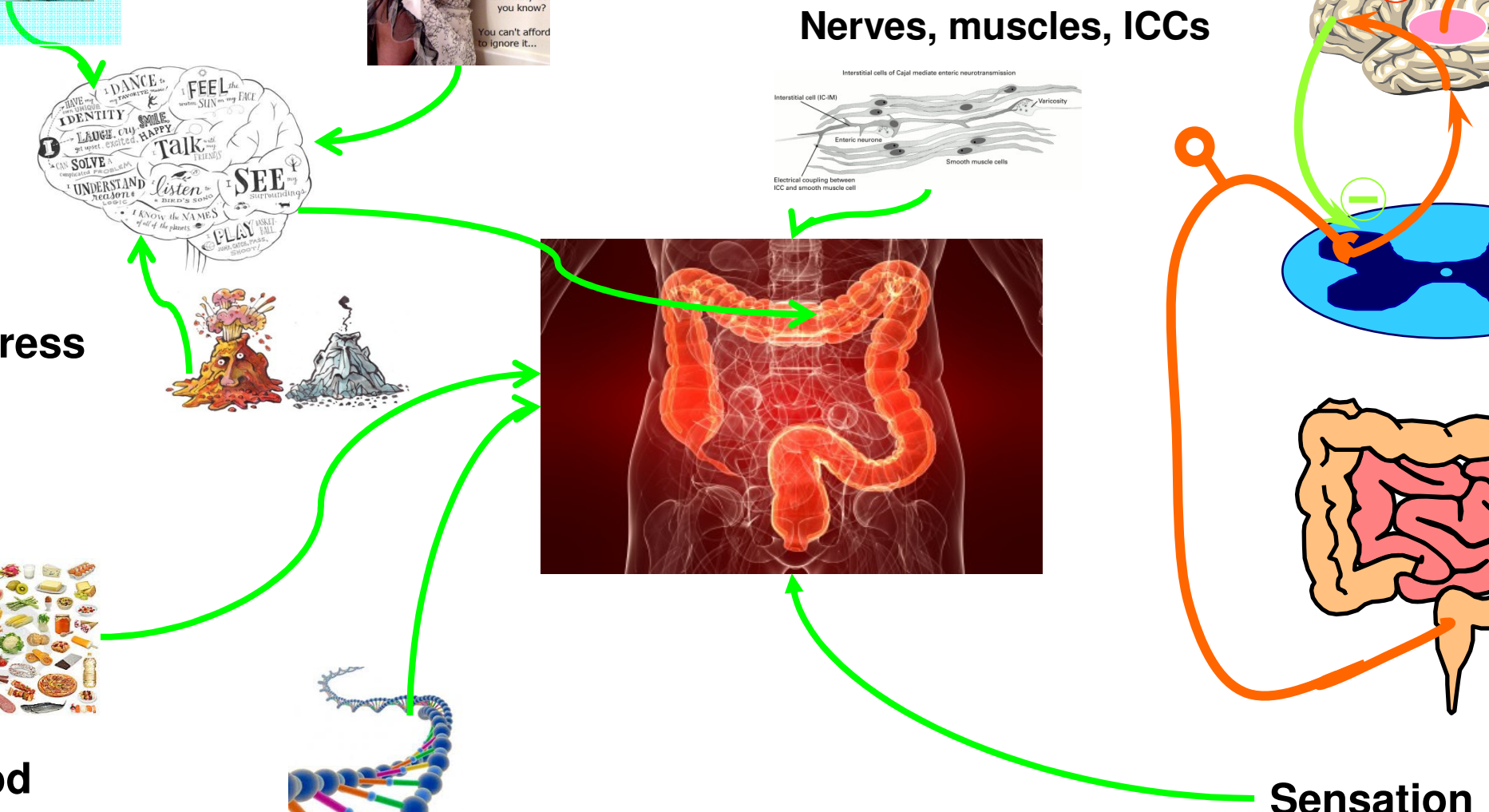


# Food



# Genetics

# Sensation



**Diagnostic work up defecation disorders**

**History**

**Physical examination**

**Bowel diary**

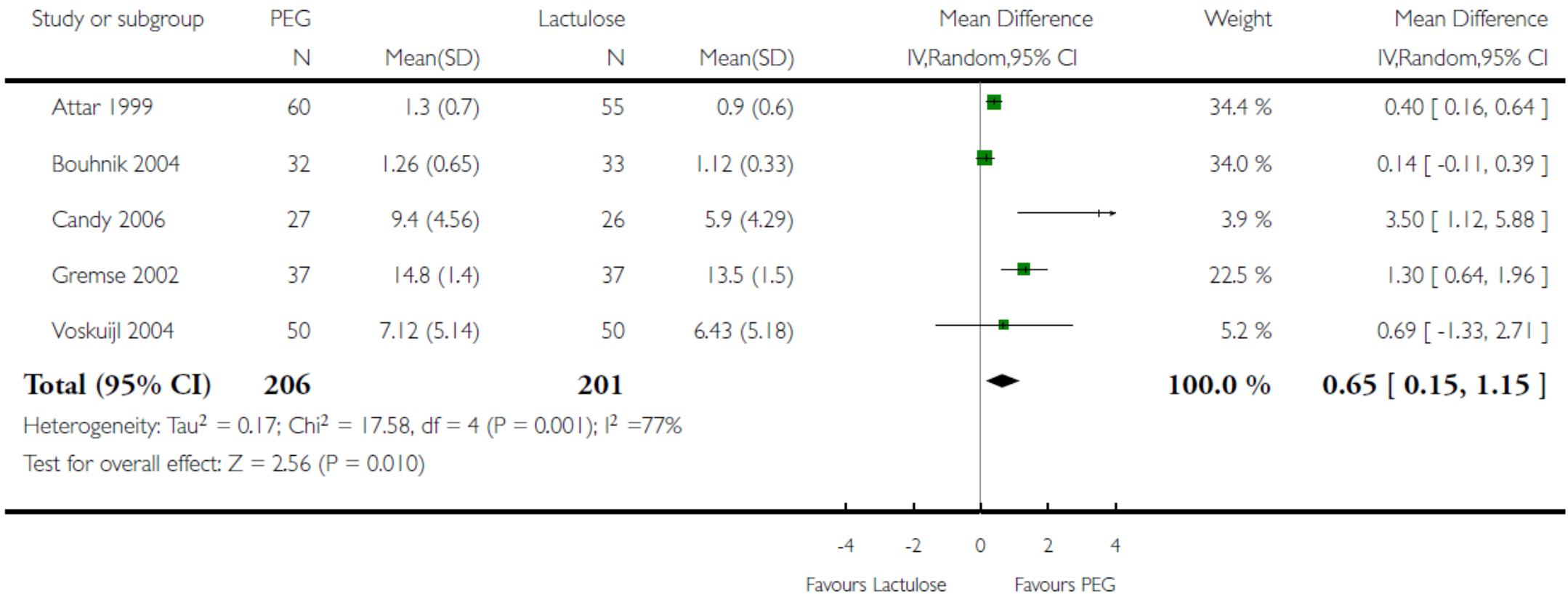
**Functional defecation disorder**

**Constipation**

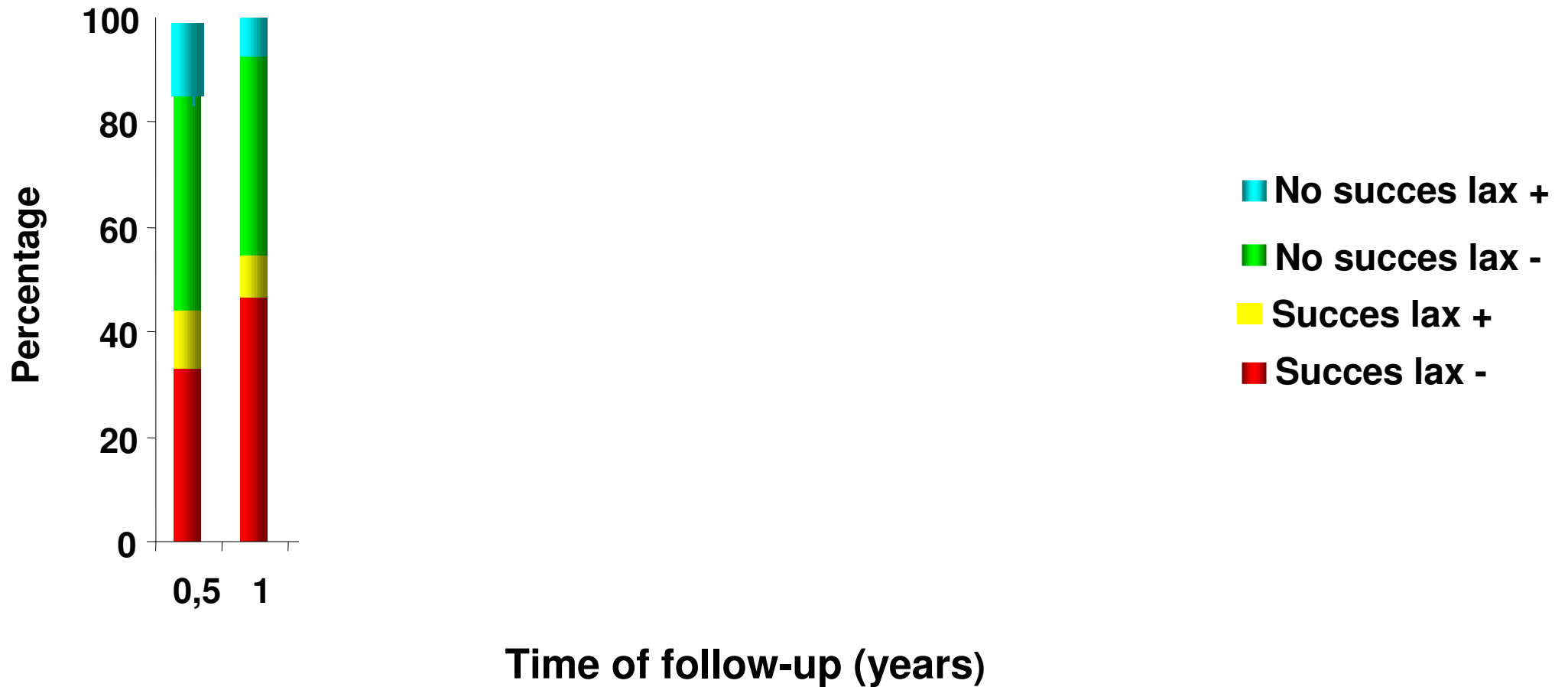
**treatment**



# Stool Frequency per Week



# Long term Follow-up and constipation





**Diagnostic work up defecation disorders**

**History**

**Physical examination**

**Bowel diary**

**Functional defecation disorder**

**CBCL / autism / ADHD**

**Constipation**

**treatment**

**No success after 3 months of treatment**

**MRI of spine**

**Lab**

**Abdominal x-ray**

**Transit study**

**Anorectal manometry**

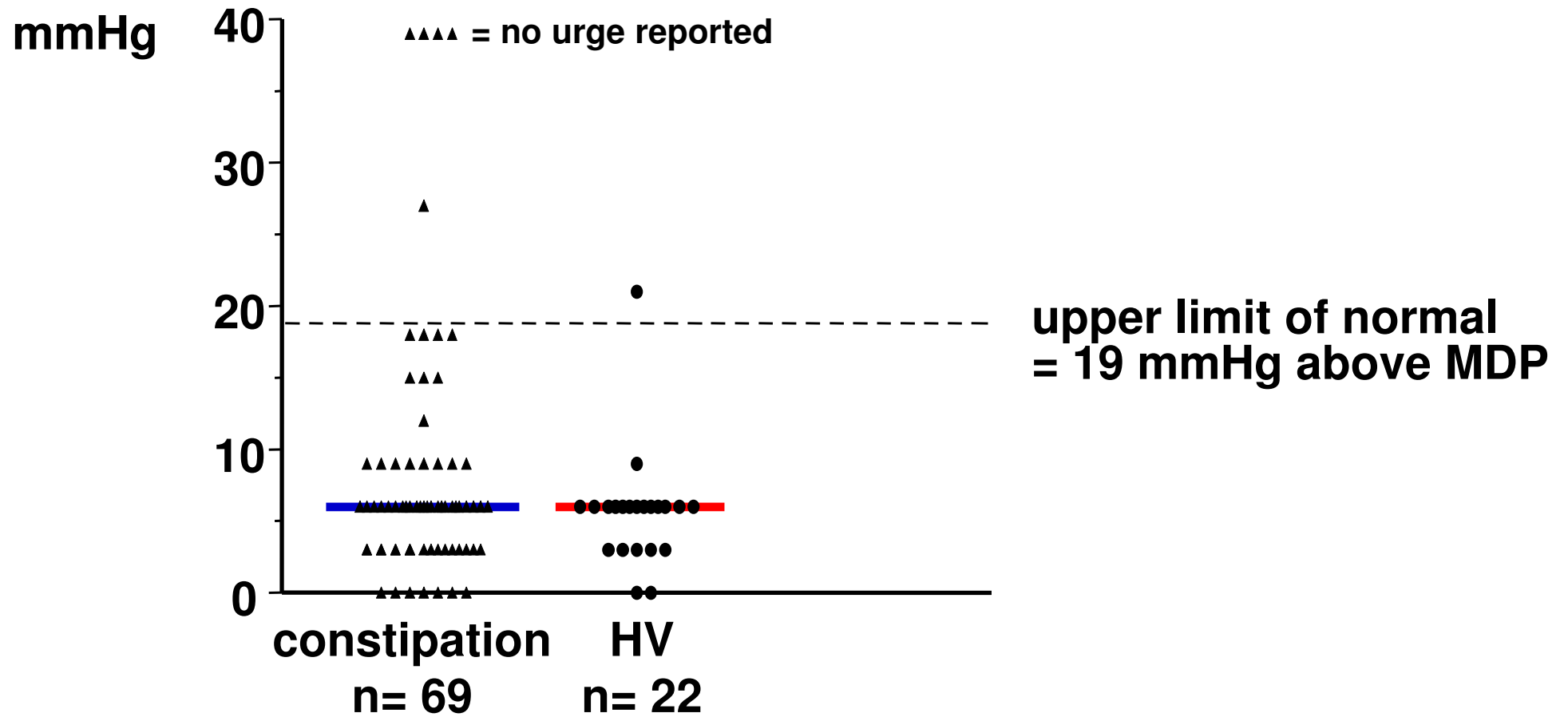
**Barium enema**

**Biopsy**

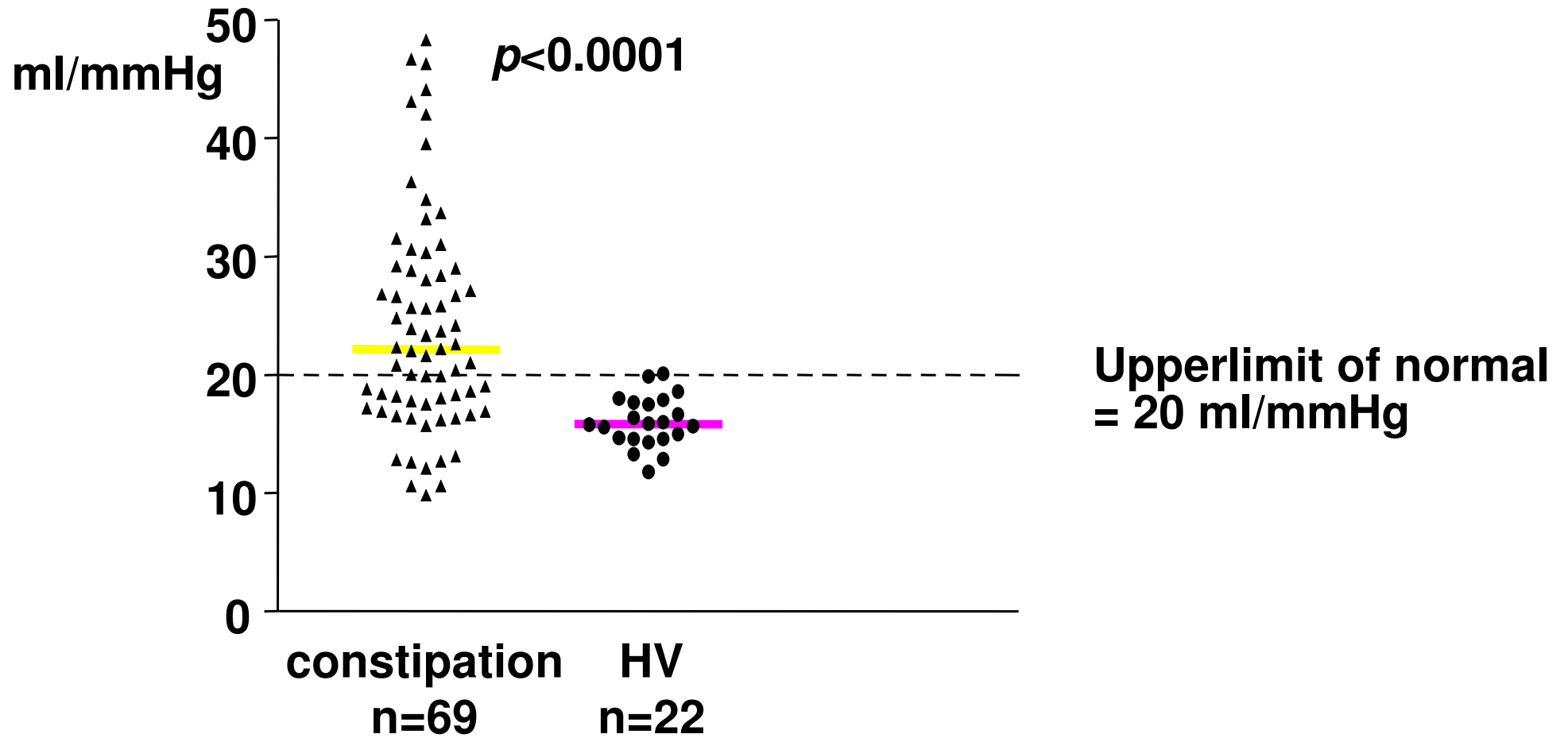
**Rectal barostat**

**Colon manometry**

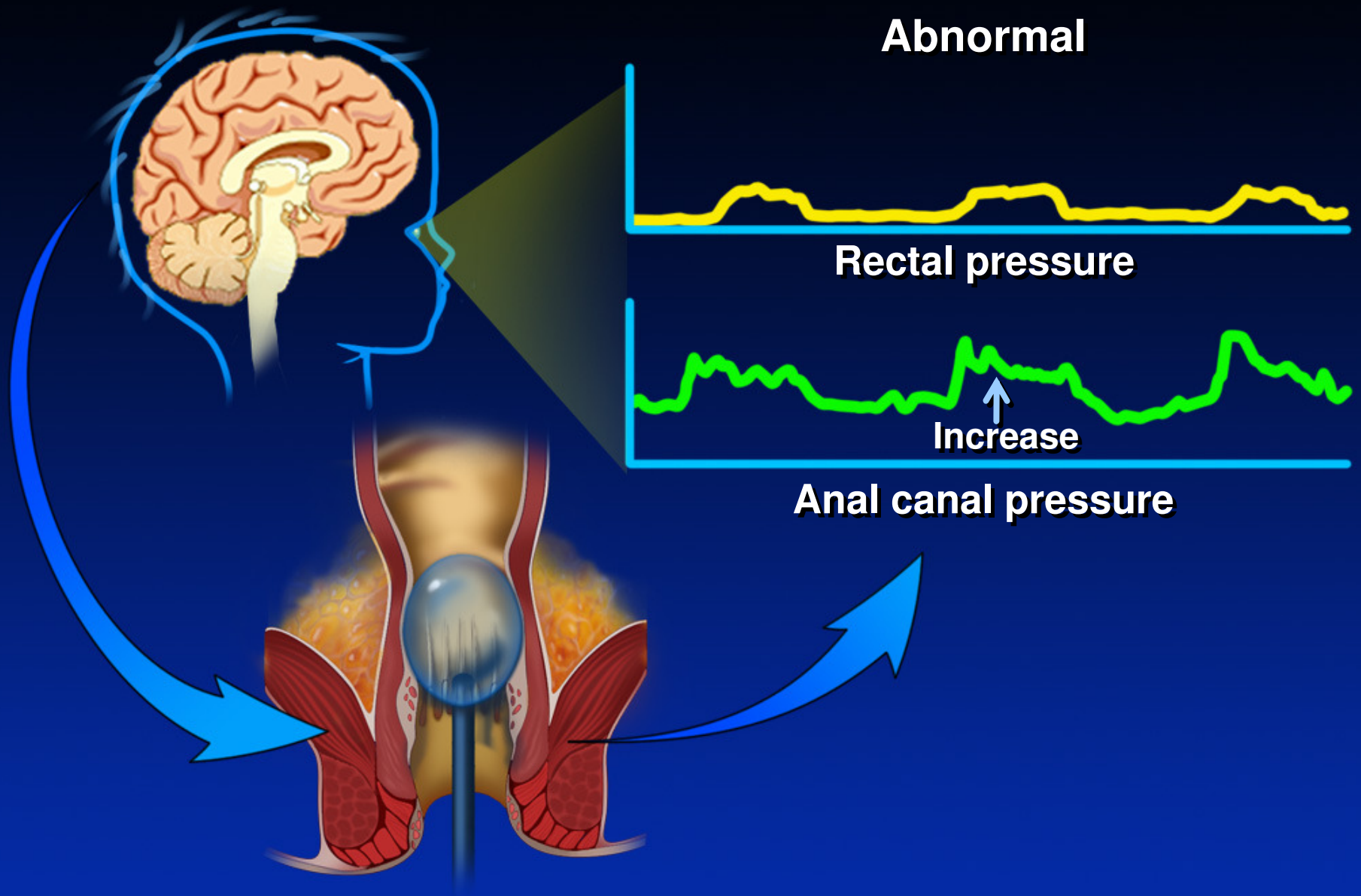
# Thresholds for urge to defecate



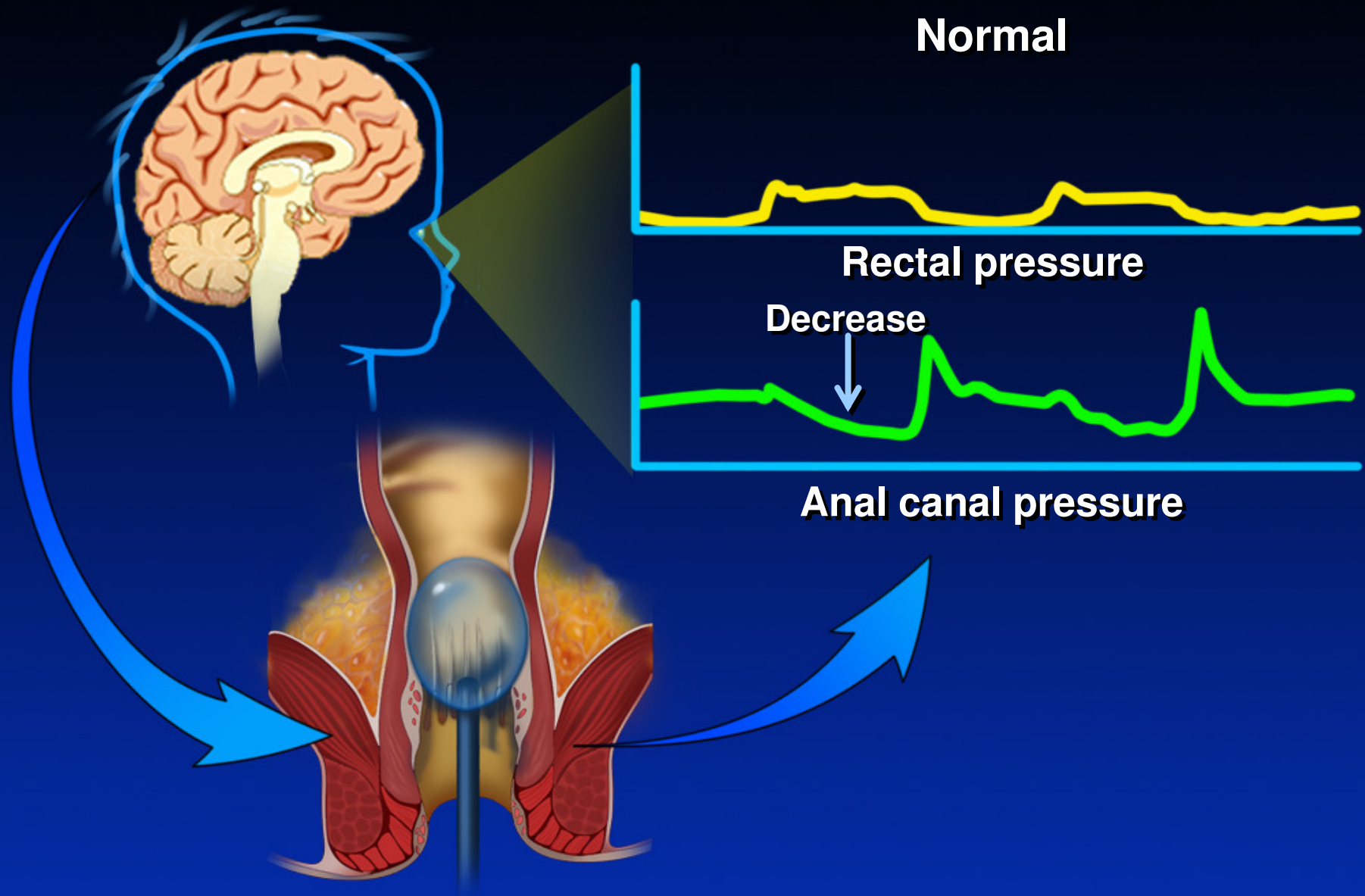
# Rectal compliance



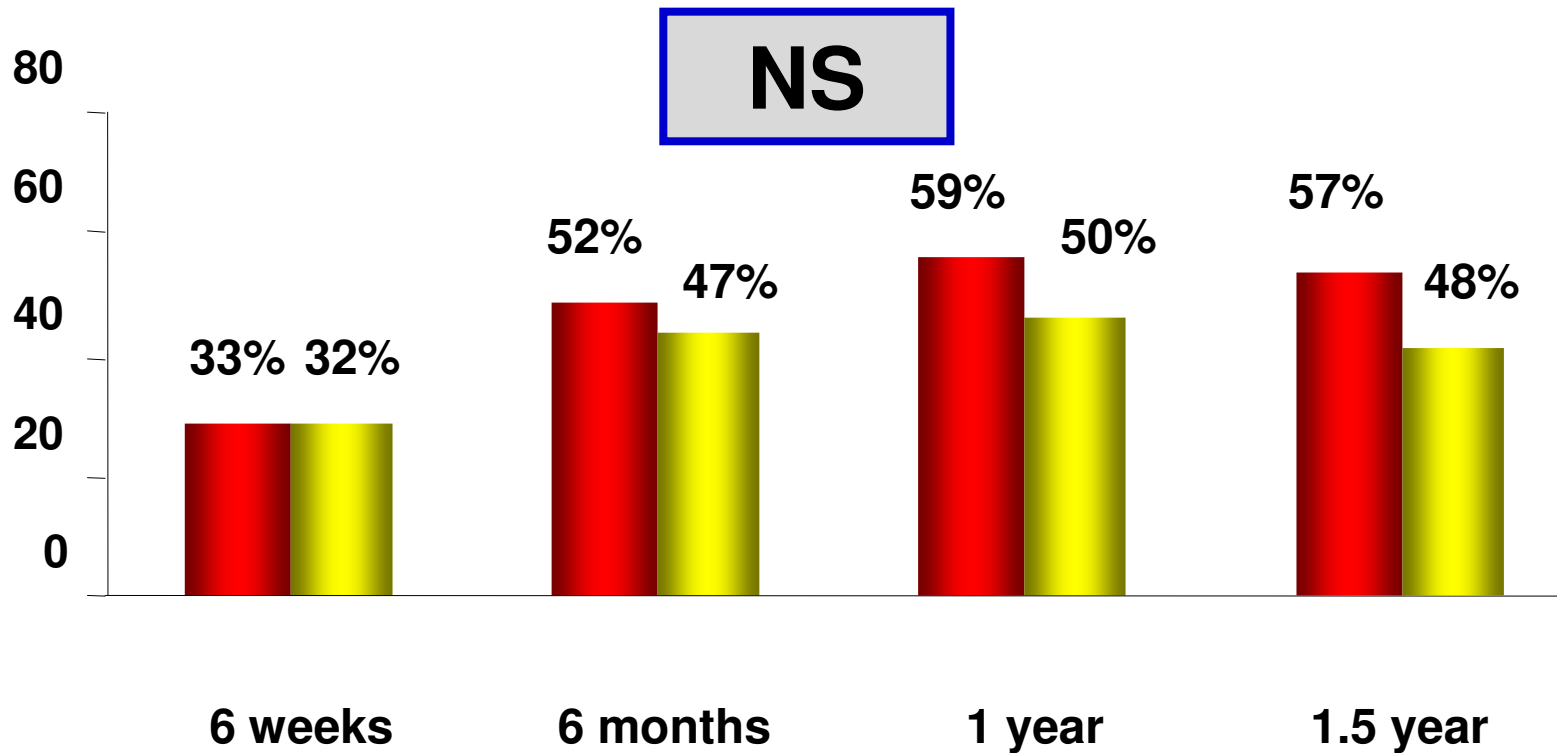
# Biofeedback Training Defecation disorders



# Biofeedback Training Defecation disorders



# Biofeedback training in the treatment of childhood constipation: a RCT



 CT (N = 94)

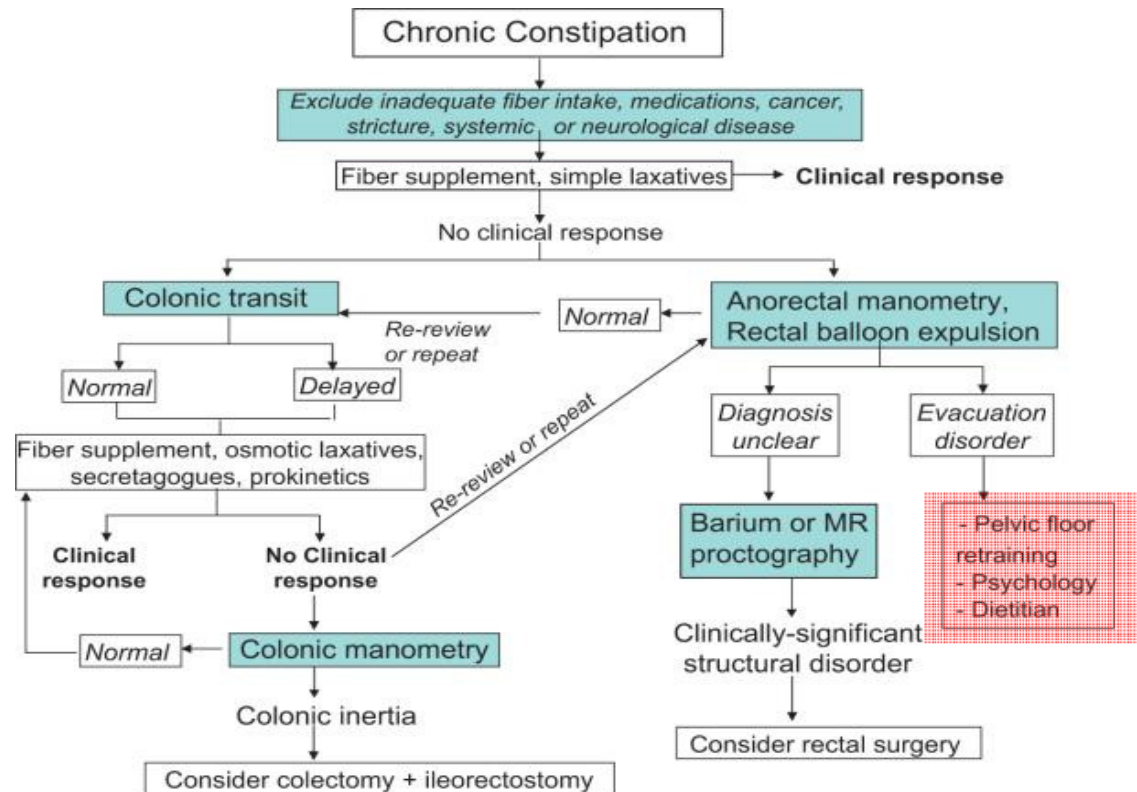
 CT + BF (n = 98)

Van der Plas RN, et al. Lancet 1996

# Behavioural and new pharmacological treatments for constipation: getting the balance right

Michael Camilleri and Adil E Bharucha

*Gut* 2010 59: 1288-1296



**Also:**

- NHS Map of Medicine
- AGA Technical review and position statement. *Gastroenterology* 2013; 144: 211-217
- Knowles & Madoff. *Chronic Constipation: ACS* 2012
- Emmanuel A. Current management strategies and therapeutic targets in chronic constipation. *Therap Adv Gastroenterol* 2011;4:37-48



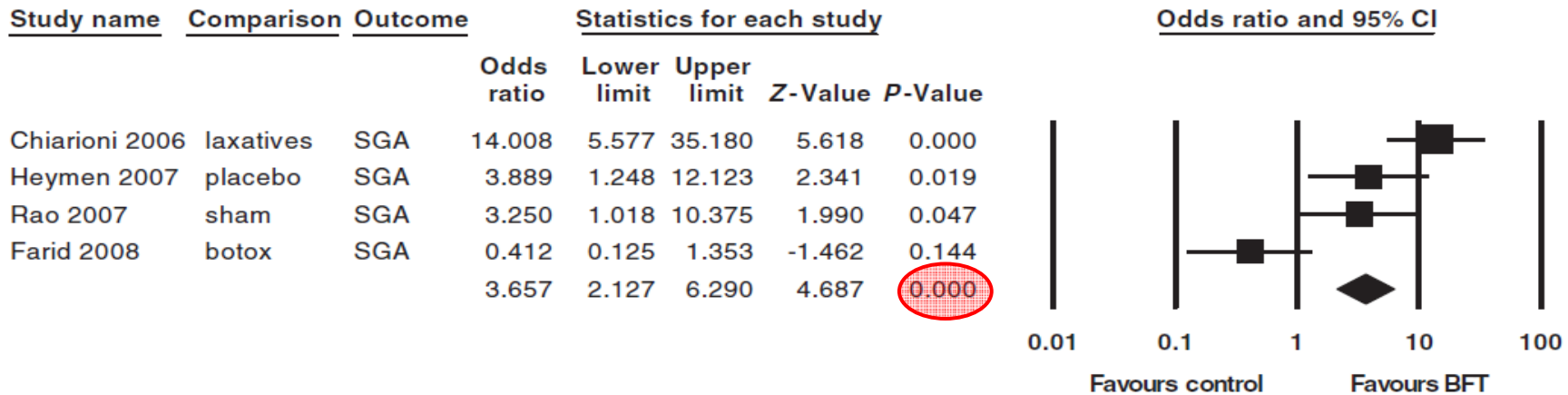
# Behavioral therapies (bowel retraining)

## Strong evidence for general success of approach

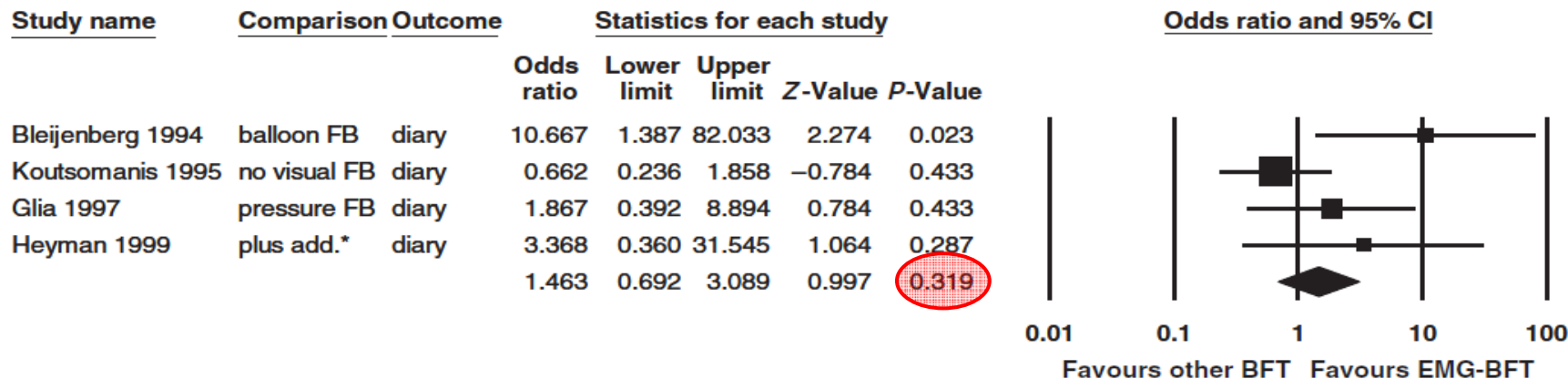
- Cohort studies<sup>1</sup>
- RCTs<sup>2-9</sup>
- Reviews<sup>10-11</sup>
- Guidelines<sup>12</sup>
- Meta-analysis<sup>13</sup>
- Cochrane review<sup>14</sup>

1. Chiotakakou-Faliakou *et al.* Gut 1998;42:517-21; 2. Bleijenberg & Kuijpers. Am J Gastro 1994; 89:1021-6; 3. Koutsomanis *et al.* Gut 1995;37:95-9; 4. Heymen *et al.* DCR 2007;50:428-41; 5. Heymen *et al.*, DCR 1999;42:1388-93; 6. Glia *et al.* DCR 1997;40:889-95; 7. Chiarioni *et al.* Gastroenterology 2005;129:86-97; 8. Rao SS, *et al.* Clin Gastro Hepatol 2007;5:331-88. 9. Rao *et al.* Am J Gastroenterol. 2010;105: 890-6; 10. Rao SS. Best Pract Res Clin Gastro 2011;25:159-66; 11. Rao. Gastroenterol Clin North Am. 2008;37(3).569-86; 12. Bharucha *et al.* Gastroenterology 2013;144:211-7; 11. Enck *et al.* NGM 2009;21:1133-41; 12. Woodward *et al.* Coch Syst Rev no 129 (in press).

## Biofeedback vs. other



## EMG motor training vs. less complex



SGA = subjective global assessment!

Enck P et al. Neurogastroenterol Motil. 2009



# Biofeedback provides long term benefit for patients with intractable, slow and normal transit constipation

E Chiotakakou-Faliakou, M A Kamm, A J Roy, et al.

Table 3 Presence of the functional symptoms straining and digitation before and after biofeedback

Functional symptom	Before biofeedback	After biofeedback	After follow up
Need to strain	86	61 (p<0.01)	56 (p<0.01)
Rectal digitation	39	22 (p=0.01)	25 (p<0.05)
Vaginal digitation	9	6 (NS)	6 (NS)
Incomplete evacuation	85	63 (p<0.01)	64 (p<0.01)
Pain			
None	16	32	36
Mild	29	36	34
Severe	55	32	30
Bloating			
None	14	32	28
Mild	4	27	20
Severe	82	49	52

Values are expressed as per cents.

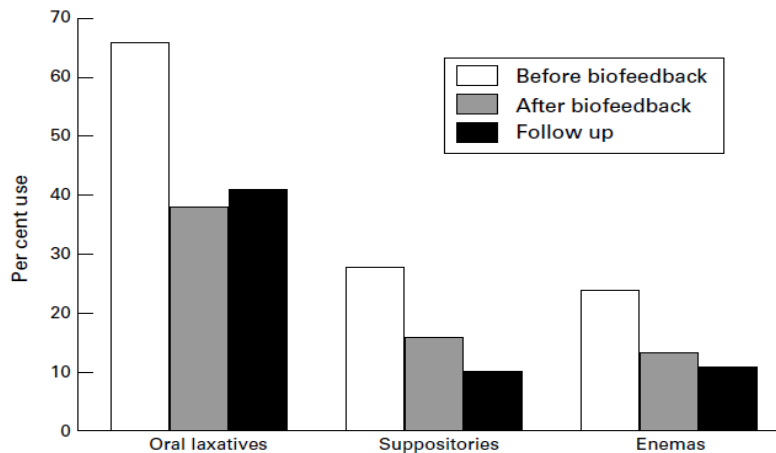


Figure 1 Use of oral laxatives, enemas, and suppositories.

- N = 100
- Retrospective analysis of prospective data

Table 6 Prognostic factors for biofeedback success after long term follow up

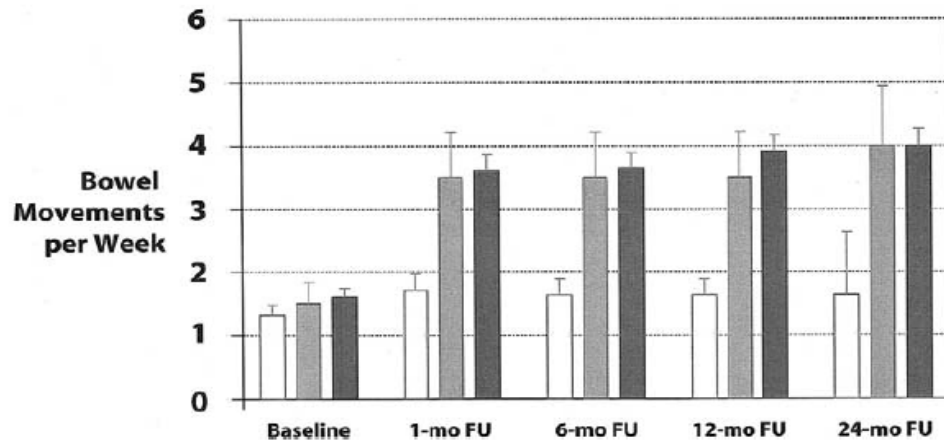
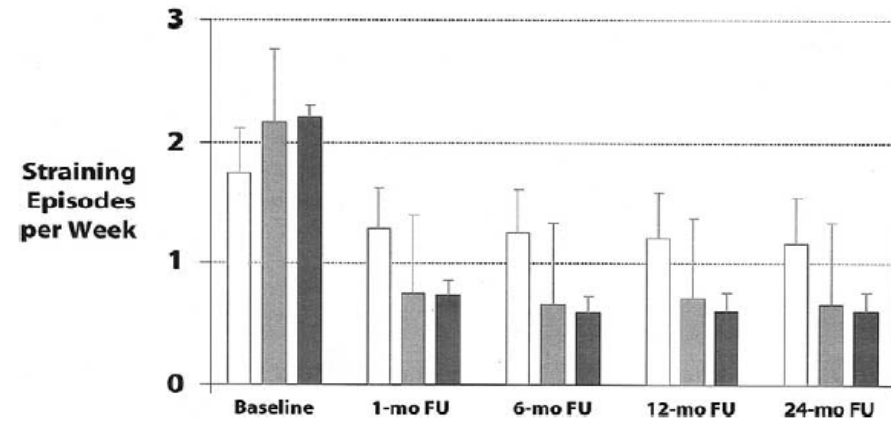
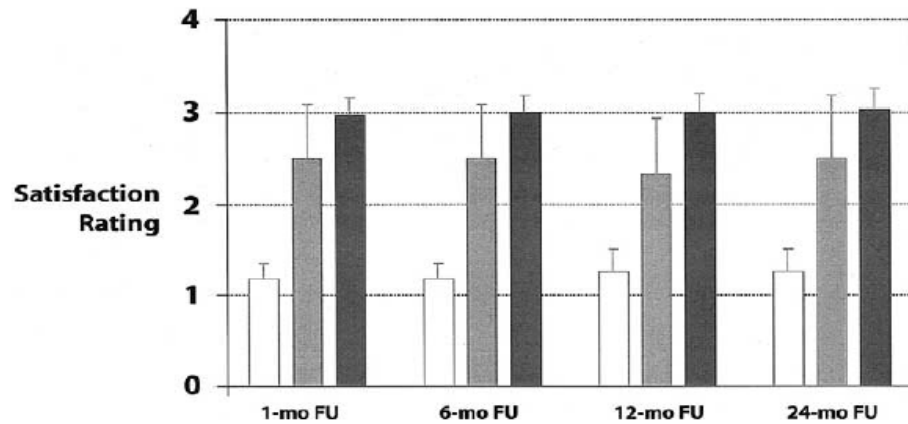
Predictive variable	Success (n=55)	Failure (n=45)	Statistical significance
Female	89	84	NS
Male	11	16	NS
Psychological problems	14	24	p=0.10
Previous hysterectomy	22	27	NS
Slow transit only	20	15	NS
Paradoxical contraction only	13	9	NS
Slow transit plus paradoxical contraction	35	22	NS
No slow transit or paradoxical contraction	16	13	NS
Practise biofeedback	82	70	p=0.07

Values are expressed as per cents.

# Biofeedback Benefits Only Patients With Outlet Dysfunction, Not Patients With Isolated Slow Transit Constipation

GIUSEPPE CHIARIONI,\* LARA SALANDINI,\* and WILLIAM E. WHITEHEAD†

\*Divisione di Riabilitazione Gastroenterologica, Università di Verona, Azienda Ospedaliera di Verona, Centro Ospedaliero Clinicizzato, Valeggio sul Mincio, Verona, Italy; and †UNC Center for Functional Gastrointestinal and Motility Disorders, and Division of Gastroenterology and Hepatology, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina

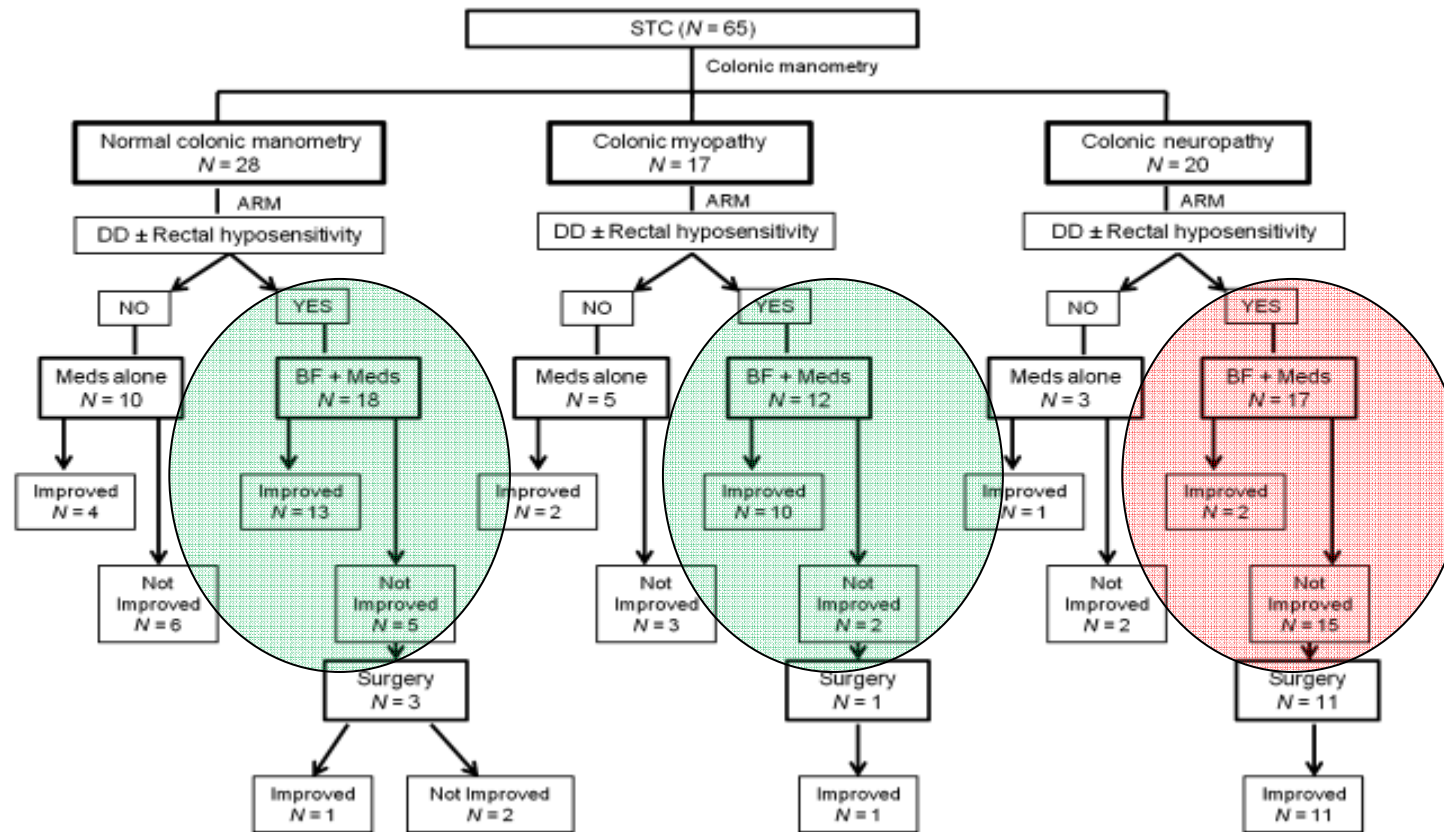


= STC only (0 tests +): n = 12  
 = Equiv. PFD (1/2 tests +): n = 6  
 = PFD (2/2 tests +): n = 34

Based on ARM & balloon expulsion

# Clinical utility of colonic manometry in slow transit constipation

S. SINGH,\* S. HEADY,\* E. COSS-ADAME† & S. S. C. RAO\* ,†



## Further data

- Numerous reviews document ‘strong evidence’ only for use in patients with dyssynergic defecation
- Several cohorts / RCTs (n = 21-119; median 48 patients)
  - Results in DD: 70-90% success
  - Results in unselected CC: 50-70% success
  - Some proof of mechanism
- One prognostic development study (n = 102)

AP&T Alimentary Pharmacology and Therapeutics

### Predictors of outcome of anorectal biofeedback therapy in patients with constipation

L. S. E. Shim\*, M. Jones†, G. M. Prott\*, L. I. Morris\*, J. E. Kellow\* & A. Malcolm\*

**Table 3 |** Logistic regression analysis for predictors of substantial improvement in global bowel satisfaction after biofeedback therapy

Predictor	Log-odds ratio ( $\beta$ )	S.E.	P value
Stool consistency	0.89	0.28	0.001
Laxative use	-0.72	0.29	0.01
Straining rectal pressure	0.03	0.01	0.009
Balloon expulsion time	0.01	<0.01	0.004

Pseudo  $R^2 = 0.21$ .

# Summary: Biofeedback in adults

**Utility of complex vs. less complex behavioral therapies is untested**

- **No pivotal RCT of unselected patients with CC**

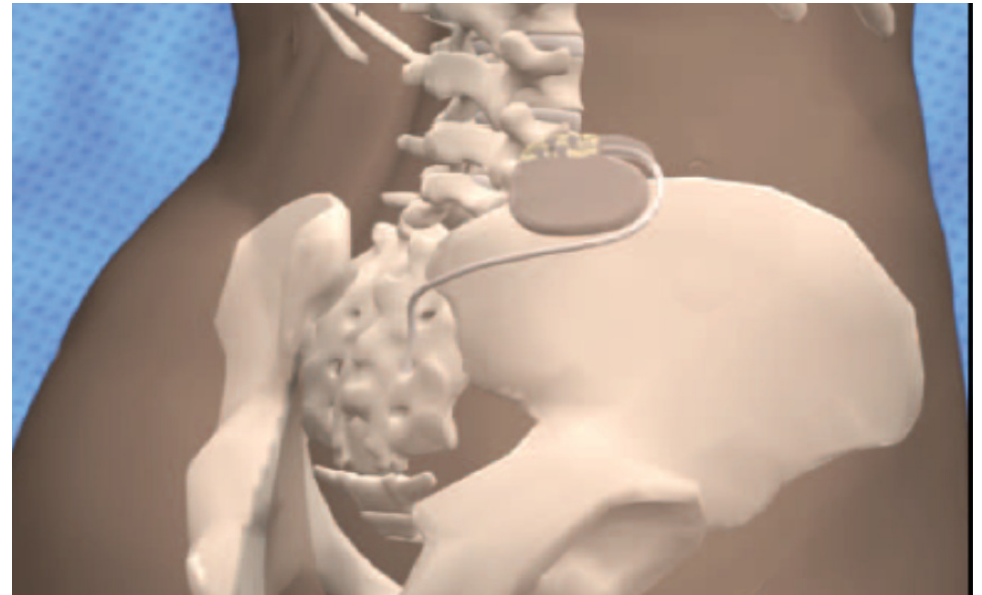
**Directed therapy**

- **No strong evidence for stratification**
- **Received wisdom / biological rationale (DD > ED > STC)**
- **Underpowered *post hoc* analyses of small case series and RCTs with high levels of bias**
- **Some proof of mechanism**
- **Much eminence-based opinion**

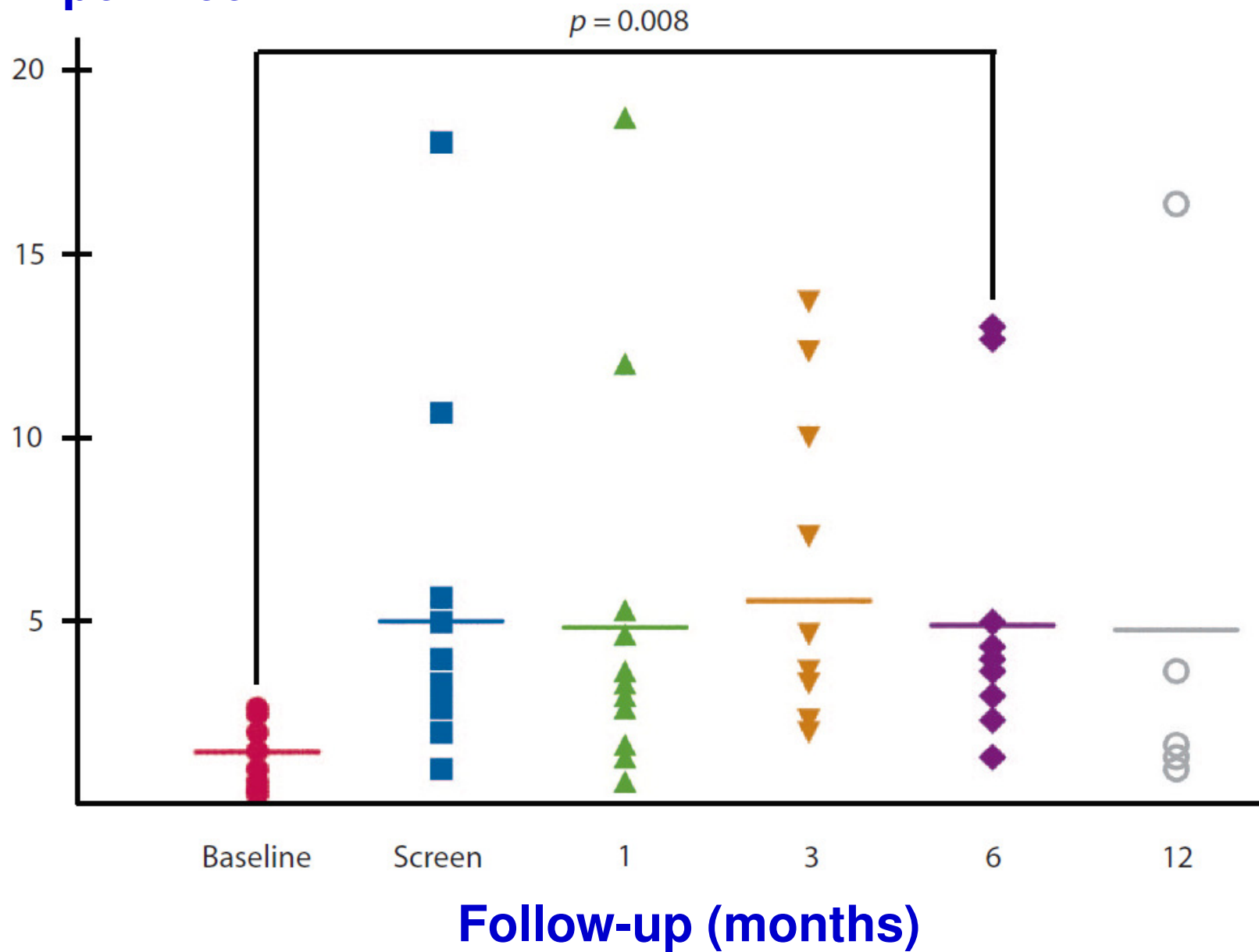


## Sacral Neuromodulation Therapy

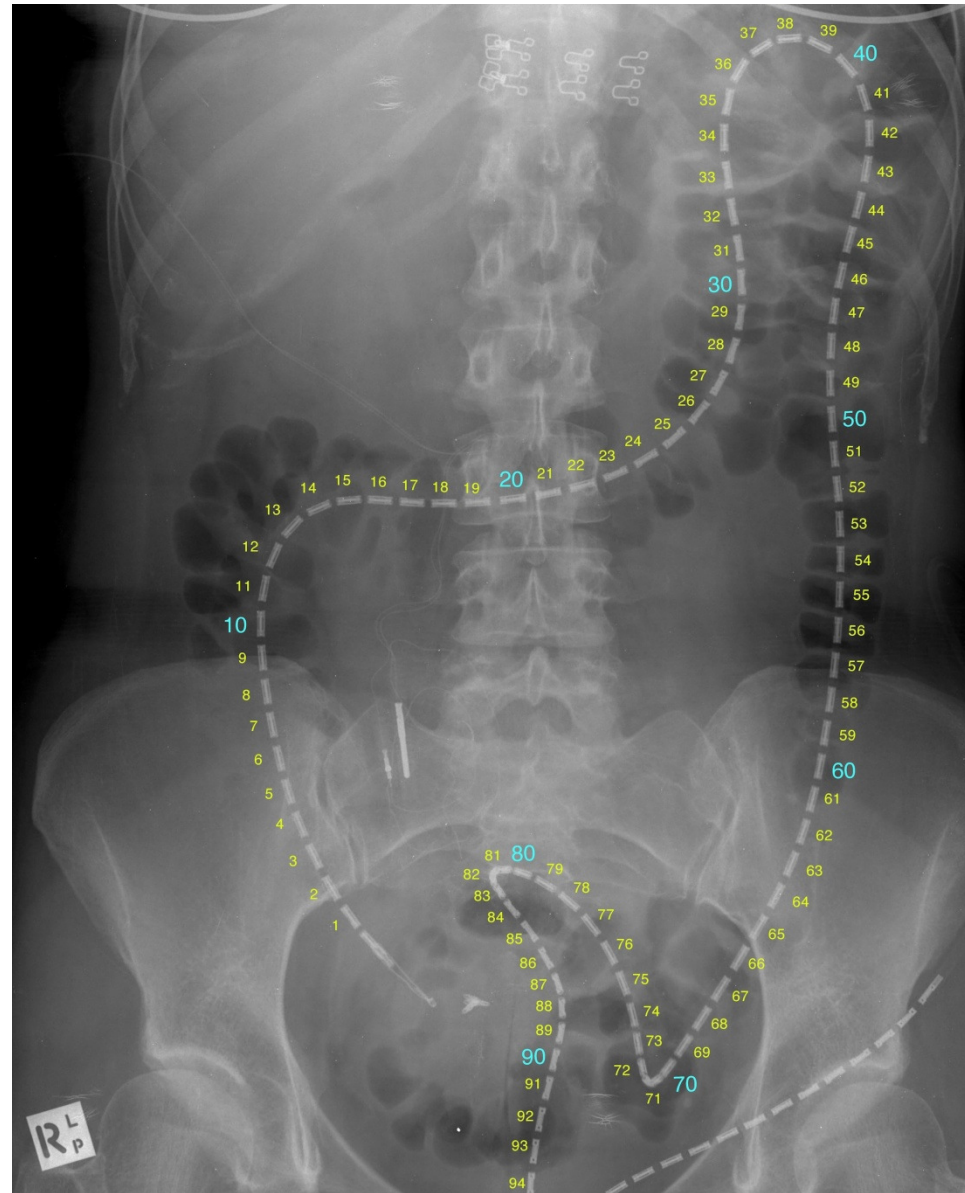
- A tined lead is inserted through needle
- Needle removed
- 1 – 4 weeks testing period with external device
- Permanent neuromodulator



# Defecation frequency per week



# 120 sensor fiber optic catheter

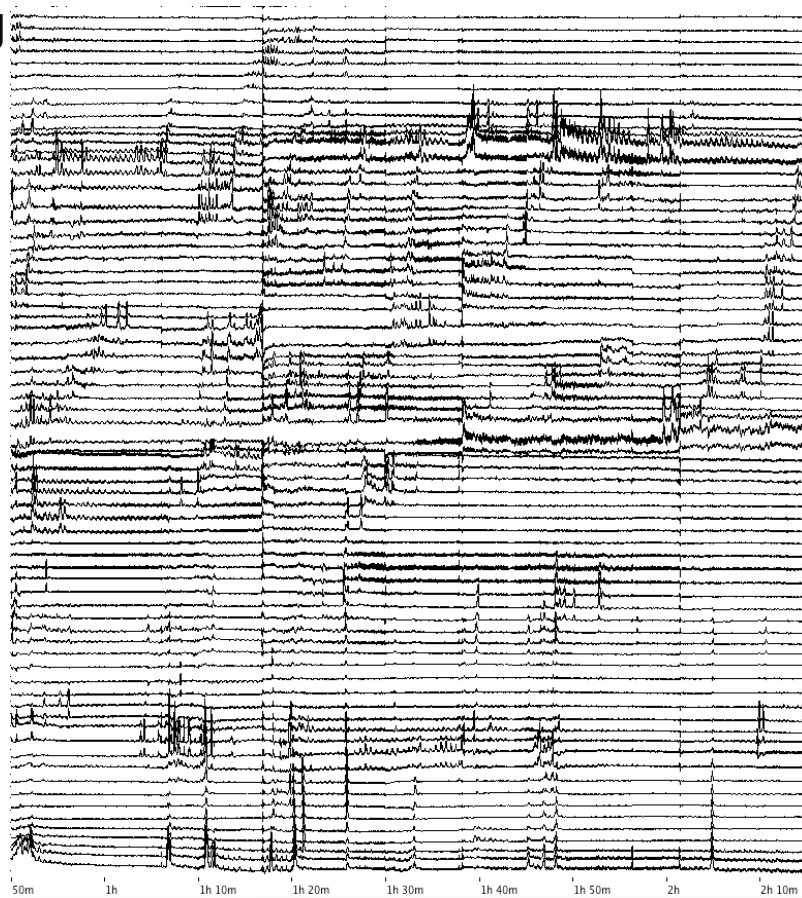


# Colonic respons to sacral nerve stimulation in constipation

Mid  
ascending  
colon

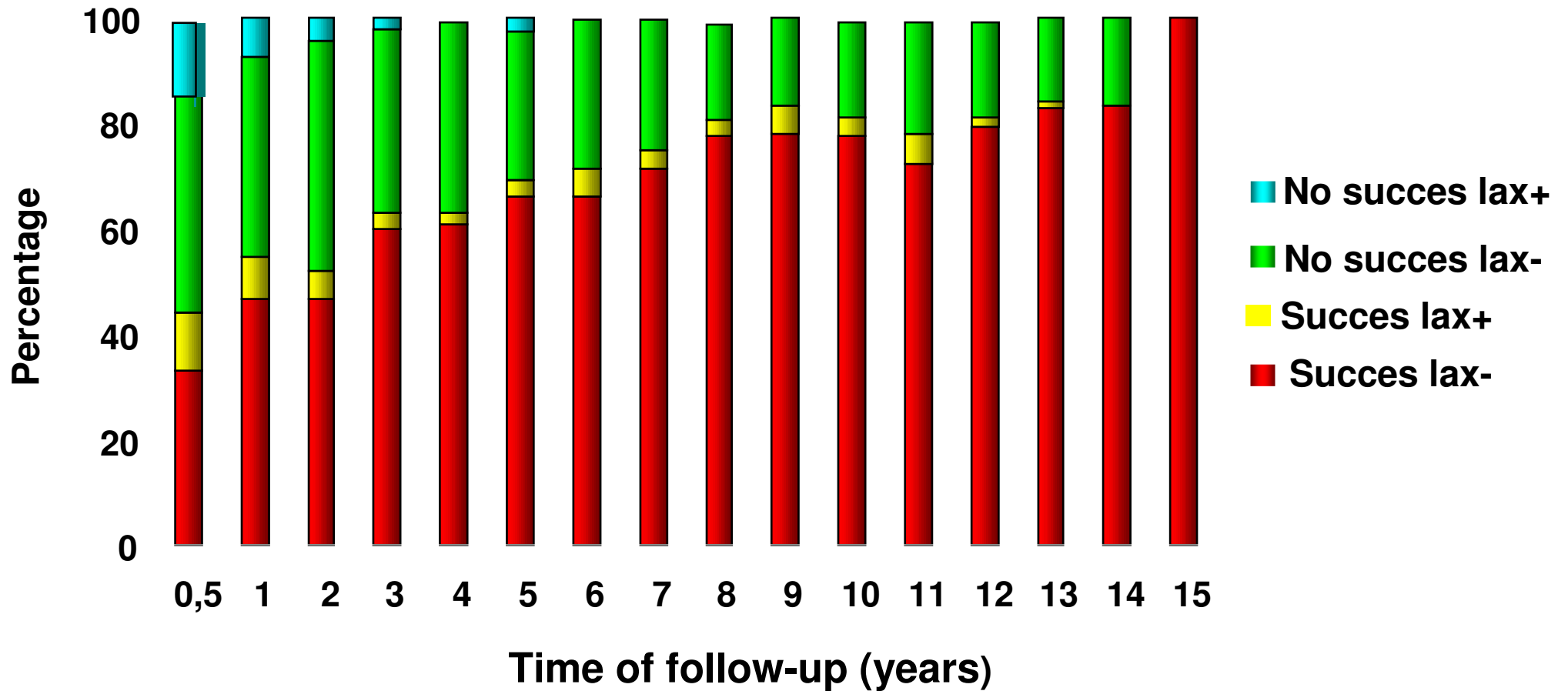
Splenic  
flexure

sigmoid  
colon

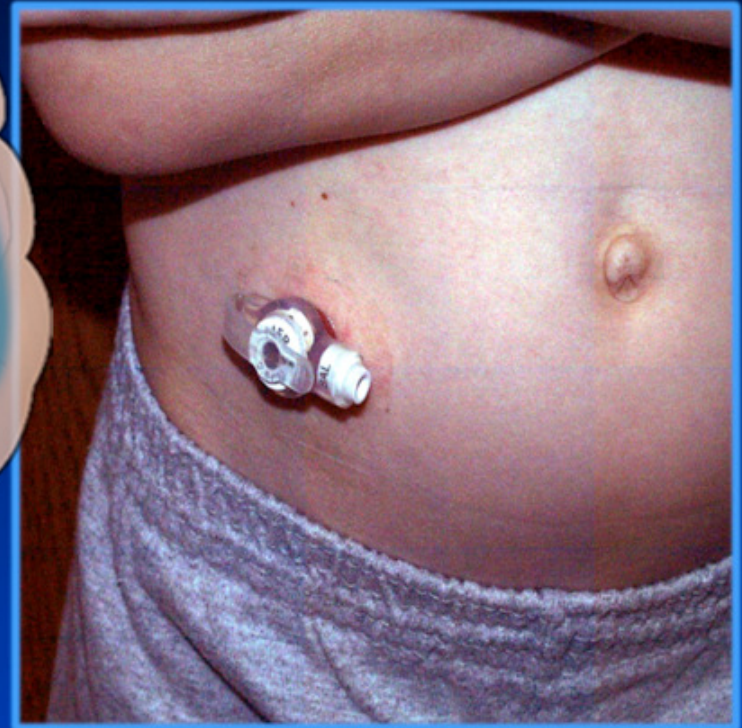
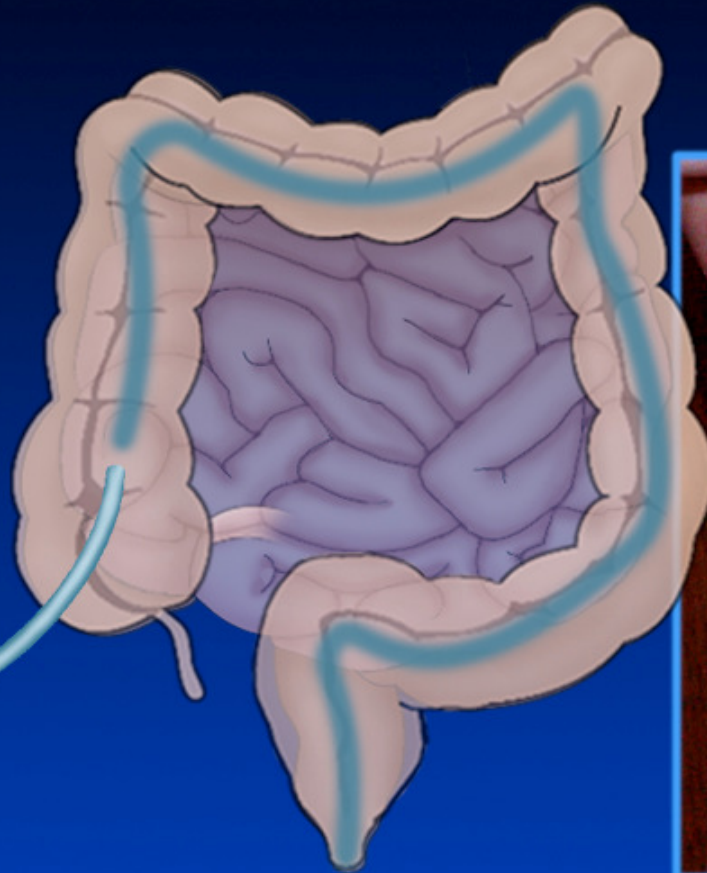


60min

# Long term Follow-up and constipation



# Antegrade continence enema



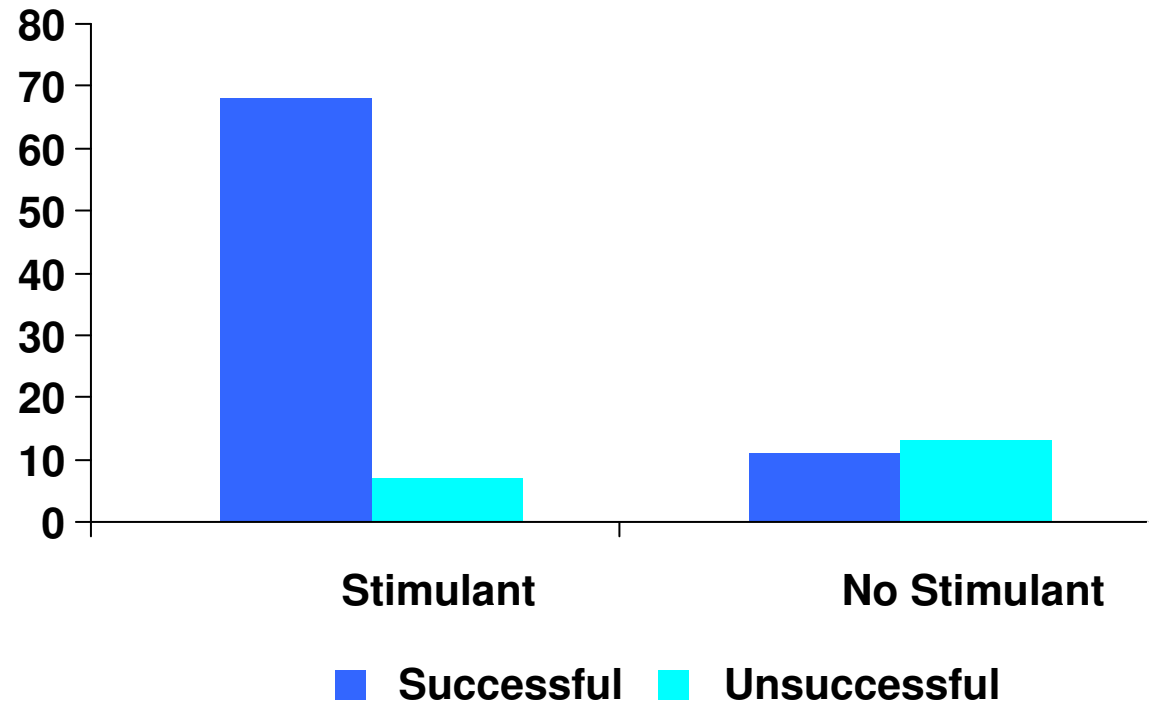
# Colonic manometry guiding treatment

- **Colonic manometry should be performed prior to cecostomy placement**
- **Patients with generalized colonic dysmotility are less likely to benefit from the use of antegrade enemas**
- **Colonic manometry findings might be helpful in those patients to decide whether colostomy, partial or total colectomy is indicated**



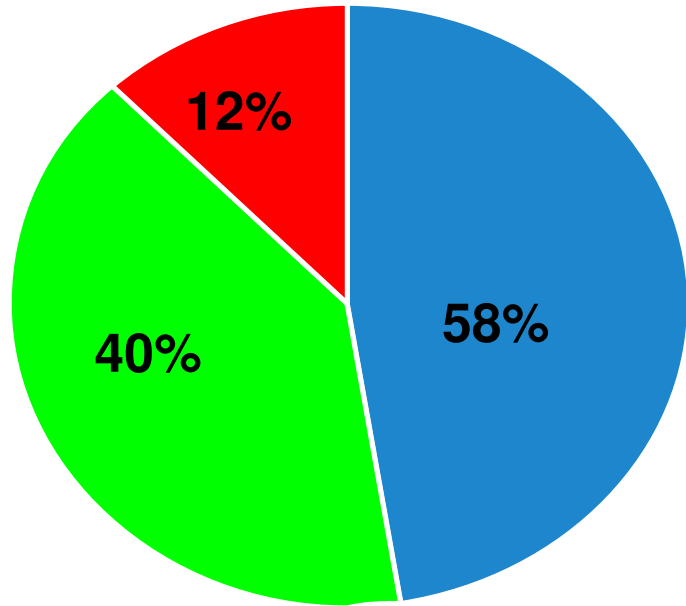
# Irrigations

- PEG solution and NS are most commonly used
- 88% most successful irrigation included a stimulant
- 27% needed oral laxative in addition to antegrade enema
- Time to start evacuation: median 7 min (1-60)
- Time to complete evacuation: median 60 min (20-480)



$p < 0.001$

# Complications



■ Minor ■ None ■ Major

Minor Complication	Number of patients
Granulation tissue	41
Leakage	21
Infection	12
Bleeding	4
Abscess	4
Pain	4
Nausea	2
Major Complication	Number of patients
Fistula	4
Peritonitis	3
Prolapse	2
Stenosis	2

## **Management of pediatric patients with refractory constipation who fail cecostomy**

- **16% ( n =12) failure**
- **Colonic motility studies demonstrated:**
  - **Colonic neuropathy (N=7)**
  - **Abnormal motility (N=4)**
  - **Abnormal left-sided colonic motility (N=1)**

## **Surgical procedures**

- **Total abdominal colectomy with ileorectal anastomosis (n=6)**
- **Left hemicolectomy with colorectal anastomosis (n=2)**
- **Colectomy with ileodistal sigmoid anastomosis (n=2)**
- **Subtotal colectomy with colorectal anastomosis (n=1)**
- **Sigmoidresection with colorectal anastomosis (n=1)**

## **Management of pediatric patients with refractory constipation who fail cecostomy**

- **16% (n =12) failure**
- **Colonic motility studies demonstrated:**
  - **Colonic neuropathy (N=7)**
  - **Abnormal motility (N=4)**
  - **Abnormal left-sided colonic motility (N=1)**
- **75% had marked clinical improvement, 3 patients (25%) continued to have poor function at long term follow-up**

# Summary & Conclusions

- **Withholding behavior important in young children**
  - **Hyposensitivity / impaired compliance**
- **Biofeedback training is not effective in children**
- **Larger studies regarding the effect of BF are necessary in adults**
  
- **SNS is promising, more studies are needed**
- **Surgery???**