

**New technology for assessment and treatment of
colorectal dysfunction
Ascona 23rd of April 2015**



University of Zurich



**Introduction of Rapid barostat bag (RBB) protocol
for the assessment of rectal function**

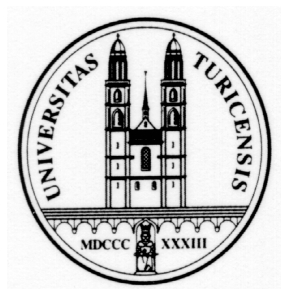
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Background

Barostat measurements:

- Best established investigation of rectal physiology
 - capacity, compliance, sensation
 - Large bag with infinite compliance
 - Repeated, pressure or volume guided inflations (computerized electronic pump)
 - Superior to measurements by elastic balloon
 - **BUT**
 - time - consuming (>1h)
 - expensive equipment
 - not widely available
- Difficult to use in clinical practice

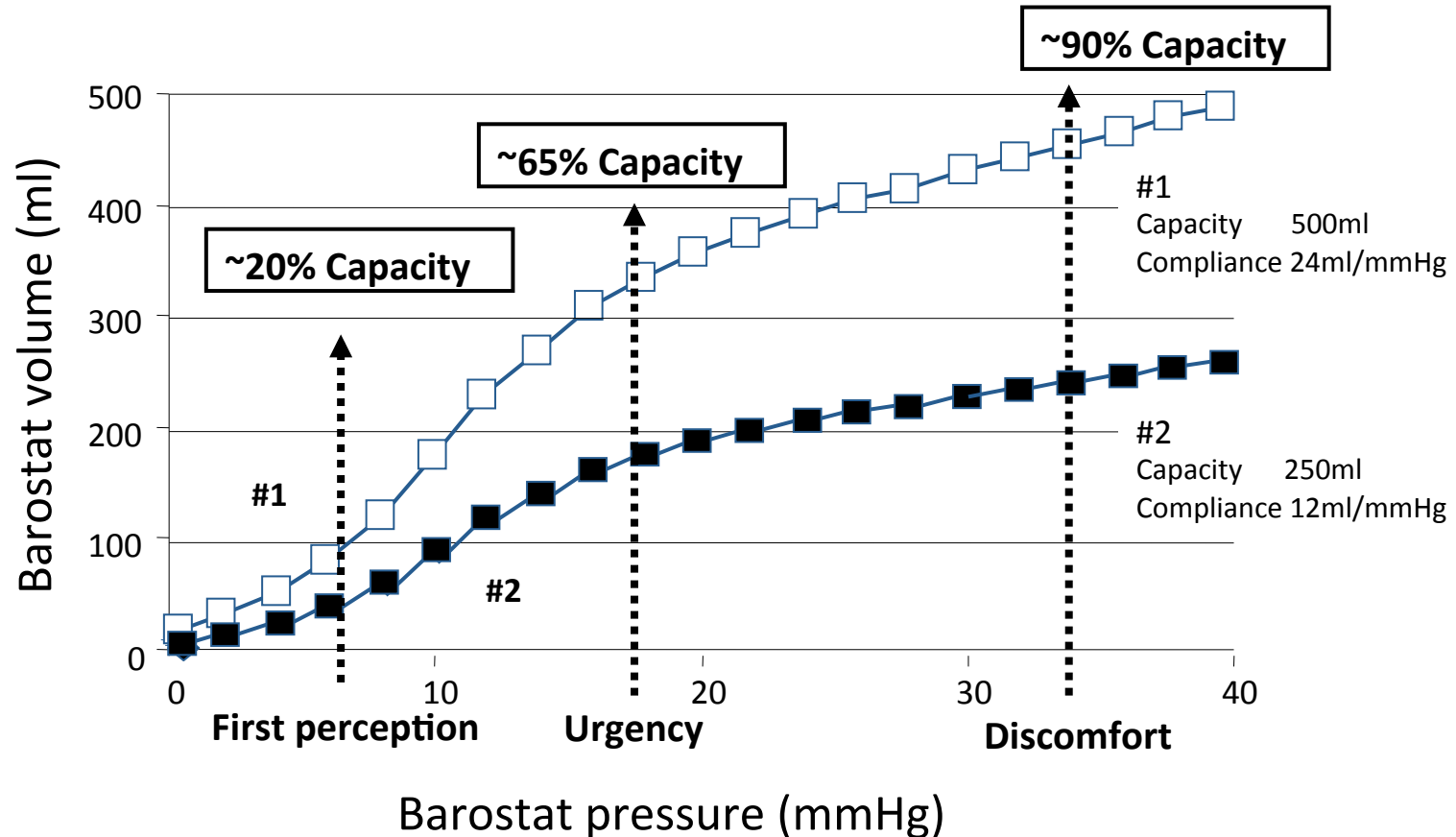


Aim

- To develop a tool to assess rectal function in routine practice
 - Short in duration
 - Easily available
 - Simple protocol
 - Cheap

- Delivers clinically relevant volume measurements

Barostat: Rectal Compliance and Capacity

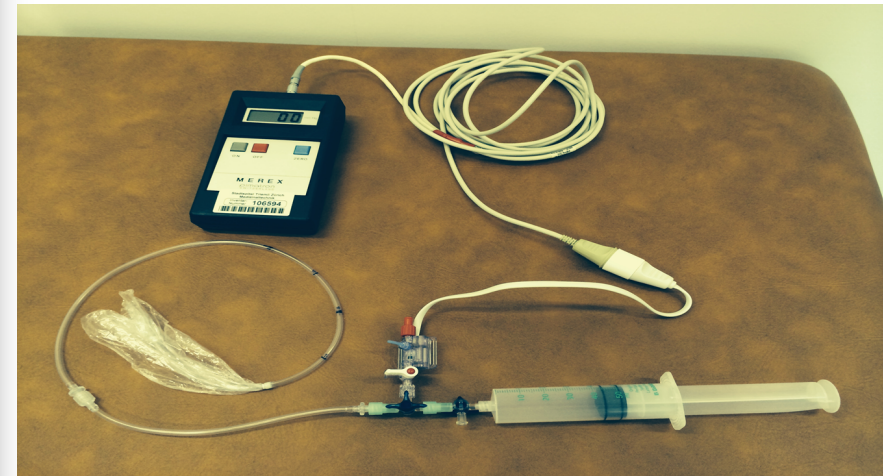
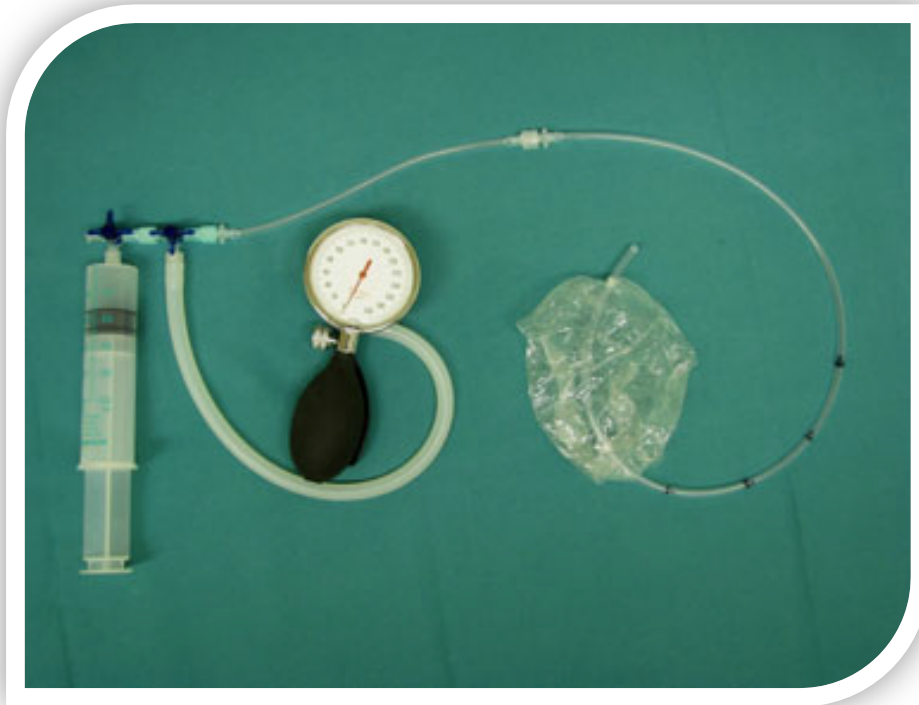


- Linear relationship between compliance and capacity
- Capacity determines ability to retain stool (i.e. reservoir volume)
- Distension volume *relative to capacity* (percentage filling) determines sensation

Setup



- Rectal Barostat Catheter and >600ml bag (~\$60)
- Standard sphygmomanometer (~\$40 reusable)
- 60ml Luer Lock Syringe and 3 way tap (~1\$)





Study Design

- 26 healthy volunteers without gastrointestinal symptoms or disease
- AR-HRM (data not shown)
- Standard Barostat and Rapid protocol studies in randomised order
 - Both protocols
 - Conditioning distention
 - Index distention
 - Rectal sensation
 - Rectal compliance
 - Rectal capacity at 40mmHg
 - Standard protocol:
 - Minimal distending pressure (MDP)
 - 2mmHg increments every 30sec up to 40mmHg
 - Rapid protocol:
 - 1-2ml/sec Increments

Short Protocol, Hand Held Barostat



Conditioning inflation
- 1-2ml/sec
- until 40mmHg



Record rectal capacity



Deflate bag

Short Protocol, Hand Held Barostat



Index inflation: 1-2ml/s
with syringe



Patient reports threshold sensation.
Absolute Volume recorded;
Percentage filling (% capacity) calculated
“First Sensation”
“Urgency”
“Discomfort /Pain” threshold



Deflate bag

Short Protocol, Hand Held Barostat



Optional assessment of rectal compliance



Deflate to 50% rectal capacity.
After ~60s record pressure
(measurement correlates with
compliance assessed by full barostat)



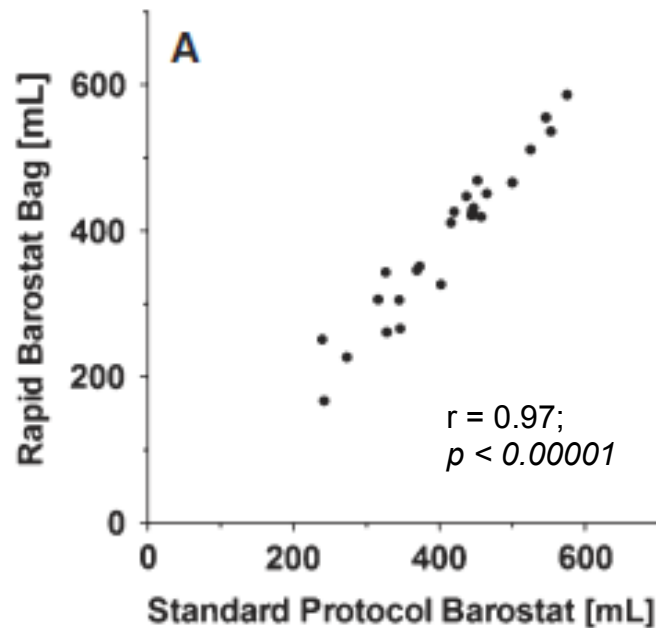
Finish



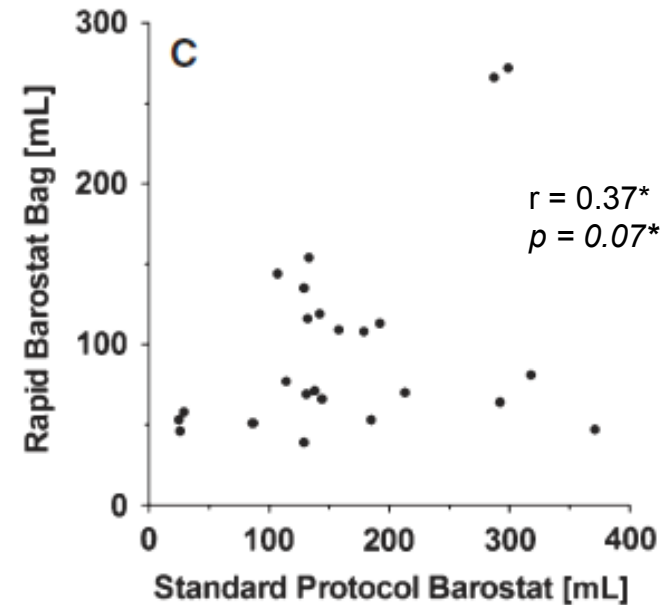
Results

- No Correlation of Standard Barostat to Elastic Balloon
- Correlation of Standard Barostat versus Rapid Barostat Protocol

Rectal capacity at 40mmHg



Initial sensation



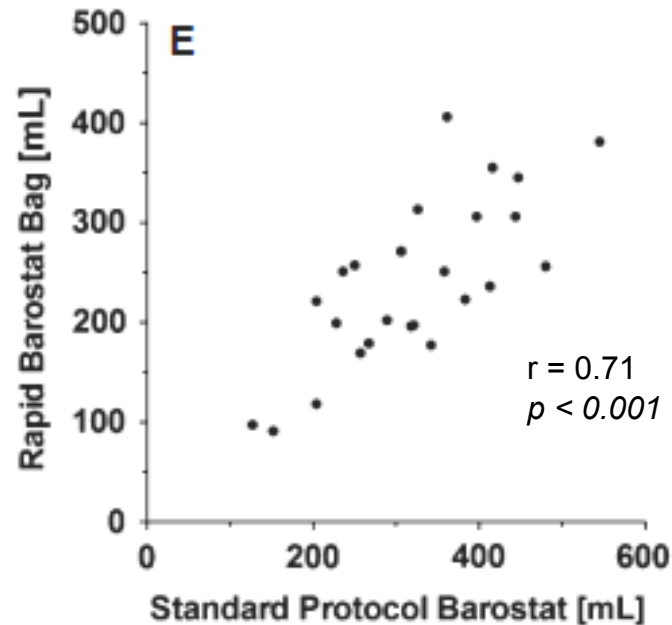
***Depending on study sequence**
(Standard protocol first: $r=0.46$)



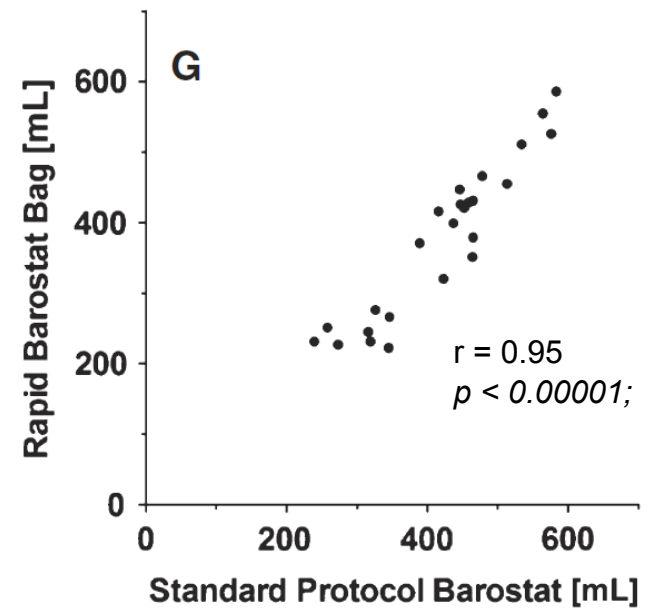
Results

- Correlation of Standard Barostat versus Rapid Barostat Protocol

Urge to defecate



Discomfort



Rapid Barostat Bag Test





Rapid Barostat Bag Test

Rectal Motor And Sensory Function:
Rapid Barostat Bag Test

setup

TODAY'S SCHEDULE: edit

	TEST	REPORT
Osterloo, Matthew	✓	
Mui, Howard	✓	
Alvarez-Oliveros, Adelyn	✓	
Rosevelt, Theodore-Teddy	Touch to start	
Fox, Mark	Touch to start	

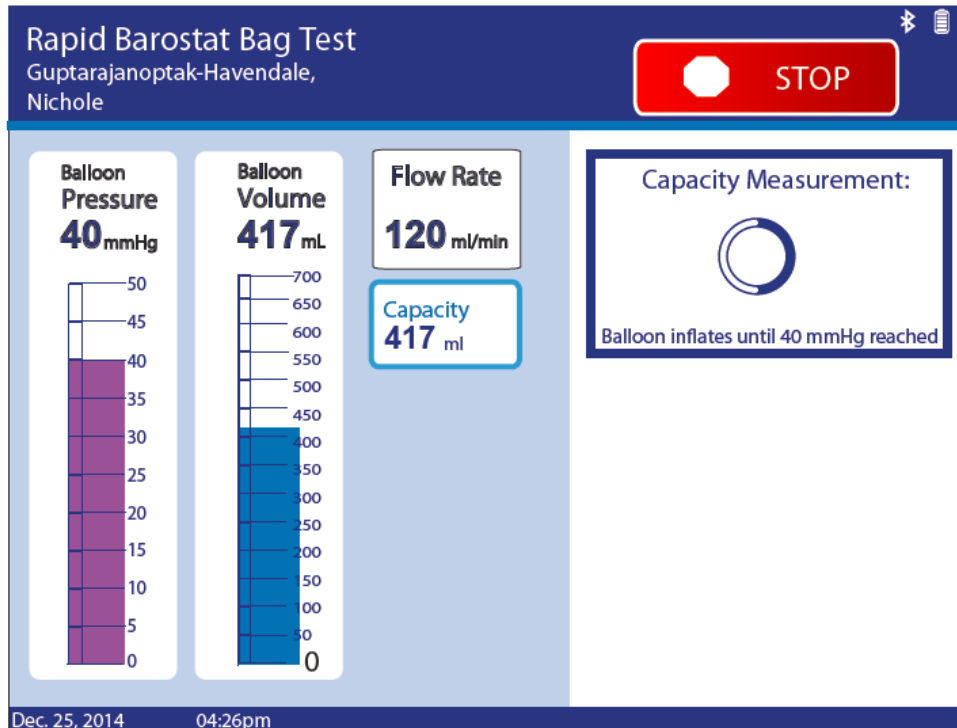
add new patient

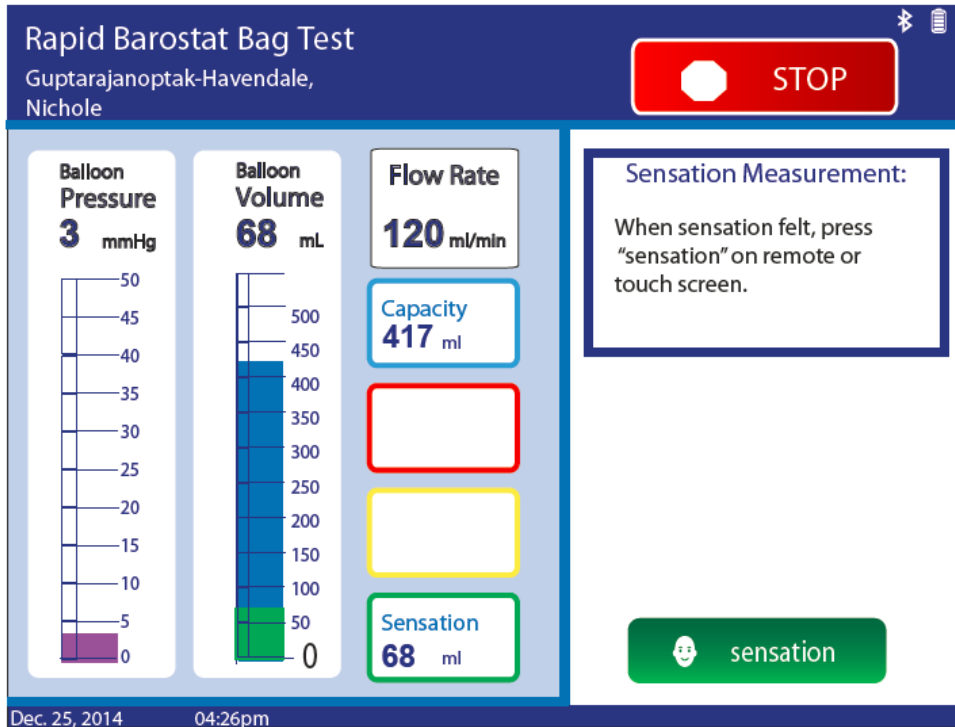
patient files

power off



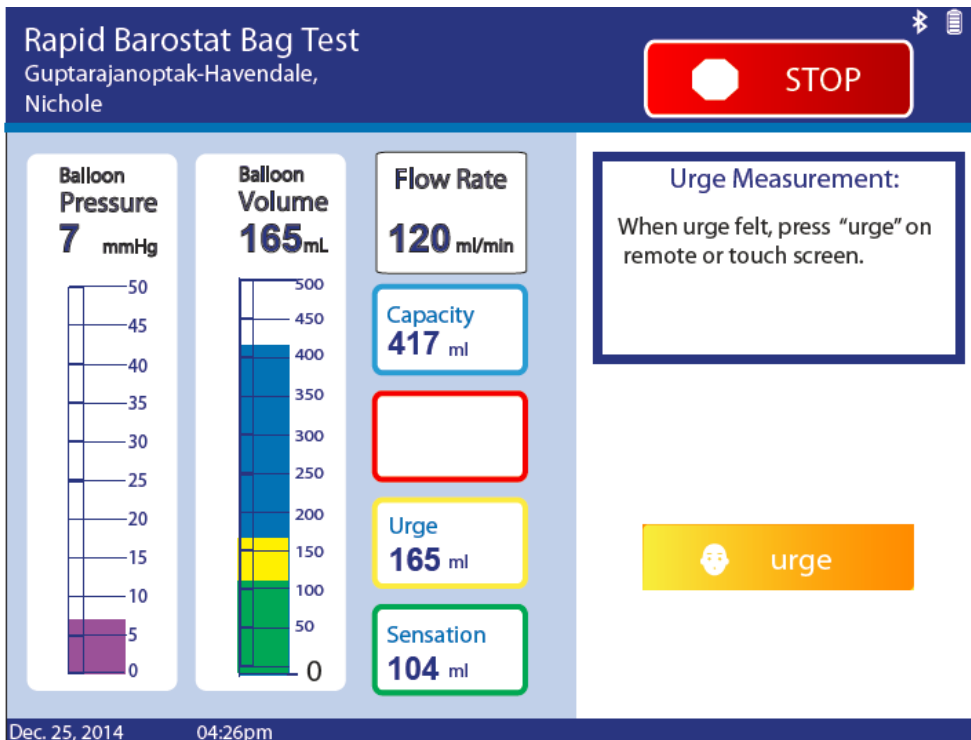
Rapid Barostat Bag Test







Rapid Barostat Bag Test





Rapid Barostat Bag Test

Guptarajanoptak-Havendale,
Nichole

STOP

Balloon Pressure
37 mmHg

Balloon Volume
285 mL

Flow Rate
120 ml/min

Capacity
417 ml

Discomfort
285 ml

Urge
205 ml

Sensation
104 ml

Discomfort Measurement:
When discomfort felt, press
"discomfort" on remote or
touch screen.

discomfort

Dec. 25, 2014 04:26pm



Rapid Barostat Bag Test

University Hospital
Street Address, City, Province
Country, Postal Code

Exam Date: April 24, 2015 - 4:26 pm

Physician: Dr. A

Operator: Nurse C

Ref. Physician: Dr. B

Rectal Motor and Sensory Function: Rapid Barostat Bag Test

Patient: _____ **Hospital ID:** 2468

	Study 1	Study 2	Study 3	Average	%	Summary
DISCOMFORT	260	240	280	260 mL	100%	Normal
URGE	200	230	245	225 mL	86%	Hypo
SENSATION	15	25	20	20 mL	8 %	Hyper
CAPACITY				260 mL	100%	

Pressure at 50% Capacity: 12 mmHg

Disclaimer: The summary findings based on this data analysis should not be interpreted as a final diagnosis.

Comments:

Editable comment section

	Hyper	Normal	Hypo
Discomfort	<80%	80-100%	>100%
Urge	<40%	40-80%	> 80%
Sensation	<10%	10-30%	>30%

Normal Rectal Capacity @ 40mmHg: 200-450mL
Normal Pressure @ 50% Capacity: 9-16mmHg

Dr. A

Signature

Date

Mui Scientific www.muiscientific.com Copyright © Patent Pending



Rapid Barostat Bag (RBB) Study

- Fast, easily available option to assess rectal capacity and sensation
- Good correlation to Standard Barostat procedure in healthy subjects
 - *If relevant, repeat initial sensation measurement at end of study*
- Commercial device soon to be available (Mui Scientific)

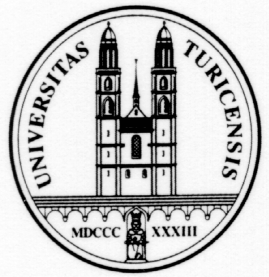
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**Additional diagnostic yield of a rapid barostat bag (RBB) study
designed for use in clinical practice**



Dr. med. Henriette Heinrich

Henriette.Heinrich@usz.ch



15-05-15 /



Background and Aim

Background:

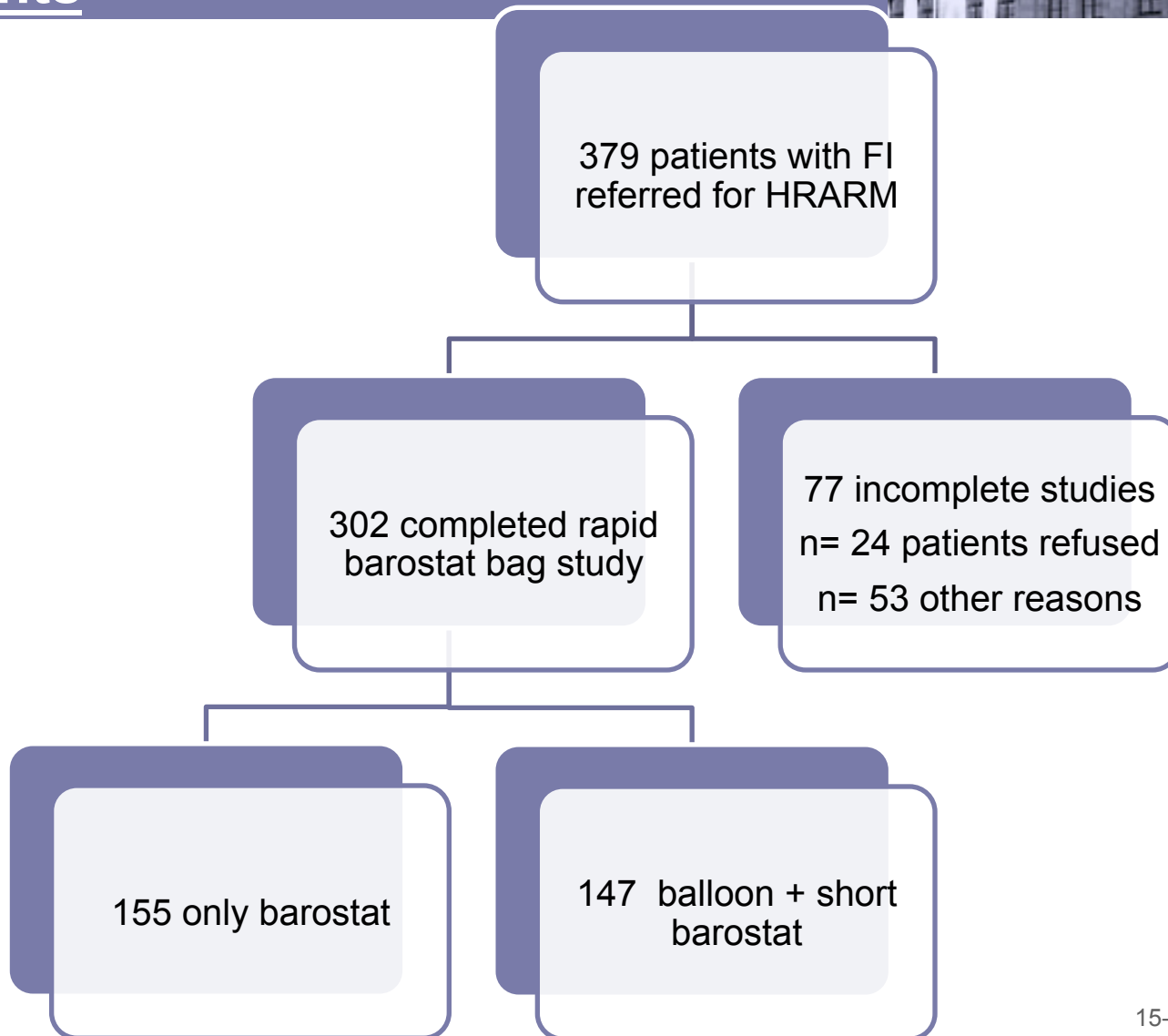
- Abnormal anorectal function not identified by clinical investigation with manometry and elastic rectal balloon in up to 50% FI patients referred for studies.

Aim:

- Impact of rapid rectal barostat measurements on yield of physiologic investigation in FI patients



Patients





Patients II

- 147 patients 121F: 26M
 - mean Vaizey score 11.5/24
- Symptoms
 - Urge Incontinence (UI) n=30
 - Passive Incontinence (PI) n=70
 - Combined Incontinence (CI) n=47
- Medical History
 - 75/121 women had given birth
 - 112 patients had history of abdominal surgery
- Medication use
 - n=24 stool regulation
 - n=33 on loperamide, opiate

Short Protocol, Hand Held Barostat Study



University of Zurich



Conditioning
inflation: until
40mmHg



Record rectal
capacity



Deflate bag

Short Protocol, Hand Held Barostat Study



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Finish



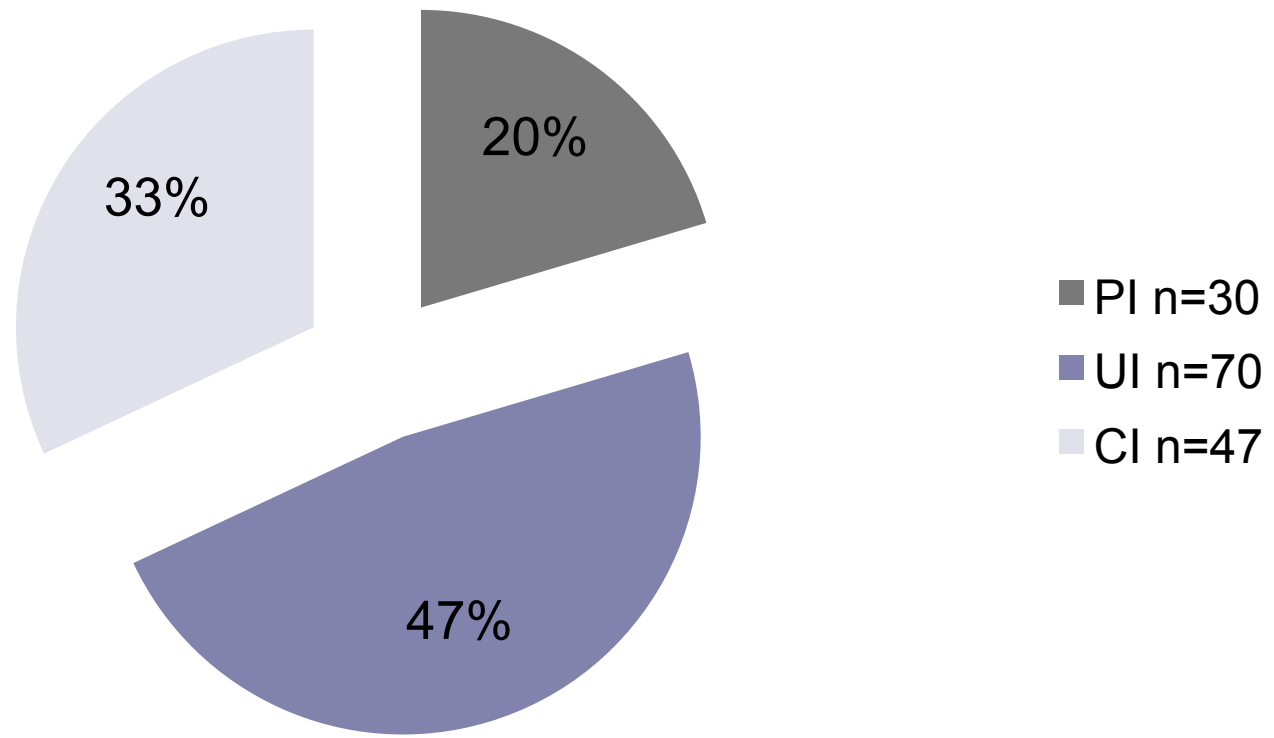
Methods - Definitions

- Normal values (n= 60 healthy subjects)
representative age and sex distribution
- **Low rectal capacity:** <200ml at 40mmHg intra-bag pressure
- **Hyposensitivity:** first sensation at >30% and/or sense of urge >70% of rectal capacity
- **Hypersensitivity:** first sensation below 10% of rectal capacity and /or sensation of urge and discomfort <40% and <80% of rectal capacity



Incontinence - Symptoms

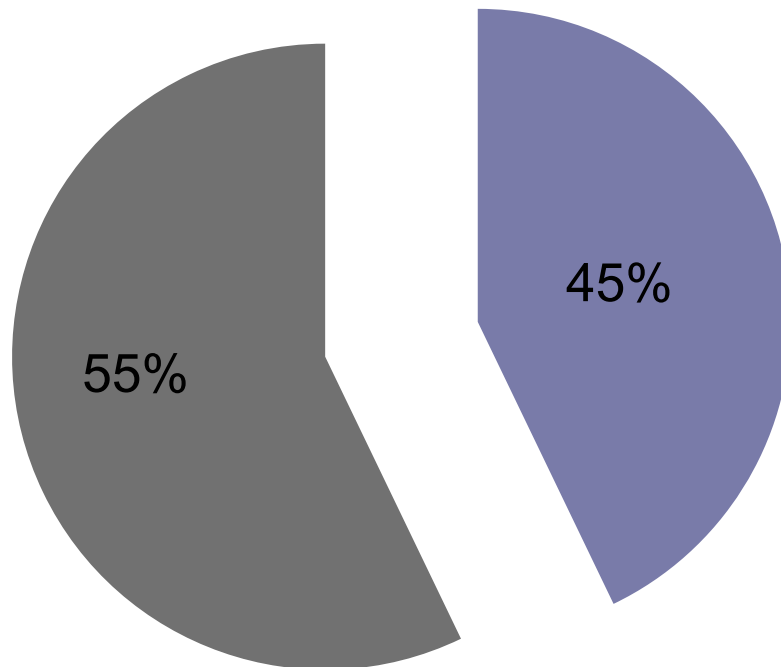
Symptoms





Incontinence – Sphincter pressures

n=147

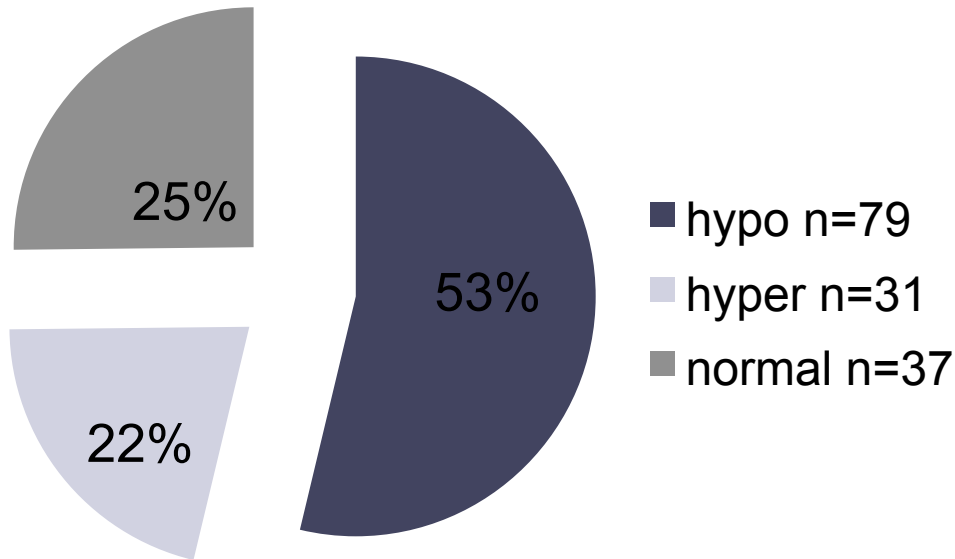


- normal sphincter n=66
- abnormal sphincter function n=88

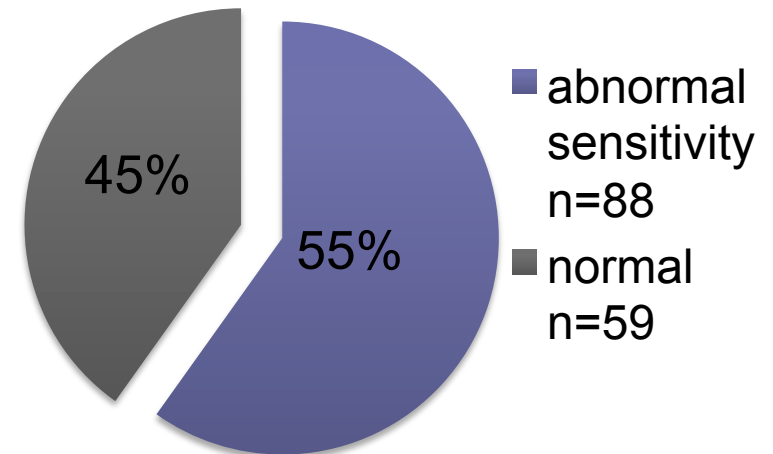


Balloon vs. Barostat – rectal sensitivity

Rapid barostat



Elastic balloon



Correlation between volume measurements by elastic balloon and barostat was poor-moderate (first sensation $r^2=0.36$, urge $r^2=0.44$, discomfort $r^2=0.39$)

79/147(53%) had abnormal abnormal capacity on barostat



Normal Sphincter Abnormal rectal function

Combined incontinence

Reduced rectal volume (n=7)
and/or
13/13 (100%) patients
rectal hyposensitivity

n=66



- UI n=37
- PI n=16
- CI n=13

Passive incontinence:

14/16 (87%) reduced
rectal capacity
and all of these had
rectal hypo-sensitivity
(n=14).

Urge incontinence:

22/37 (60%) reduced
rectal capacity
and / or
rectal hyper-sensitivity
(n=14)

17/66 (26%) had entirely normal manometry and barostat studies



Conclusions

Rapid Barostat Bag (RBB) Studies

- Simple description of rectal capacity and function
- Mechanistic explanation for fecal incontinence in patients with normal anal sphincter function
- *Similar results were not obtained using a standard rectal balloon*