Goop Soup
A Nervous System Breakdown

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Motor PD

• Treatment of PD
  – Focused on dopamine
    • Movement
    • Mood
    • Motivation

More than just a motor illness
Autonomic nervous system

Autonomic = involuntary or unconscious

Rest & digest  
Fight or flight

Autonomic nervous system (ANS)

Frequency of ANS complaints in PD

<table>
<thead>
<tr>
<th>Compartment</th>
<th>Frequency</th>
<th>P (correlation with quality of life)</th>
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<tbody>
<tr>
<td>Gastrointestinal</td>
<td>95%</td>
<td>&lt;0.001</td>
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<tr>
<td>Urinary</td>
<td>100%</td>
<td>0.024</td>
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<tr>
<td>Cardiovascular</td>
<td>62.5%</td>
<td>0.006</td>
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<tr>
<td>Thermoregulation</td>
<td>77.5%</td>
<td>0.001</td>
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<tr>
<td>Sexual</td>
<td>95%</td>
<td>0.970</td>
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Gastrointestinal dysfunction

- Drooling
- Abnormal swallowing
- Bloating
- Nausea
- Belching
- Abdominal pain
- Constipation
- Flatulence
- Defecatory dysfunction
- Weight loss

Gastrointestinal manifestations of PD


Gastrointestinal dysfunction in PD

**drooling**
- 70-78% of patients
- ↓ swallowing

**dysphagia**
- 30-80% of patients
  - Under-reported (20-40% aware)
  - Usually late
  - Usually slow swallow
  - Risk of aspiration
- Dysfunction of pattern generator

Drooling & dysphagia in PD

<table>
<thead>
<tr>
<th>HY score</th>
<th>N</th>
<th>Drooling</th>
<th>Dysphagia</th>
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<tbody>
<tr>
<td>1</td>
<td>53</td>
<td>25%</td>
<td>8%</td>
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<tr>
<td>1.5</td>
<td>27</td>
<td>19%</td>
<td>11%</td>
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<tr>
<td>2</td>
<td>163</td>
<td>35%</td>
<td>13%</td>
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<td>2.5</td>
<td>95</td>
<td>40%</td>
<td>20%</td>
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<tr>
<td>3.0</td>
<td>72</td>
<td>46%</td>
<td>32%</td>
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<tr>
<td>4.0</td>
<td>26</td>
<td>65%</td>
<td>46%</td>
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P-value: <0.001 <0.001 <0.001


Gastrointestinal dysfunction in PD

Upper GI dysmotility
- > 60% of patients
- Esophagus, stomach
  - Slow esophageal transit,
  - Efficiency of sphincter
  - Slow stomach emptying

Constipation
- 20-89%
- Slow colonic transit

Defecatory dysfunction
- 57-67%
- Paradoxical muscle contraction
- Spinal cord disease


Constipation

- 20-81% of PD patients
  - Usual definition < 3 BM per week
- May begin years before motor symptoms
- ↑ colonic transit time in 80% of PD
  - Normal: 20-39 hours
  - Early PD: 89 hours
  - Later PD: 44 to 130 hours
### Constipation prior to PD

#### Risk estimates across all studies

<table>
<thead>
<tr>
<th>Author, yr</th>
<th>Design</th>
<th>$p$ Value</th>
<th>RR</th>
<th>HR</th>
<th>OR</th>
<th>CI</th>
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<td>-</td>
<td>1.80-10.5</td>
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<td>-</td>
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<td>Rehmel, 2014</td>
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<td>1.3-10.4</td>
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<td>3.74</td>
<td>-</td>
<td>-</td>
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<td>Stieg, 2014</td>
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<td>-</td>
<td>2.73</td>
<td>-</td>
<td>1.0-7.3</td>
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</tbody>
</table>

People with constipation in mid-life about **twice as likely to develop PD as people without**

Adams-Carr et al. JNNP 2015:0:1-7

### Defecatory dysfunction

- **Filling phase in PD**
  - Resting anal pressure ↓
  - Smaller ↑ pressure when squeezing
  - Rectal and anal pressures increase together
- **Defecation phase in PD**
  - ↓ rectal contraction
  - ↓ abdominal straining
  - ↑ anal pressure

Sakakibara et al. Parkinson’s Disease 2011; article ID 924605

### GI symptoms and nutritional risk

208 PD patients

- **17.2% at nutritional risk**
- **5% at severe nutritional risk**
  - Mainly related to weight loss
- **Those at risk:**
  - More severe disease
  - Higher levodopa dosage
  - More “non-motor” complications


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ANS involvement in PD

Treatment approaches

- Hard candy, gum
- Anticholinergic medications
  - Glycopyrrolate
- Botulinum toxin injections

Treatment for drooling

- Hard candy, gum
- Anticholinergic medications
  - Glycopyrrolate
- Botulinum toxin injections

Treatment of dysphagia

- Lack of good studies
- Expiratory Muscle Strength Training:
  - Exhalation against pressure
  - 5 sets, 5 breaths per day
  - Improved swallow safety after 4 weeks
  - Modest effect
- Video Assisted Swallowing therapy:
  - Patients watch videos of swallow process and their own swallow
  - Reduced food residues and better swallowing quality of life
- Lee Silverman Voice Treatment (LSVT LOUD)
  - One small uncontrolled study
  - Improved tongue and tongue base movement

Common recommendations for swallow

Environment
- Quiet place, no distractions
- Focus on eating
- No talking
- Don’t eat when tired
- Eat when “on”

Posture & feeding
- Sit close to the table
- Upright, head up
- Stay up after eating
- Small bites
- Chew thoroughly
- Swallow more than once

Ayres et al. Int Arch Otorhinolaryngology 2016;20(3)

Common recommendations for swallow

Meal duration
- 30 minute maximum
- Don’t rush

Oral hygiene
- Brush thoroughly after meals
- Brush your tongue
- Remove dentures and clean after every meal
- Clean mouth even if no teeth

Ayres et al. Int Arch Otorhinolaryngology 2016;20(3)

Management of constipation

- Conservative strategies
  - Regular bathroom time
    - After meals
    - Don’t ignore the urge,
  - Relax
  - Drink enough water
  - Fiber: bran, fruits, vegetables
  - Exercise
  - Position

Ayres et al. Int Arch Otorhinolaryngology 2016;20(3)
Management of Constipation & Defecatory Dysfunction

**Constipation**
- Stool softeners
- Laxatives
  - Senna
  - Polyethylene glycol
  - Lactulose
- Prescription drugs
  - Pyridostigmine bromide
  - Tegaserod
  - Lubiprostone
  - Linactolide

**Defecatory Dysfunction**
- Pelvic floor physical therapy*
- Botulinum toxin injections


Anti-constipation paste

**Ingredients**
- 1 T Senna tea & 2.5 C boiling water
- 3 # dried fruit (prunes, figs, raisins etc)
- 1 C brown sugar
- 1 C lemon juice

**Directions**
- Steep tea 5 minutes and strain. Boil the fruit in tea to soften (5 mins). Add sugar and lemon juice. Blend into a smooth paste. Store in "Tupperware" in freezer.
- Take 1-2 T daily as needed

http://naturalhealthtechniques.com/recipesconstipation_paste1_filesconstipation_paste1/
Urinary dysfunction in PD

- Overactivity of detrusor muscle
  - Frequency
  - Urgency
  - Incontinence
- Treatment strategies
  - Bladder training
  - Drugs: oxybutynin, tolterodine, fesoterodine, trospium, darifenacin, solifenacin
  - Botulinum toxin injections

Cardiovascular dysfunction

Orthostatic hypotension

- Symptoms:
  - Lightheaded, dizzy
  - Blurred vision
  - Fatigue
  - Neck, shoulder pain
  - Cognitive difficulties
  - Chest pain
  - Loss of consciousness

- Orthostatic hypotension
  - Greek: ortho=straight, static=standing
  - ↓BP 20/10 within 3 m standing
- 750-1000 ml displaced ↓
ABCD of treating OH

- Abdominal binder
- Boluses of water
- Bed up
- Conservative
  - Salt
  - Caffeine
- Countermaneuvers
  - Toe raising
  - Cross legs
  - Contract thigh muscles
  - Bend at the waist
  - March in place
  - Elevate legs

Drugs

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose</th>
</tr>
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<tbody>
<tr>
<td>Fludrocortisone</td>
<td>0.1-0.6 mg/day</td>
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<tr>
<td>Pyridostigmine</td>
<td>30-60 mg TID</td>
</tr>
<tr>
<td>Midodrine</td>
<td>3-10 mg TID</td>
</tr>
<tr>
<td>Droxidopa</td>
<td>200-600 mg TID</td>
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Thermoregulatory dysfunction

Thermoregulation
Excessive sweating in PD

- The problem
  - 64% PD report abnormal sweating
  - Often localized or asymmetric
    - ↑ face, head, trunk
    - ↓ limbs
  - Not correlated with severity
  - Predominantly when "off" or "dyskinetic"

- Approach
  - Avoid triggers
  - Use antiperspirant
  - Wear natural fabrics

- Treatments
  - Optimize PD meds
  - Anticholinergics?
  - Botulinum toxin

Sexual dysfunction

- Women
  - Arousal 87.5%
  - Orgasm 75%
  - Low desire 46.9%
  - Dissatisfaction 37.5%

- Associations
  - Higher dose of meds
  - Deteriorating health
  - Depression

- Men
  - ED 68.4%
  - Premature ejaculation 40.6%
  - Orgasm 39.5%
  - Dissatisfaction 65.1%

- Associations
  - Depression
  - Hx prostatectomy
  - Dopamine agonist
  - More severe disease
  - Use of antidepressant
  - Hyperlipidemia

Brommer et al. J Sex & Marital therapy 2010;36:95