

*Webinar*

*‘Doorgeslikt en opgegeten:  
over mondzorg en slikstoornissen bij ouderen’*

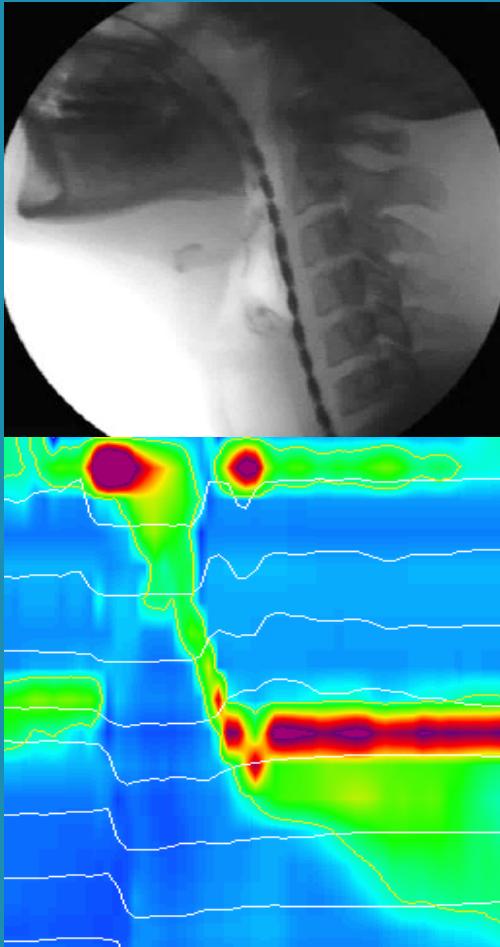
*Dienst Geriatrie UZ Leuven  
31 mei 2022*

# Wat vertelt objectieve diagnostiek van slikken over slikproblemen bij gezonde en zieke ouderen ?

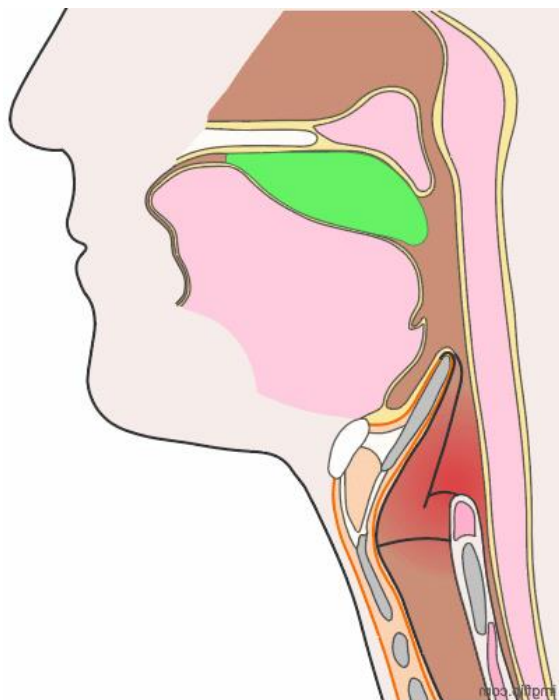
Prof Dr Nathalie Rommel

KU Leuven, Neurowetenschappen, Experimentele ORL, Deglutologie  
UZ Leuven, Gastroenterologie, Neurogastroenterologie & Motiliteit

[www.deglutology.com](http://www.deglutology.com)



# Inleiding



Slikken is een complexe beweging, grotendeels automatisch

Samenspel van lippen, gebit, tong, wangen, speekselklieren, palatum, farynx, epiglottis, larynx en slokdarm.

32 spieren en 6 hersenzenuwen

Gemiddeld 800 tot 2400 keer per dag

Eten en drinken, ook speekselcontrole

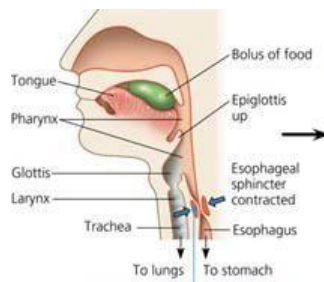
Een slik duurt max twee seconden

# Inleiding

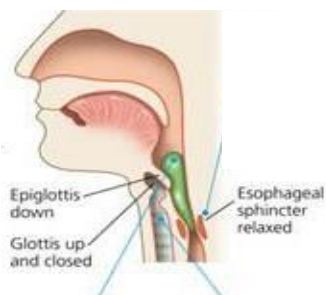
Stoornis in het slikken: dysfagie

Wetenschap van het slikken: deglutologie

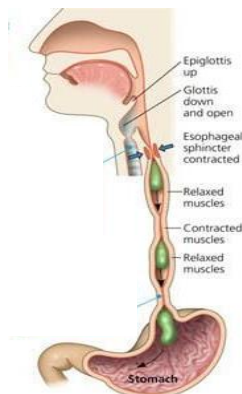
MOND



KEEL



SLOKDARM



Dysfagie bij 30-40% van ouderen vanaf 65 jaar :  
dysfagie erkent als geriatrisch syndroom

Geschat: meer dan 16 miljoen US en tot 30 miljoen  
Europese ouderen hebben specifieke zorg nodig voor  
dysfagie op dit moment

Gerelateerd aan leeftijd, fragiliteit, neurogene,  
endocriene en psychiatrische aandoeningen

Leeftijd van 75 jaar verdubbelt het risico op dysfagie  
en heeft significante impact op morbiditeit en de duur  
van ziekenhuisopnames

Impact dysfagie op de gezondheid van oudere  
patienten is groter dan andere chronische ziektes  
zoals metabole and cardiovasculaire ziektebeelden

# Prevalentie van dysfagie

Neurogene populatie
Dementia: <b>13-57%</b>
Parkinson's disease: <b>19-81%</b>
Stroke: <b>38-78%</b>
Neurodegenerative diseases: <b>44-60%</b>

Ouder wordende populatie
Independently-living older people (>70 y.o): <b>27.2%</b>
Elderly patients admitted to an acute care unit : <b>47.4%</b>
Nursing home residents : <b>51%</b>

Structurele pathologie
Hoofd-hals oncologie: <b>38-50%</b>
Osteofyt: <b>17-28%</b>
Zenker Diverticulum: unclear

**Dysfagie: erkend als een belangrijke druk op gezondheidssystemen**

**Aanwezigheid van dysfagie verhoogt gezondheidskosten en verlengt hospitalisatieduur**

Orofaryngeale Dysphagie  
WHO classification:

ICD-9-CM Code : 787.20  
ICD-10-CM Code: R13.1  
ICD-11-CM Code : MD93

**Gastrointestinale symptomen die onmiddellijke zorg vereisen:**

- Dysfagie: rank 10 in de US
- Aantal dysfagie consulten: 500,000/jaar

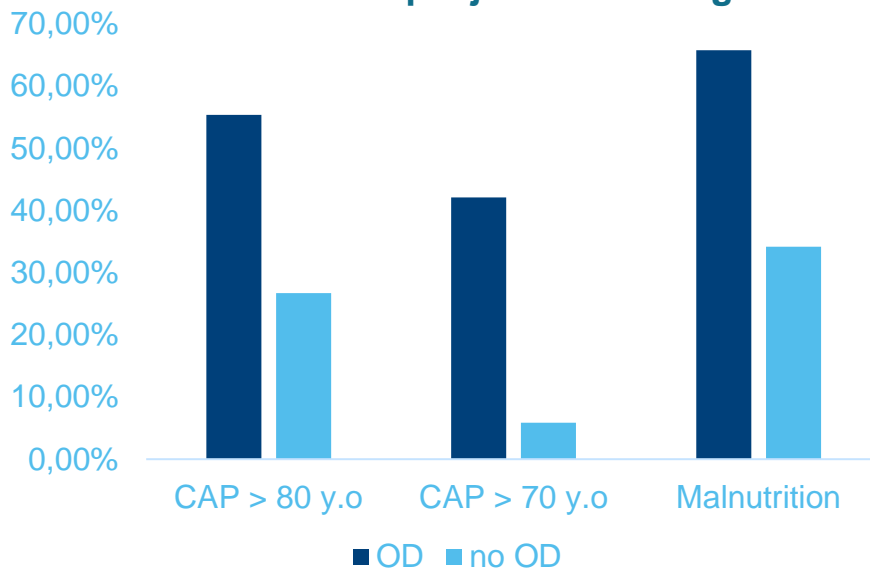
**Uitgaven (in million \$):**

- Totale bedrag besteed: <18,000 for dysphagia
- Overstijgt de kost voor GI kanker

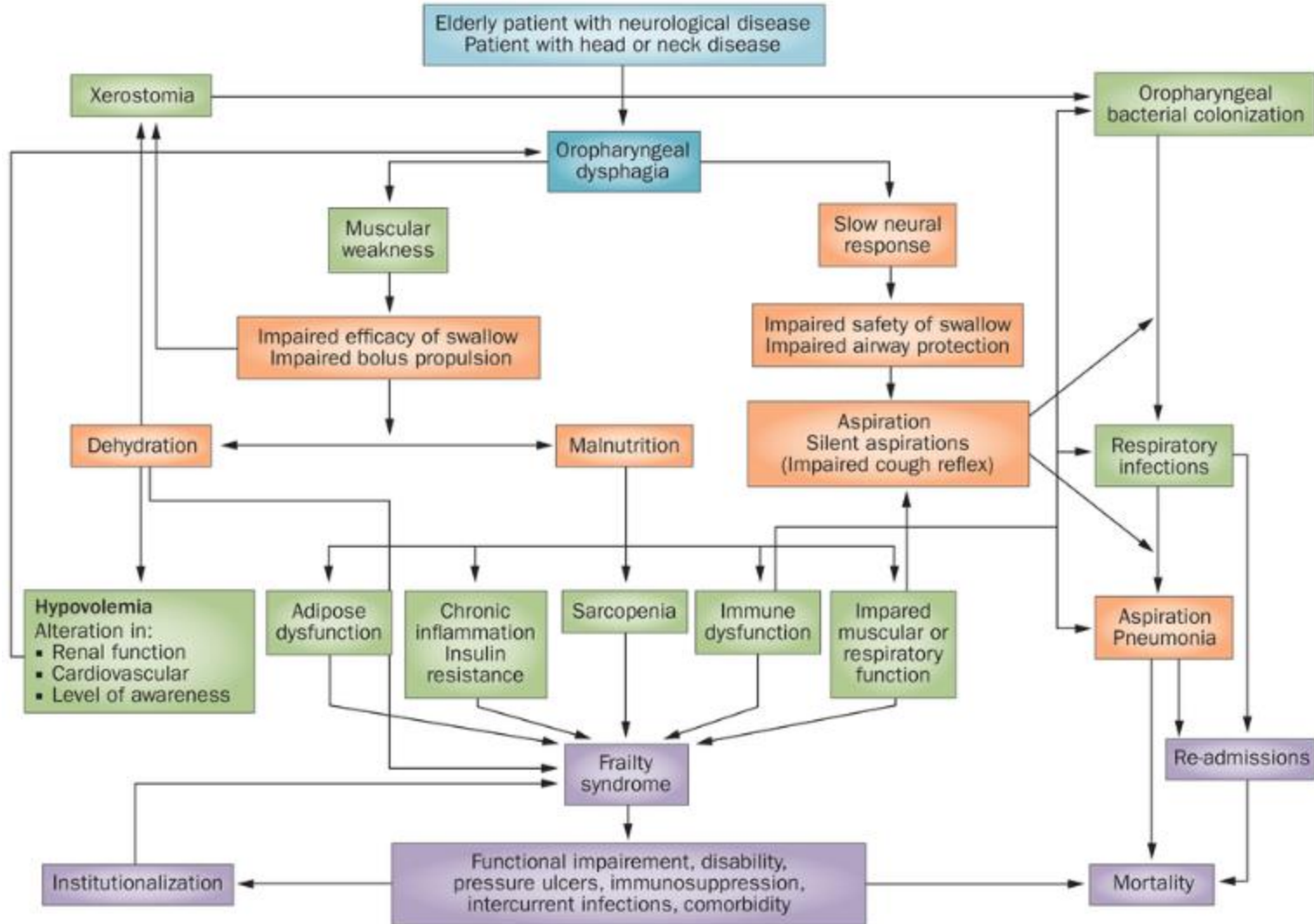
# Comorbiditeit dysfagie respiratoire klachten, malnutritie, dehydratie en voedsel impactie

Prevalentie en prognostische factoren van dysfagie bij ouderen  
comorbiditeit: community acquired pneumonia (CAP) en malnutritie

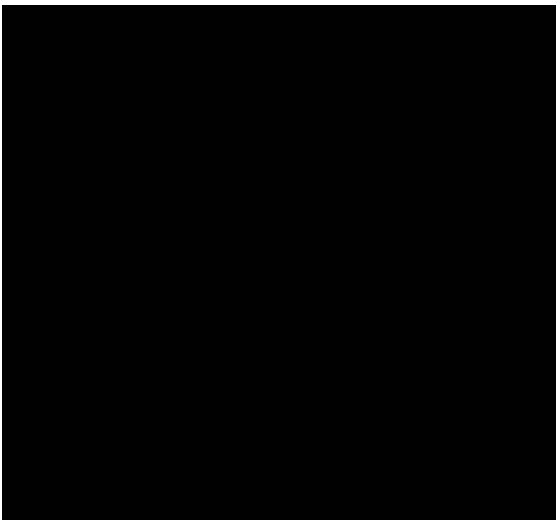
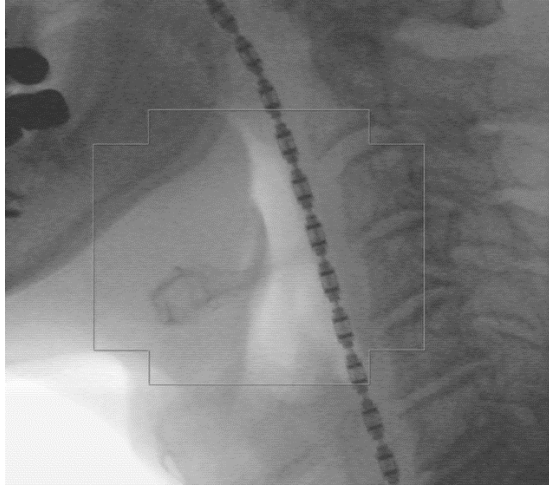
**Mortaliteit op 1 jaar na ontslag uit ziekenhuis**



# Pathofysiologie van nutritionele en respiratoire complicaties gelinkt aan orofaryngeale dysfagie



# Slik fysiologie



**VEILIG:** luchtweg sluiting

**EFFICIENT:** effectieve mechanisme

1. bolus propulsie (mond)
2. bolus klaren  
(keel / bovenste slokdarmspier)

**ONVEILIG:** onvoldoende luchtweg sluiting:  
aspiratie / penetratie

**INEFFICIENT:** geen effectieve mechanisme

1. Afwijkende bolus propulsie (mond):  
overloop
2. Inefficiënte bolus klaring in keel:  
residue

# Directe en indirecte symptomen van of orofaryngeale dysfagie

## Direct symptoms of oropharyngeal dysphagia

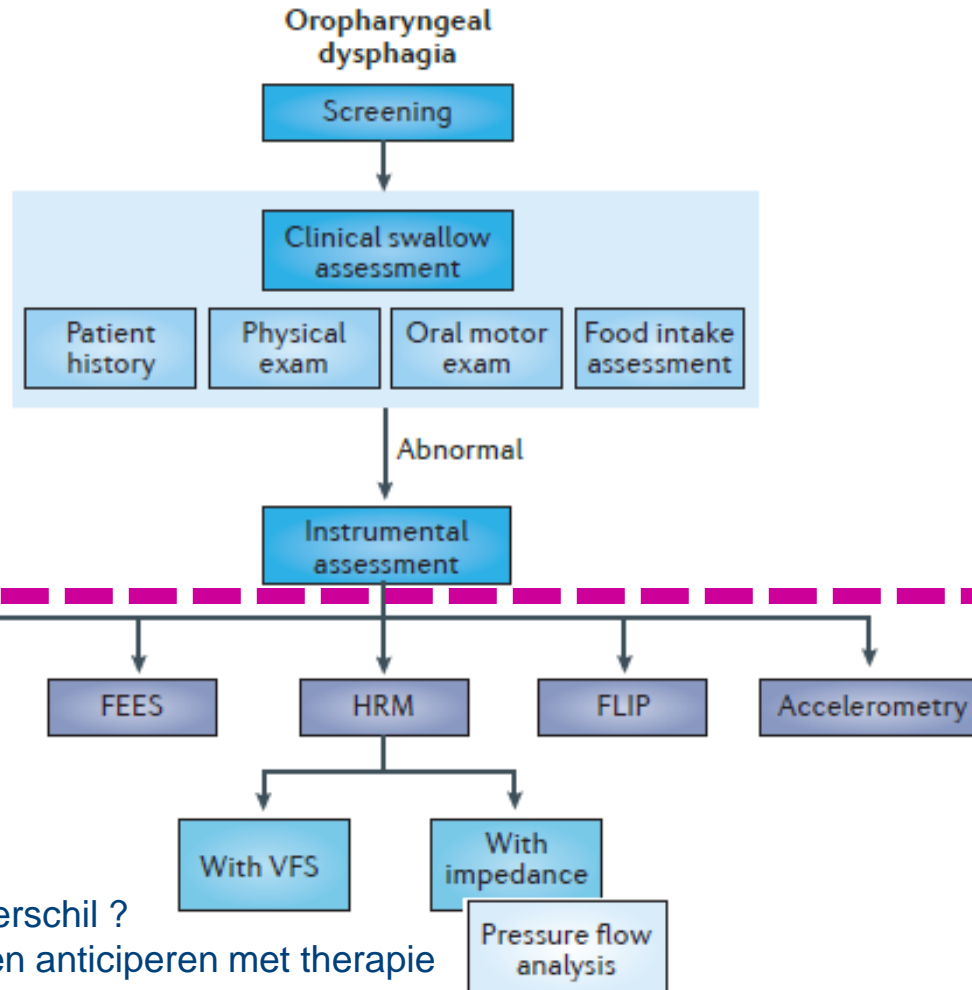
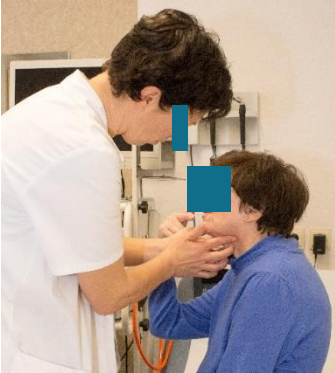
- Food spillage from lips
- Drooling
- Nasal regurgitation
- Coughing, choking
- Regurgitation
- Food sticking in the throat
- Avoidance of certain consistencies
- Posture changes

## Indirect symptoms of oropharyngeal dysphagia

- Weight loss
- Repeated chest infections
- Bronchitis and/or pneumonia
- Prolonged meal duration
- Coughing
- Changes in voice, articulation, speech and language



# Hoe gebeurt slikonderzoek ?



Doel objectieve diagnostiek :

Diagnostiek: nauwkeurig

Behandeling evalueren: verschil ?

Ziekteproces voorspellen en anticiperen met therapie

# Slikdiagnostiek

## Fundamentele vragen bij vermoeden van dysfagie

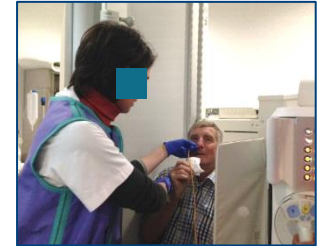
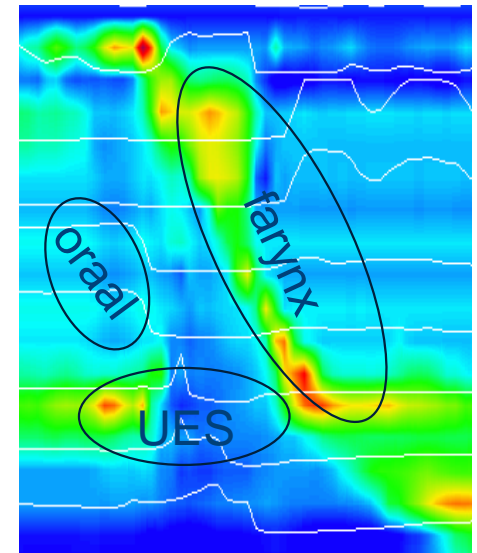
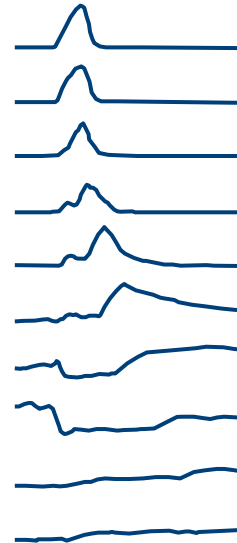
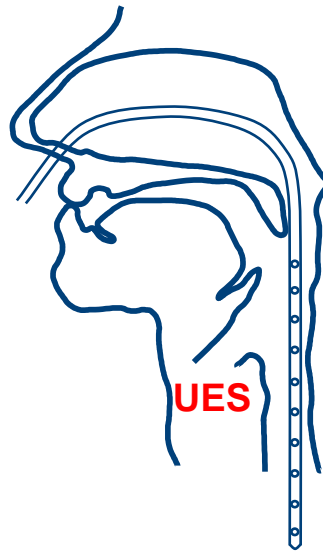
1. Is het (oro)faryngeale slikken normaal of abnormaal ?
2. Is er aspiratie ?
3. Is er een anatomische afwijking die chirurgisch of endoscopisch kan behandeld worden ?
4. Is er sprake van abnormale motoriek die kan behandeld worden met sliktherapie ?
5. 5. Hoe linken bevindingen met symptomen en perceptie van de patiënt ?

# Videofluoroscopie met manometrie

## Videofluoroscopie BOLUS VLOED



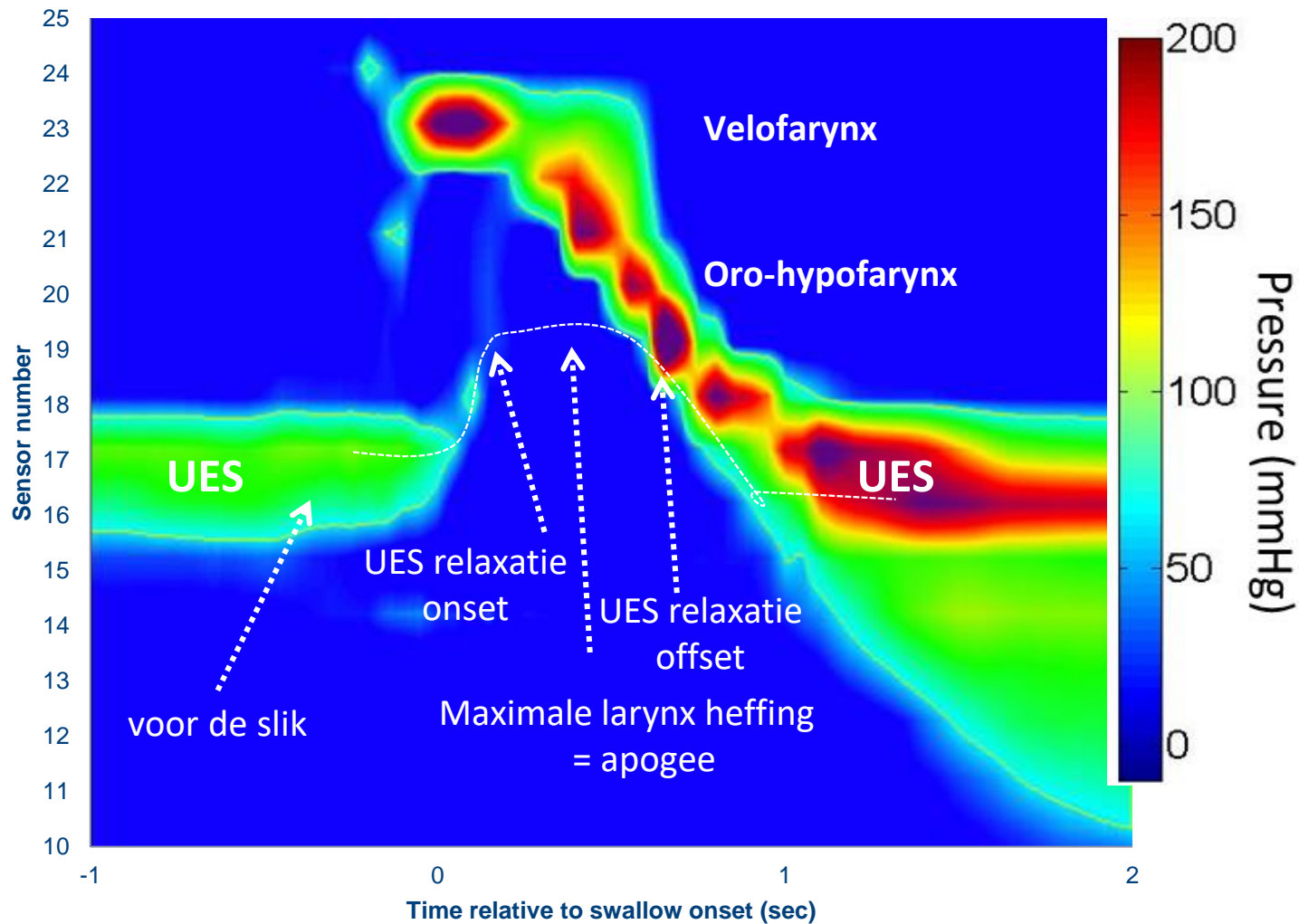
## Manometrie MOTILITEIT

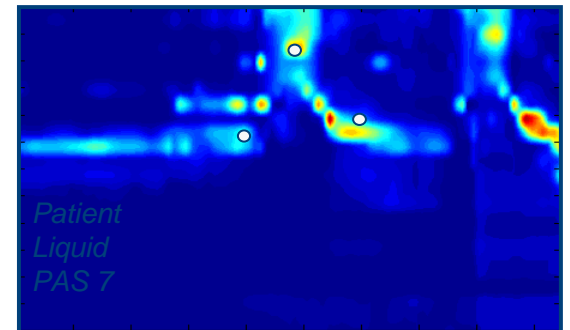
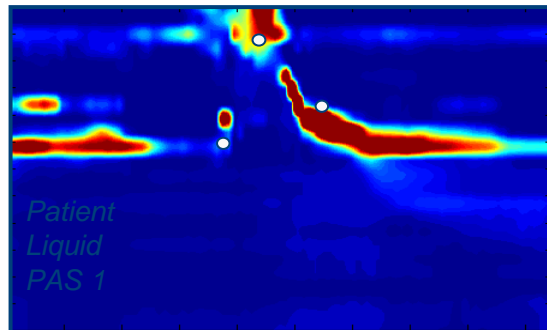
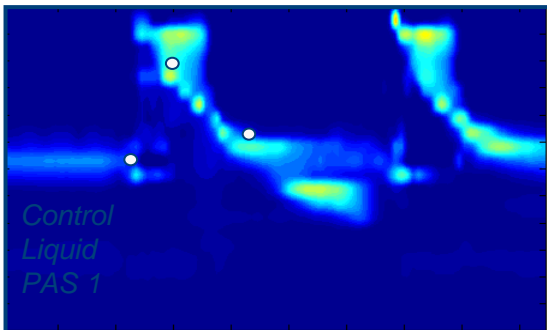
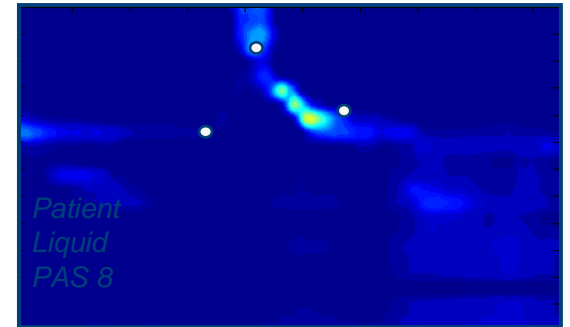
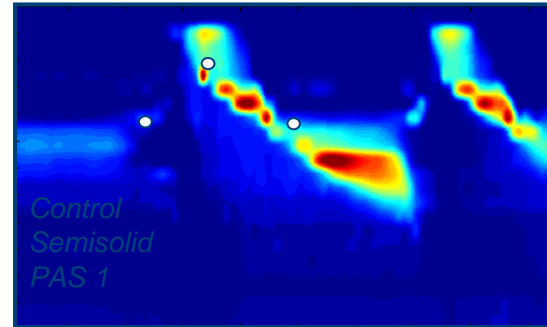
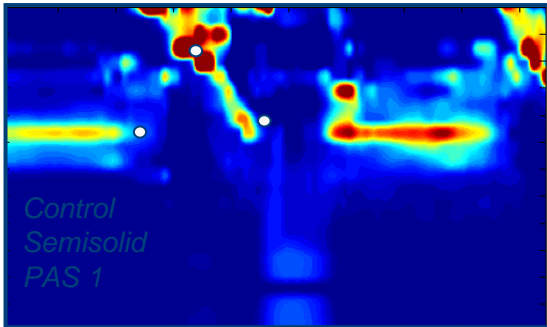
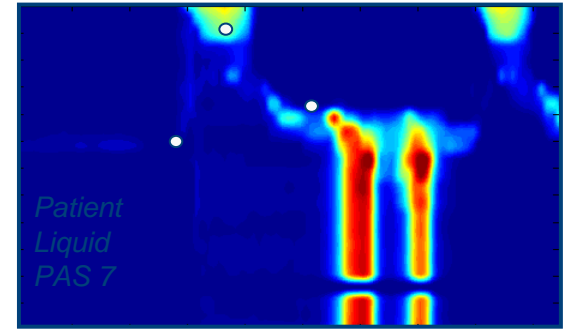
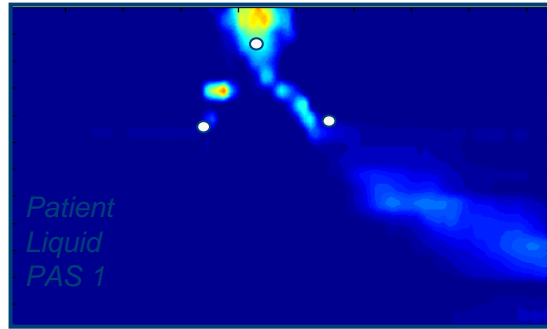
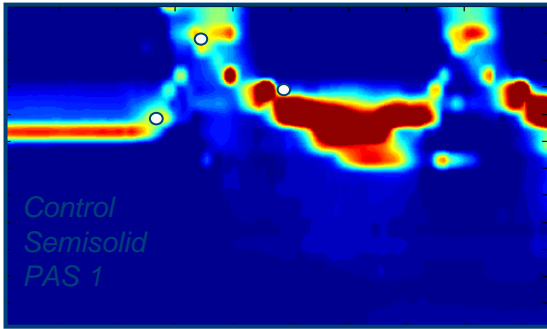


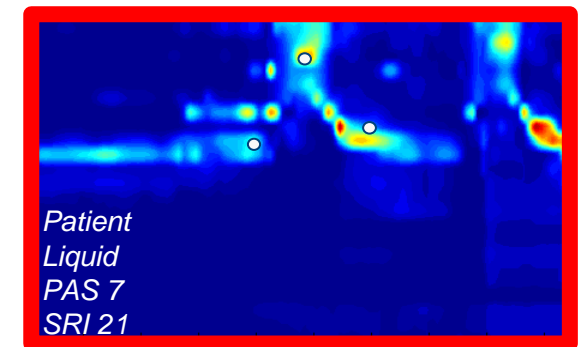
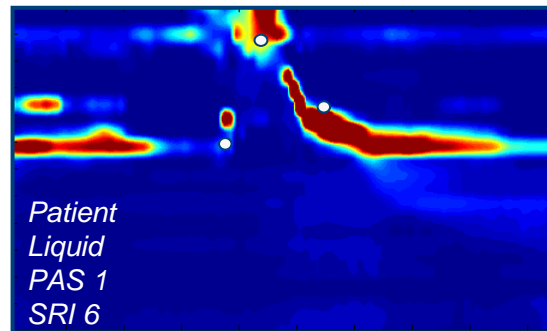
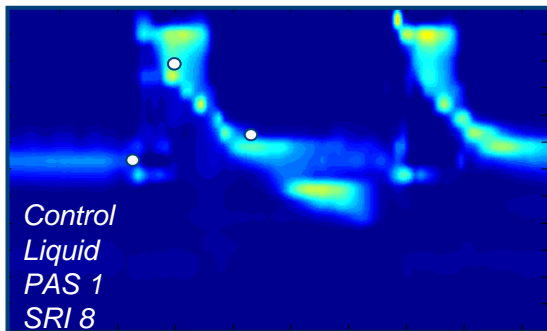
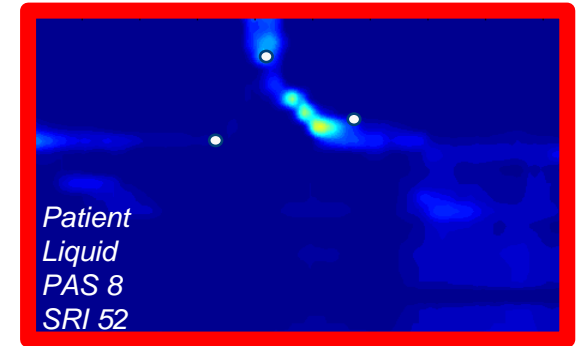
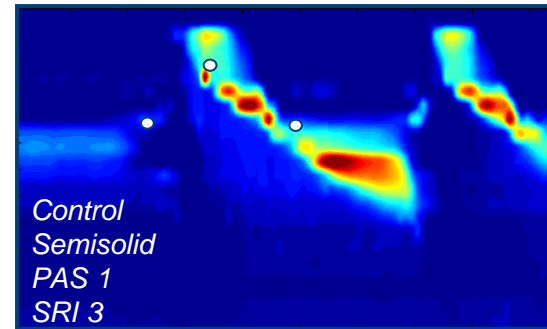
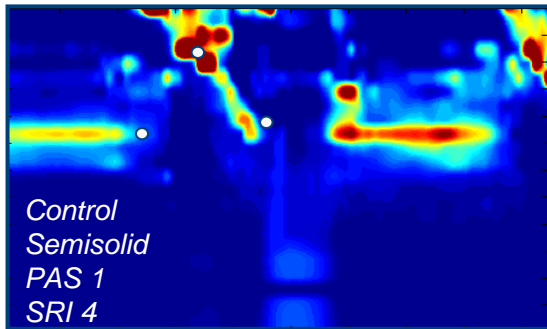
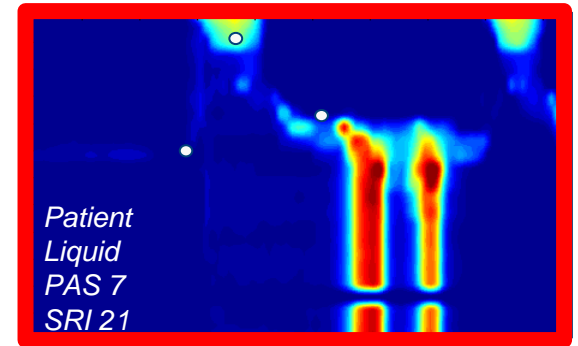
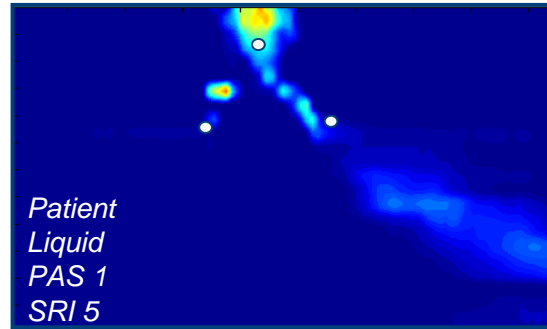
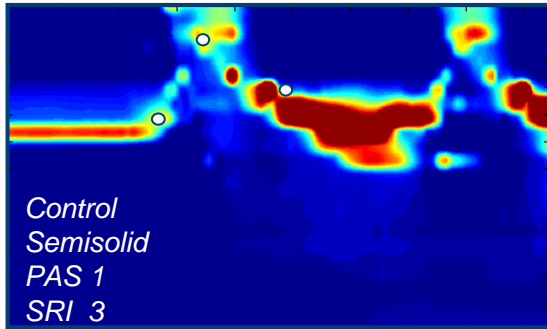
*Catheter met digitale sensoren (OD 3.2mm) :  
36 1cm-spaced druk sensoren*



# Diagnostiek: manometrie keel en bovenste slokdarmsfincter

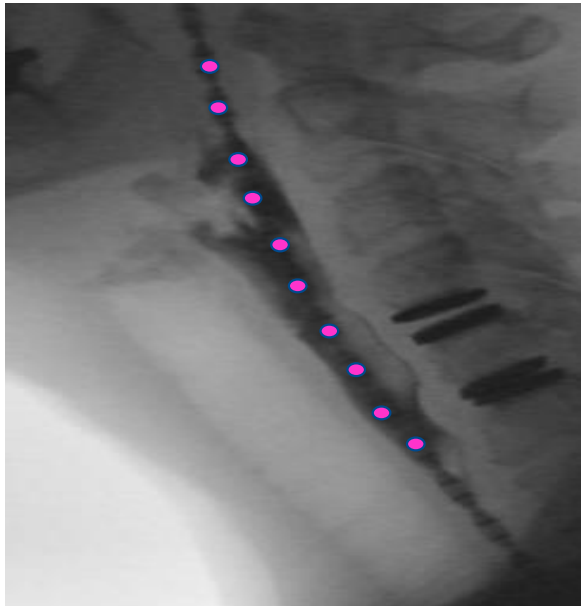




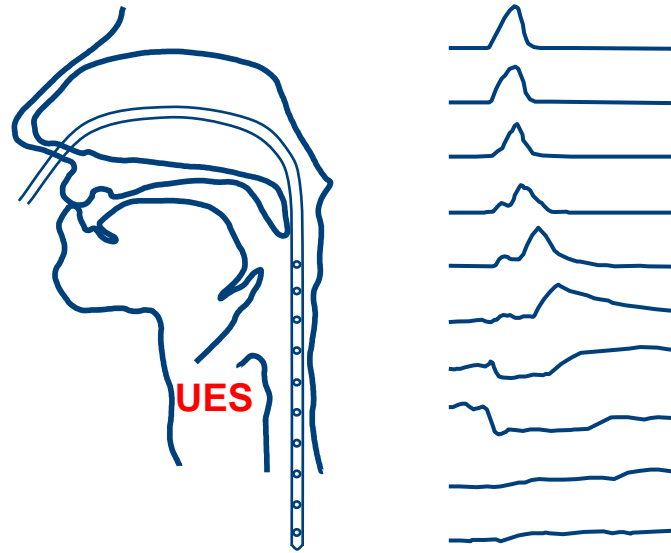


# Videofluoroscopie - Manometrie – Impedantie

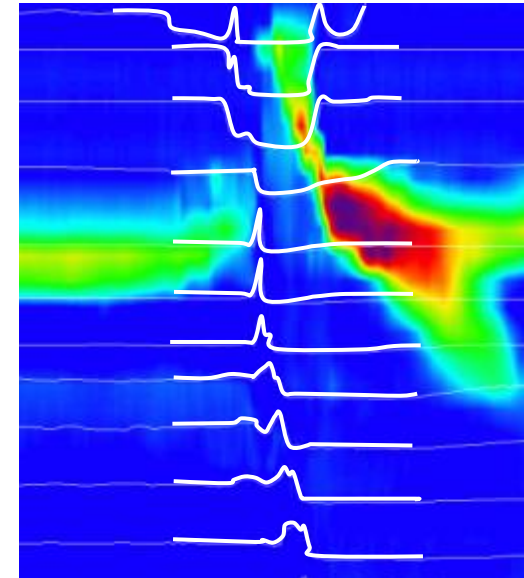
## Videofluoroscopie BOLUS VLOED



## Manometrie MOTILITEIT

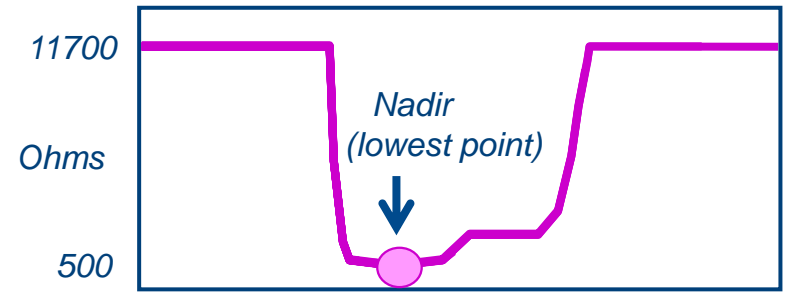
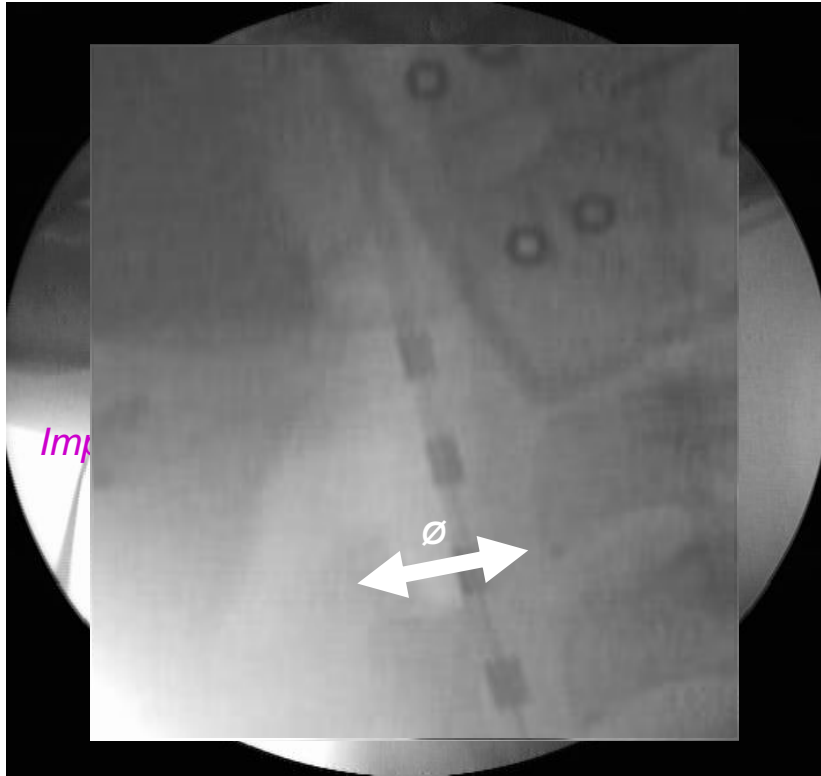


## Impedantie BOLUS VLOED

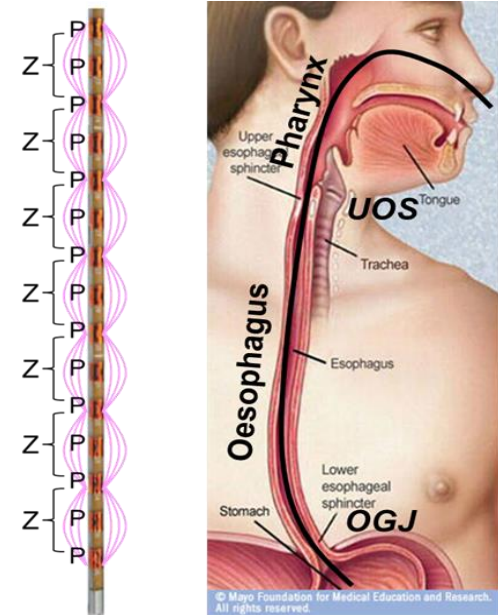


*Catheter : solid state (OD 3.2mm) :  
36 1cm-spaced pressure sensors  
16 impedance segments (2 cm)*

# Impedantie meting



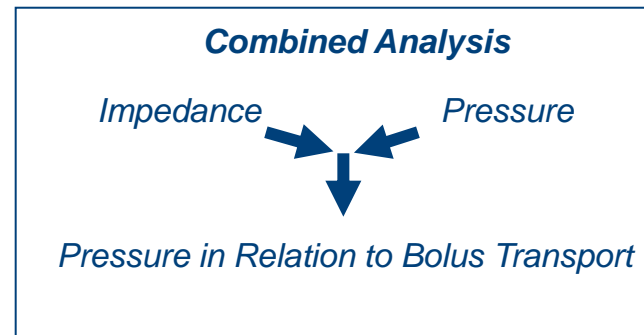
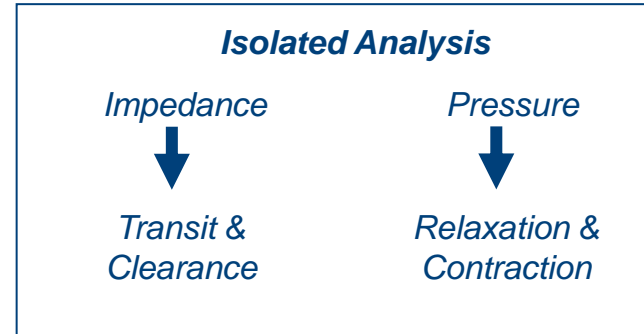
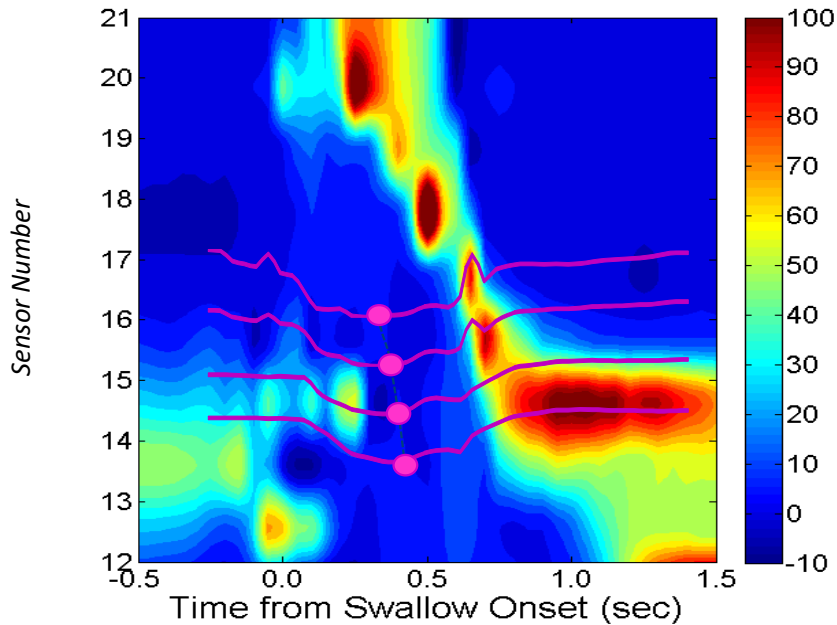
1sec



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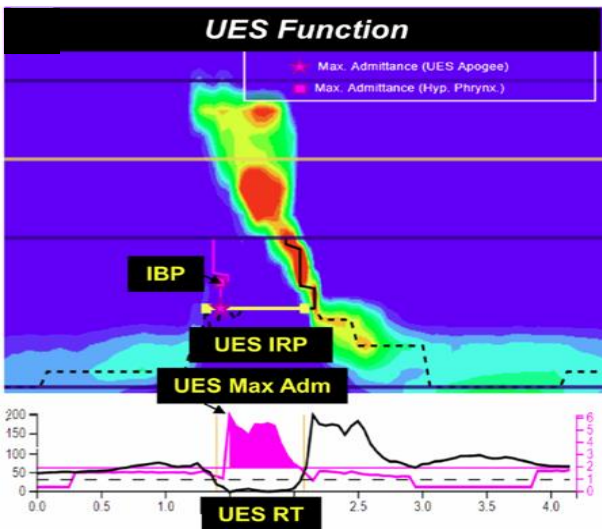
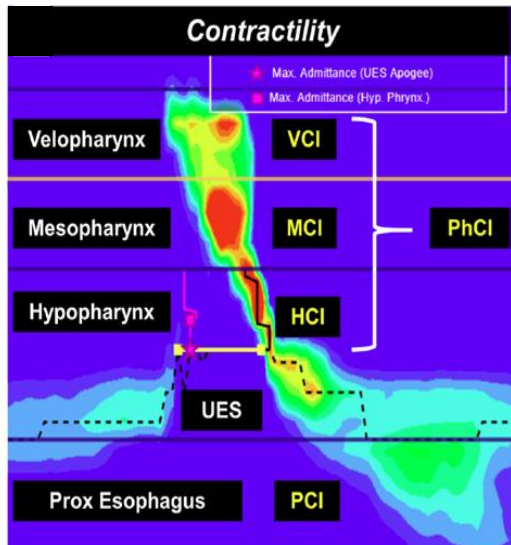


# Diagnostiek: videomanometrie met impedantie



## 'Pressure Flow Analyse' (PFA)

# Diagnostiek: videomanometrie met impedantie



- Farynx
  - Contractiliteit (HRM)
- Bovenste slokdarmsfincter (UES)
  - UES relaxatie (HRM)
  - UES opening (impedantie)
  - Weerstand op bolus thv UES (HRM)
- Swallow Risk Index (swallow functie)

Dysphagia (2020) 35:281–295  
<https://doi.org/10.1007/s00455-019-10023-y>

ORIGINAL ARTICLE



## High-Resolution Pharyngeal Manometry and Impedance: Protocols and Metrics—Recommendations of a High-Resolution Pharyngeal Manometry International Working Group

Taher I. Omari<sup>1</sup> · Michelle Ciucci<sup>2</sup> · Kristin Gozdzikowska<sup>3</sup> · Ester Hernández<sup>3</sup> · Katherine Hutcheson<sup>4</sup> · Corinne Jones<sup>2</sup> · Julia Maclean<sup>5</sup> · Nogah Nativ-Zeltzer<sup>6</sup> · Emily Plowman<sup>7</sup> · Nicole Rogus-Pulia<sup>2</sup> · Nathalie Rommel<sup>8</sup> · Ashli O'Rourke<sup>9</sup>

Pharynx CI

Contractie  
Kracht

IBP

Druk in de bolus

DCL

Bolus  
Propulsie

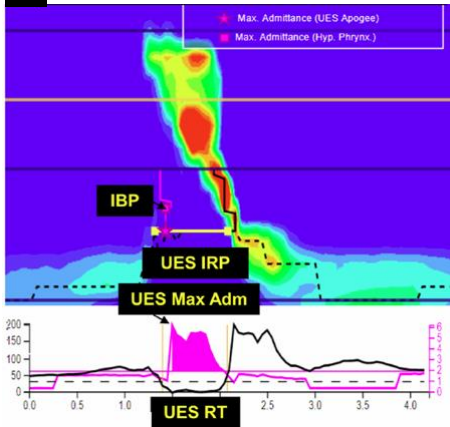
Flow Interval

Bolus  
Vloed

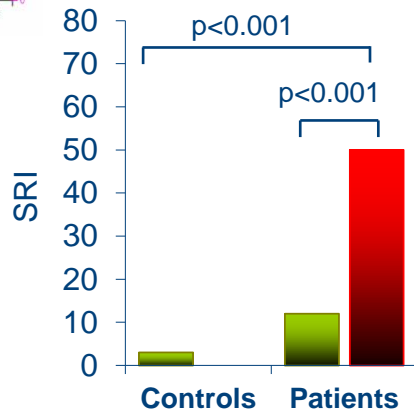
UES admittance

UES  
Opening

Swallow Risk Index (SRI)  
(globale slikdysfunctie)



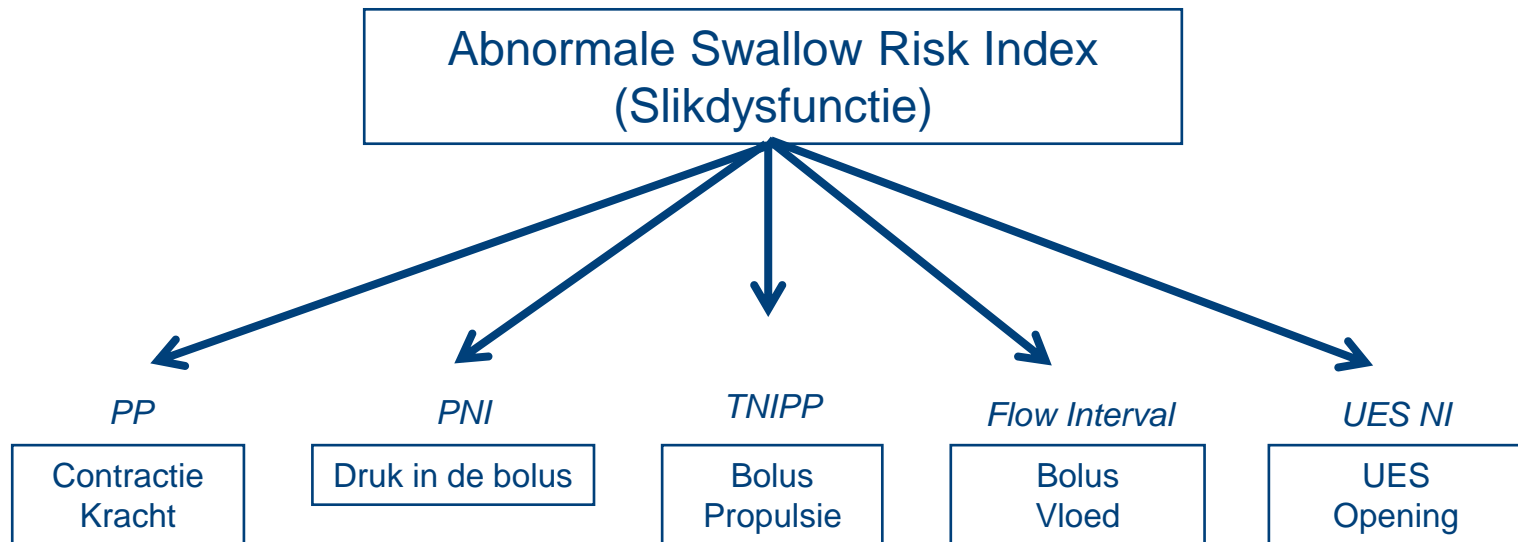
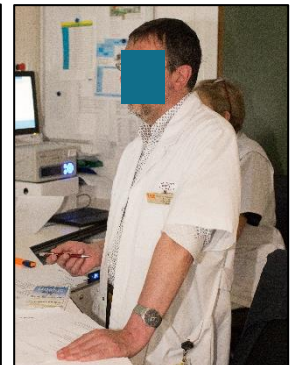
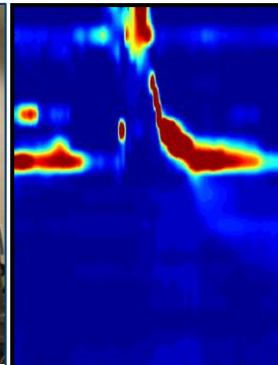
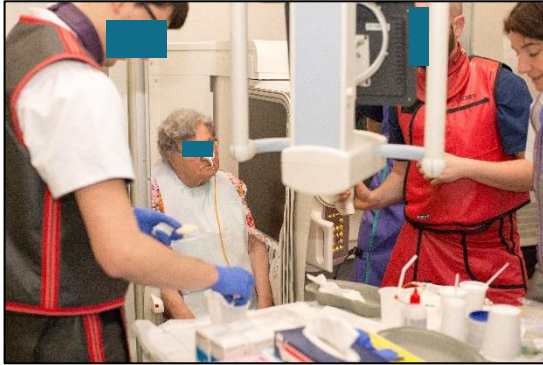
■ NO Asp-Pen  
■ Asp-Pen



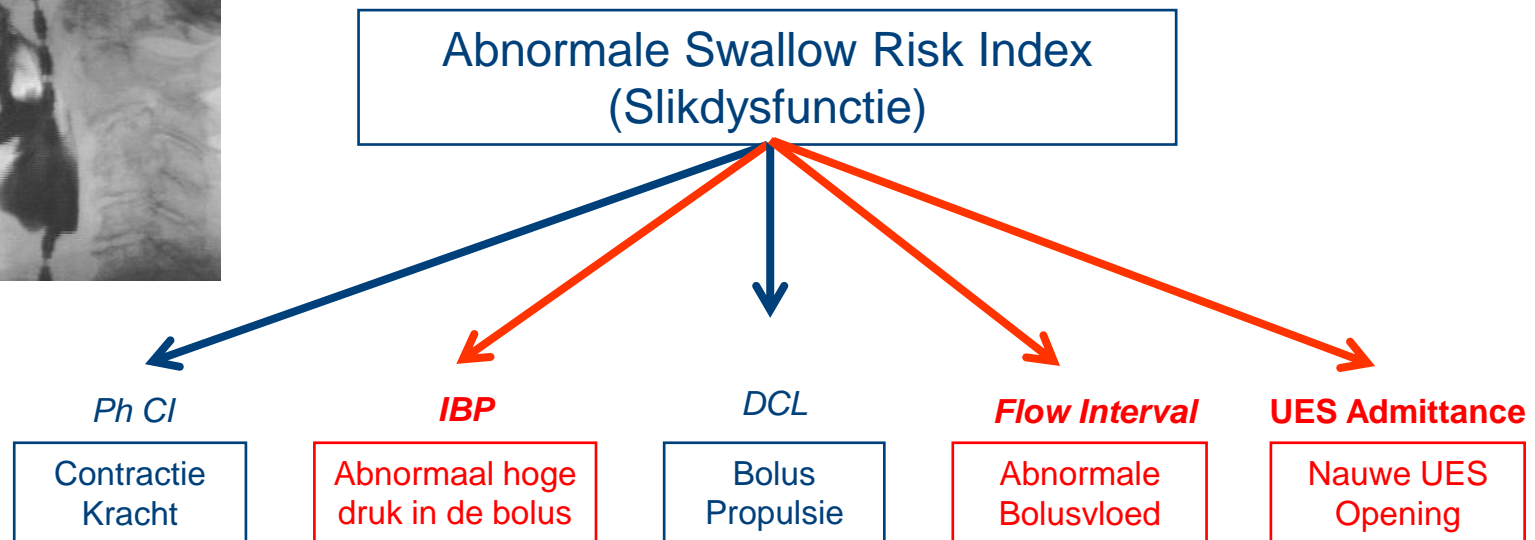
SRI correleert met aspiratie op RX  
=  
Niet radiologische marker voor slikdysfunctie

Sensitivity = 0.95 Specificity = 1.0 Kappa = 0.993

# Diagnose op basis van Pressure-Flow Analyse



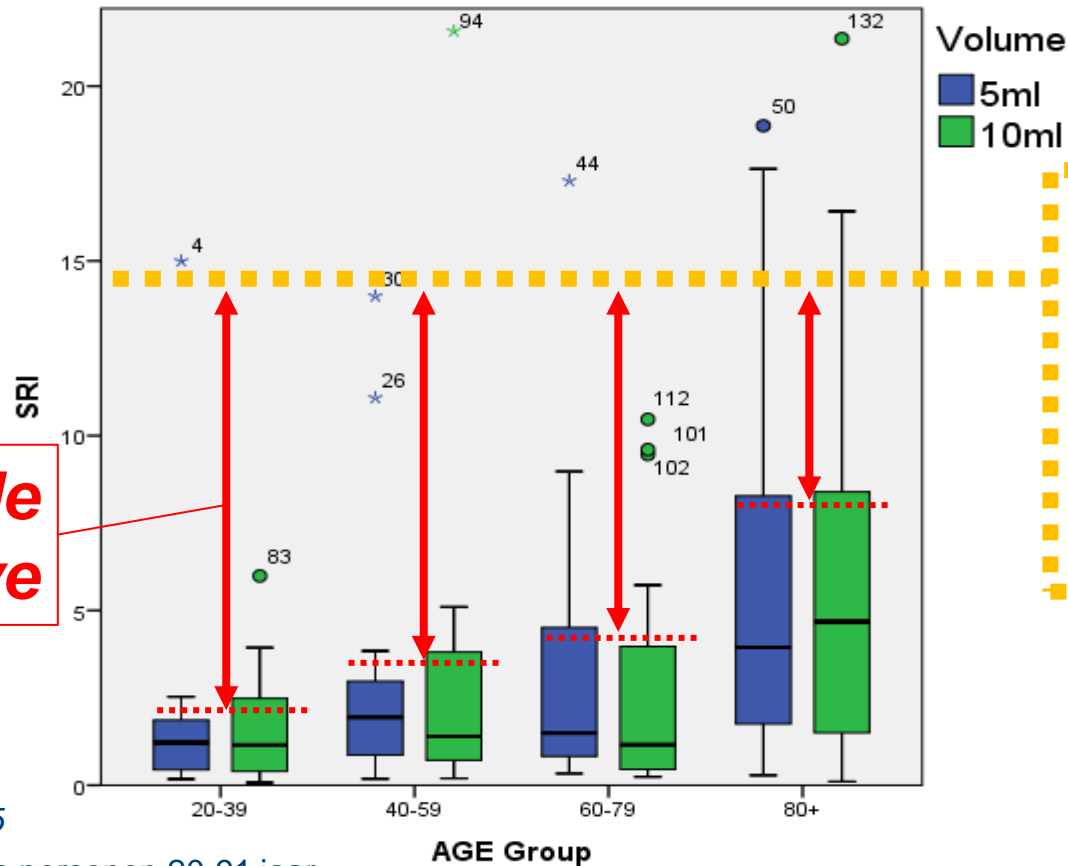
# Diagnose op basis van Pressure-Flow Analyse



## UES Obstructie

Karakterisering van de pathofysiologie van het slikken bij patiënten met NMD, Parkinson, ALS, MS,...

# Verhoogd slikrisico bij de gezonde oudere persoon: sub-klinische detectie, evaluatie en diagnose



**Functionele Reserve**

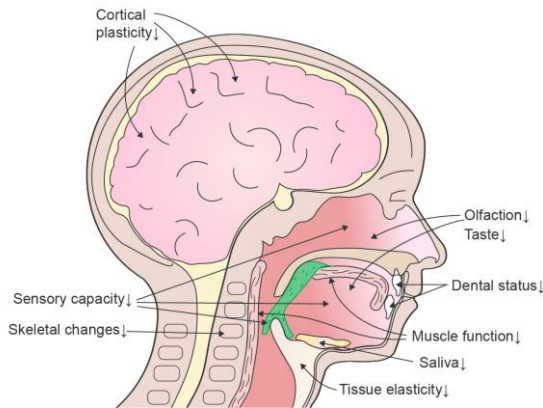
**Mate van slik  
dysfunctie die  
leidt tot  
aspiratie risico**

**Swallow Risk  
Index (SRI)**

Significant leeftijdseffect  
per volume ANOVA  $p < 0.05$

Data : 68 Asymptomatische personen 20-91 jaar

# Slikfunctie bij ouderen : SRI omvat slikmodulatie



Fysiologische veranderingen bij ouderen:  
Ook verandering in slikfunctie

Variable Subtype	Volume Effect	Viscosity Effect	Age Effect	Gender Effect
Pharyngeal lumen occlusive pressure	↑5.42	0.74	2.01	↑95.24
	<b>0.001</b>	ns	ns	<b>&lt;0.001</b>
	↑9.27	0.07	↓7.29	↑54.87
	<b>&lt;0.001</b>	ns	<b>0.007</b>	<b>&lt;0.001</b>
	0.46	0.23	↓8.98	↑181.2
Hypopharyngeal intrabolus distension pressure	ns	ns	<b>0.003</b>	<b>&lt;0.001</b>
	↑2.87	1.53	0.67	1.29
	<b>0.04</b>	ns	ns	ns
	↑26.30	↑10.49	↑3.36	↓12.06
	<b>&lt;0.001</b>	<b>&lt;0.001</b>	0.07	<b>0.001</b>
UES relaxation and opening	↑43.47	↑35.93	↑21.71	↑9.03
	<b>&lt;0.001</b>	<b>&lt;0.001</b>	<b>&lt;0.001</b>	<b>0.003</b>
	↑32.87	↓9.25	1.21	↑43.49
	<b>&lt;0.001</b>	<b>&lt;0.001</b>	ns	<b>&lt;0.001</b>
	↑383.2	↑51.84	↓7.68	↓19.62
Global swallow risk index	<b>&lt;0.001</b>	<b>&lt;0.001</b>	<b>0.006</b>	<b>&lt;0.001</b>
	↑31.71	↑3.19	↑4.55	↓3.98
	<b>&lt;0.001</b>	<b>0.04</b>	<b>0.03</b>	<b>0.05</b>

RESEARCH ARTICLE

Neurogastroenterology and Motility

Modulation of pharyngeal swallowing by bolus volume and viscosity

Lara Ferris,<sup>1</sup> Sebastian Doeltgen,<sup>2</sup> Charles Cock,<sup>1,3</sup> Nathalie Rommel,<sup>4</sup> Mistyka Schar,<sup>1,5</sup> Silvia Carrión,<sup>6,7</sup> Ingrid Scholten,<sup>2</sup> and Taher Omari<sup>1</sup>

## Swallow Risk Index (SRI)

- Neemt toe bij groter bolus volume ( $p < 0.001$ )
- Neemt toe bij toenemende consistentie ( $p = 0.04$ )
- Neemt toe met oudere leeftijd ( $p = 0.03$ )
- Lager bij mannen ( $p = 0.05$ )

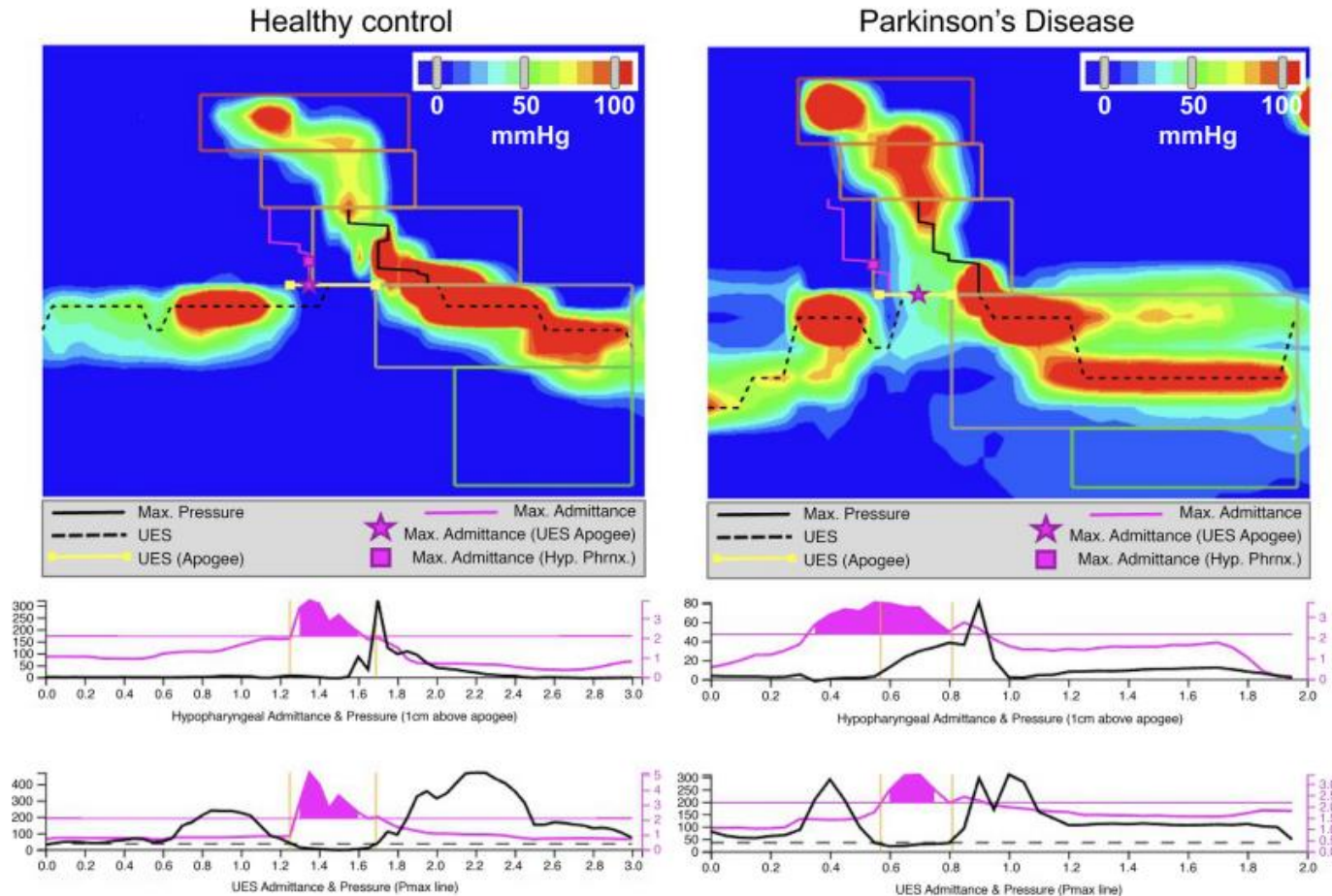
Grotere farynx die beter accomodeert aan de bolus karakteristieken waardoor minder impact op bolusvloed in vgl met vrouwen



# Ziekte van Parkinson

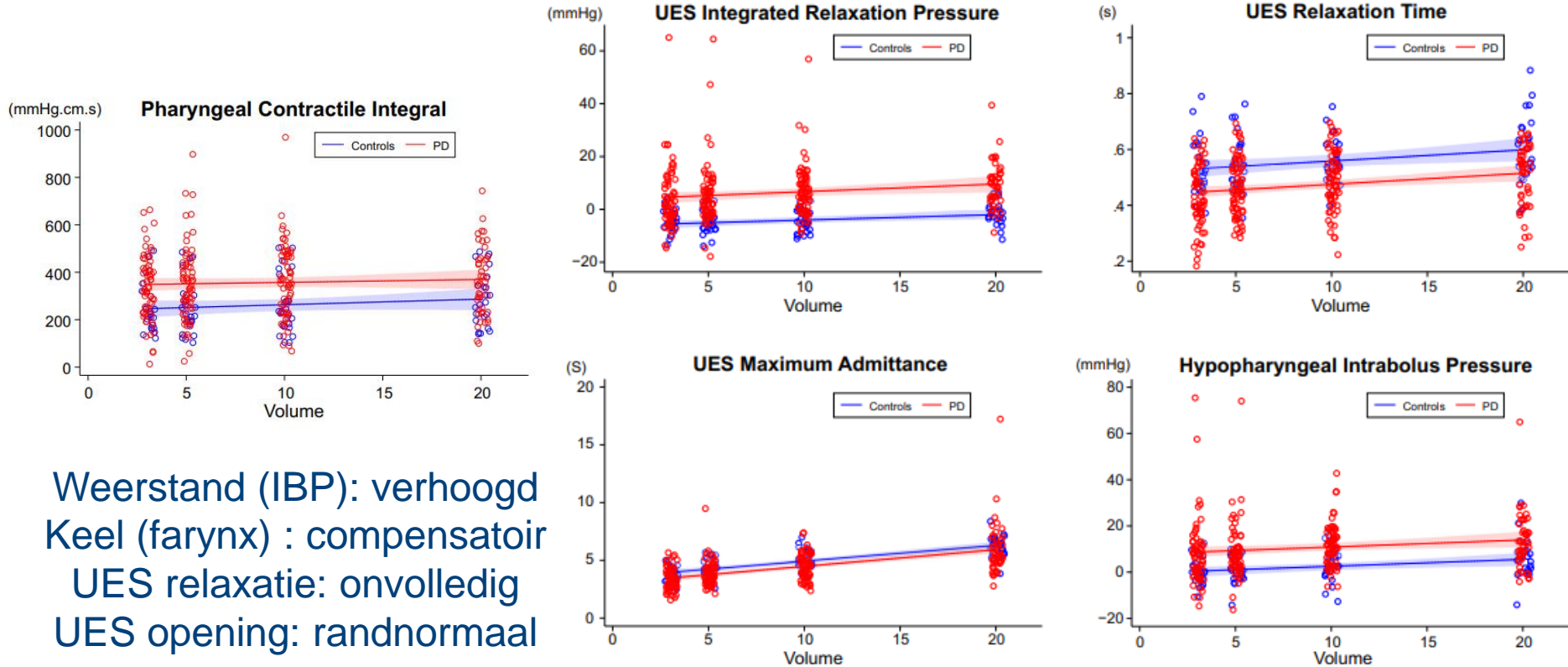
weerstand op bolus  
 waardoor inefficiënte  
 klaring

Oorzaak:  
 Keel (farynx)  
 UES relaxatie ?  
 UES opening ?





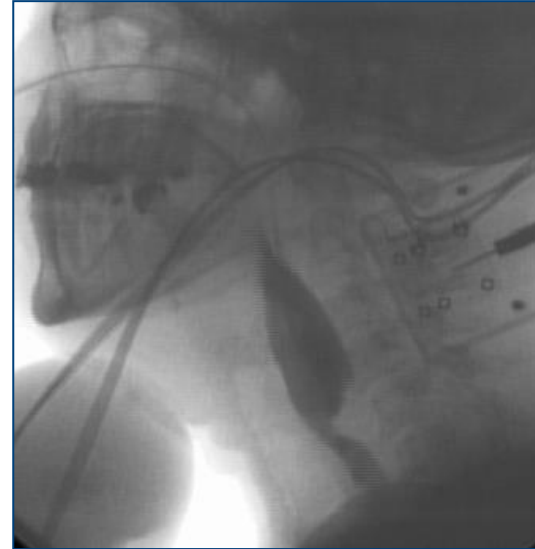
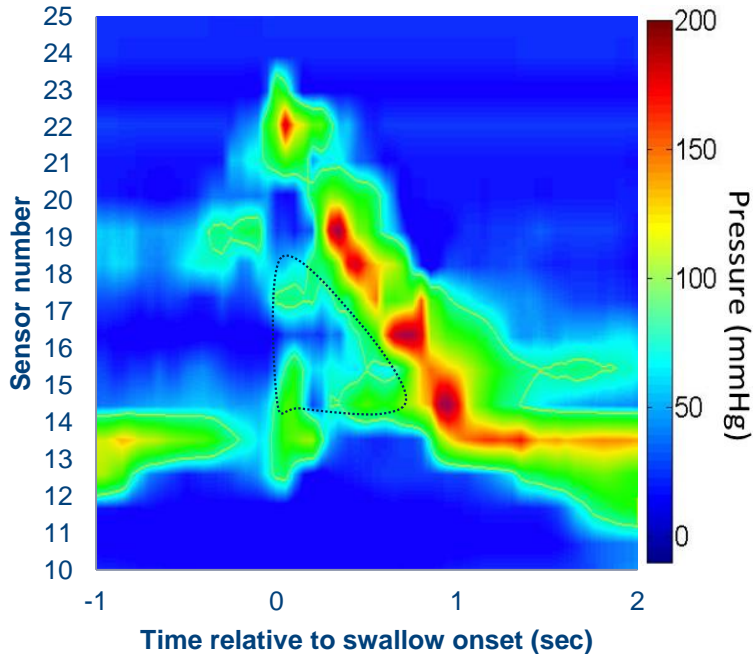
# Slikfunctie bij Ziekte van Parkinson



Weerstand (IBP): verhoogd  
Keel (farynx) : compensatoir  
UES relaxatie: onvolledig  
UES opening: randnormaal

**Figure 4.** Differences in high-resolution impedance manometry UES relaxation parameters for liquid bolus swallows between healthy controls and Parkinson's disease (PD) patients. Individual scores with fitted regression line with 95% CI. CI, confidence interval; UES, upper esophageal sphincter.

# Slikfunctie bij Ziekte van Parkinson



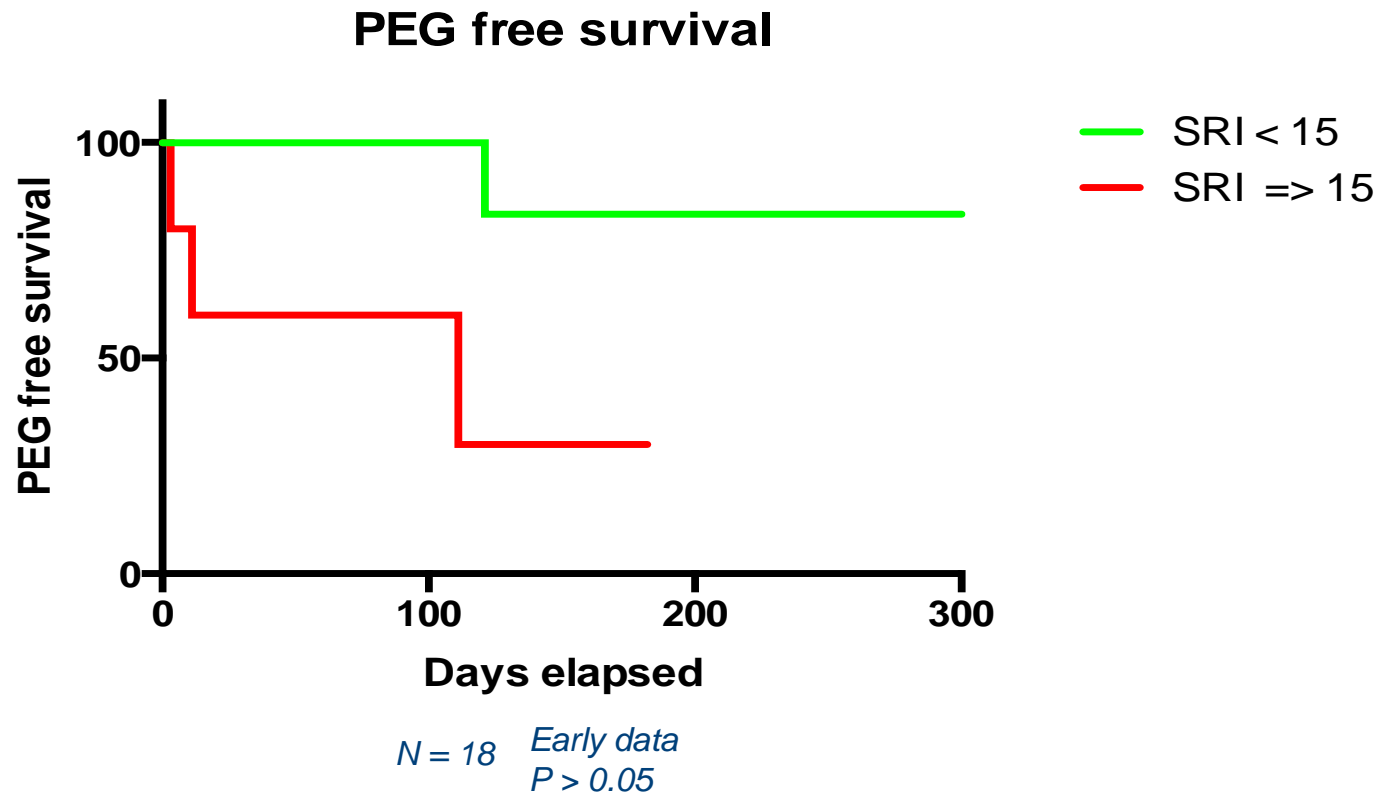
Vloeibare slik bij patient (F, 64 yr) met juvenile parkinsonism, chronische dysfagie, recurrente aspiration pneumonie

HRM : inadequate UES relaxatie met verhoogde weerstand

RX : inadequate UES opening

# Outcome meting van slikken op basis HMRI

Swallow Risk Index (SRI) is predictief voor overleving zonder PEG bij patients met motor neuron disease (MND)



# Besluit: belang van slikobjectivering voor de patiënt

- Nauwkeurige diagnose
- Detectie van sub-klinische dysfagie
- (h) Erkenning van het probleem en oorzaak - visualisatie
- Link naar symptomen (vb gevoel van slikken tegen weerstand)



# Take home message

- Verschillende **combinaties van afwijkende slikmechanismen** kunnen slikproblemen drijven, zelf bij gelijkaardige symptomen van dysfagie.
- Herkennen van deze, kan gebeuren met **meetbare** diagnostiek.
- Videomanometrie-impedantie is een meerwaarde in het **bepalen van de pathofysiologie** die leidt tot afwijkend slikken, zoals gezien op slik-endoscopie of radiologie.
- Al deze onderzoeken zijn **geïmplementeerd in de klinische zorg** van patiënten met dysfagie
- Verbetert deze objectieve diagnostiek de zorg van de patiënt met dysfagie ?  
Ja, beter begrip van de pathofysiologie leidt tot **meer gerichte behandeling**.



## Multidisciplinair team slikstoornissen UZ Leuven

Dr Dirk Van Beckevoort	Radiologie
Prof Ann Goeleven	MUCLA/NKO
Prof Nathalie Rommel	Deglutologie/ NKO/ GI
Prof Eddy Dejaeger	Geriatric
Prof Johan Flamaing	Geriatric
Prof Jan Tack	Gastroenterologie
Prof Tim Vanuytsel	Gastroenterologie
Dr Jeroen Meulemans	NKO – Gelaat-en Halschirurgie
Prof Willy Coosemans	Thorax Heelkunde
Dr Hans Van Veer	Thorax Heelkunde
Prof Philippe Vandamme	Neurologie

# Prevalentie van dysfagie

Target population	Evaluation method	Prevalence (%)	References
<b>Neurodegenerative disease</b>			
Parkinson disease	Reported by patients	35	Kalf et al. (2012) <sup>128</sup>
	Instrumental exploration	82	
Alzheimer disease	Instrumental exploration	57–84	Langmore et al. (2007) <sup>129</sup> Horner et al. (1994) <sup>130</sup>
Dementia	Reported by caregivers	19–30	Langmore et al. (2007) <sup>129</sup> Ikeda et al. (2002) <sup>131</sup>
	Instrumental exploration	57–84	Suh et al. (2009) <sup>132</sup> Langmore et al. (2007) <sup>129</sup> Horner et al. (1994) <sup>130</sup>
Multiple sclerosis	Screening (questionnaires)	24	De Pauw et al. (2002) <sup>133</sup>
	Instrumental exploration	34.3	Calcagno et al. (2002) <sup>134</sup>
Amyotrophic lateral sclerosis	Clinical and Instrumental exploration	47–86	Chen & Garrett (2005) <sup>135</sup> Ruoppolo et al. (2013) <sup>136</sup>
<b>Structural</b>			
Head and neck cancer	Clinical exploration	50.6	García-Peris 2007 <sup>61</sup>
	Instrumental exploration	38.5	Caudell et al. (2009) <sup>137</sup>
Zenker diverticulum	Instrumental exploration	86	Valenza V et al. (2003) <sup>138</sup>
Osteophytes	Screening	17–28	Utsinger et al. (1976) <sup>139</sup> Resnick et al. (1976) <sup>140</sup>

# Prevalentie van dysfagie

Target population	Evaluation method	Prevalence (%)	References
<b>Elderly</b>			
Independently-living older people	Screening (questionnaires)	11.4–33.7	Holland et al. (2011) <sup>119</sup> Roy et al. (2007) <sup>50</sup> Bloem et al. (1990) <sup>120</sup> Kawashima et al. (2004) <sup>121</sup> Yang et al. (2013) <sup>122</sup>
	Clinical exploration (V-VST)	23	Serra-Prat (2011) <sup>52</sup>
Hospitalized in an acute geriatric unit	Not specified/Clinical exploration (water swallow test or V-VST)	29.4–47.0	Lee et al. (1999) <sup>123</sup> Cabr�e et al. (2014) <sup>124</sup>
Hospitalized with community-acquired pneumonia	Clinical exploration (water swallow test or V-VST)	55.0–91.7	Cabr�e et al. (2010) <sup>125</sup> Almirall (2012) <sup>68</sup>
Hospitalized with community-acquired pneumonia	Instrumental exploration	75	Almirall (2012) <sup>68</sup>
Institutionalized	Screening (questionnaires)	40	Nogueira & Reis (2013) <sup>126</sup>
	Clinical exploration (water swallow test)	38	
	Screening and clinical exploration	51	Lin et al. (2002) <sup>127</sup>
Stroke: acute phase	Screening (questionnaires)	37–45	Martino et al. (2005) <sup>56</sup>
	Clinical exploration	51–55	
	Instrumental exploration	64–78	
Stroke: chronic phase	Clinical exploration	25–45	Martino et al. (2005) <sup>56</sup>
	Instrumental exploration	40–81	

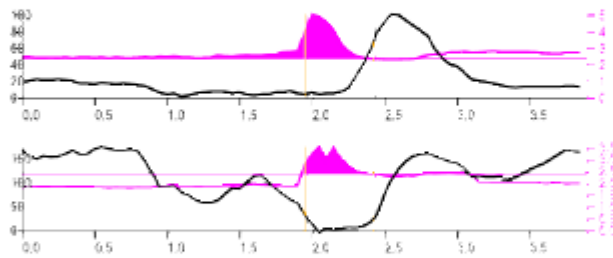
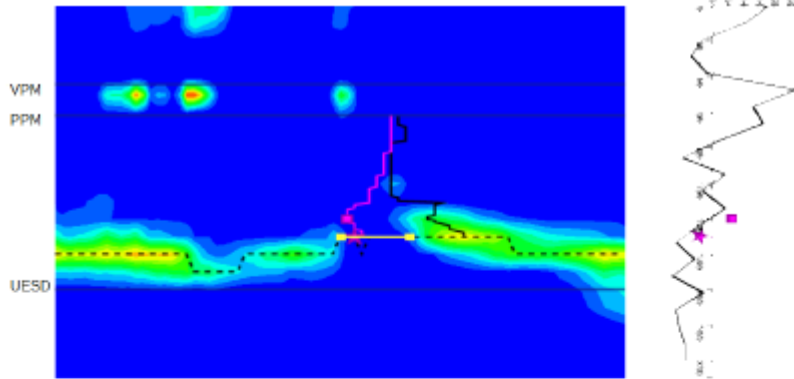


# Inadequate UES opening : residue - aspiratie

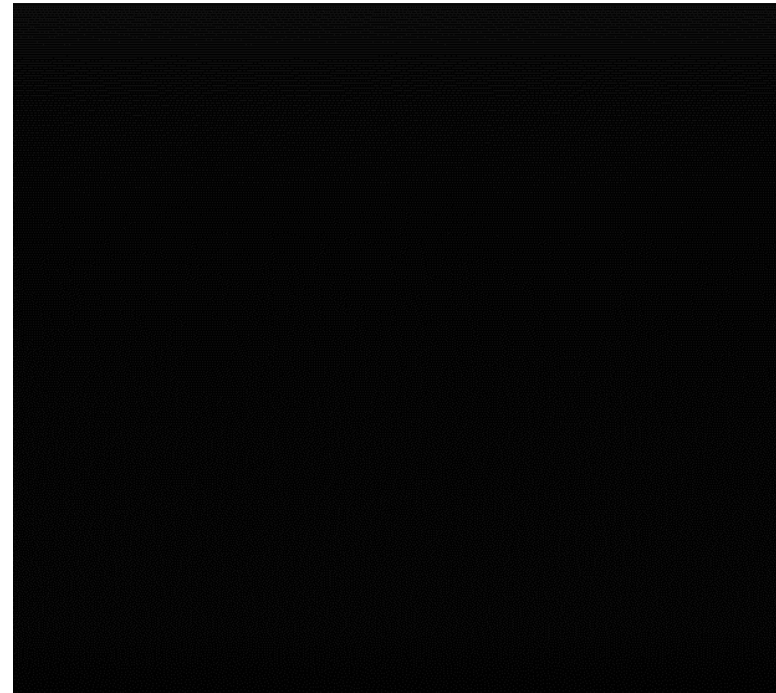
## Drie hoofd scenarios

1. Normale UES relaxatie en faryngeale hypocontractiliteit
2. Abnormale UES relaxatie en normale faryngeale contractiliteit
3. Abnormale UES relaxatie en faryngeale hypocontractiliteit

# Inadequate UES opening : normale UES relaxatie - faryngeale hypocontractiliteit

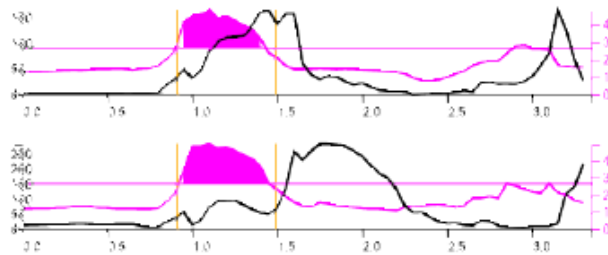
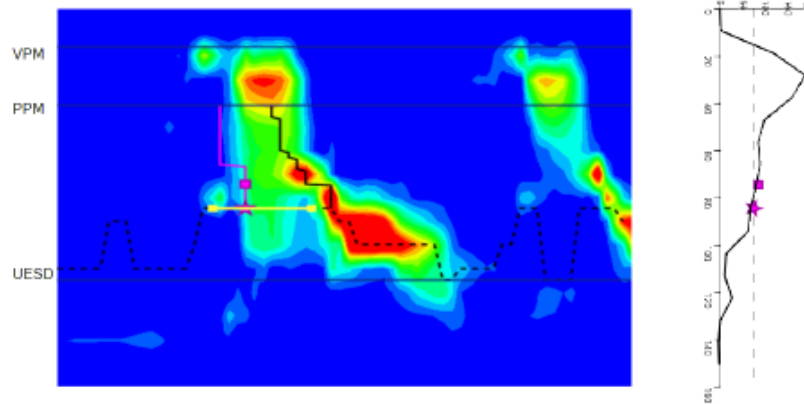


Variable	Measurement
Swallow Risk Index	48.3
UES Max Adm	3.52 mS
IBP	6.00 mmHg
UES IRP	1.60 mmHg
UES Open Time	0.470 ms
UES BP	117.02 mmHg
VTI	90.97 mmHg.cm.s
PeakP	36.17 mmHg
UES PeakP	168.00 mmHg
BPT	3.600 ms
DCL	0.237 ms

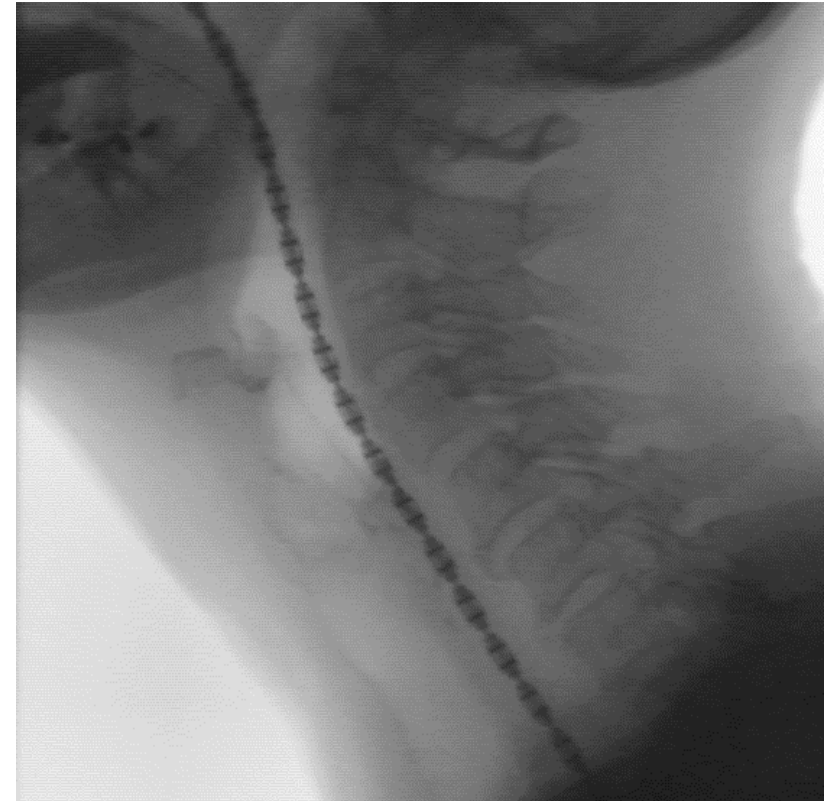


Female pt, 63 yrs, oropharyngeal tumor, currently chemotherapy  
 Clinical complaint : coughing during liquids  
 ? : oral feeding ? swallow safety ?

# Inadequate UES opening : abnormale UES relaxatie - normale faryngeale contractiliteit

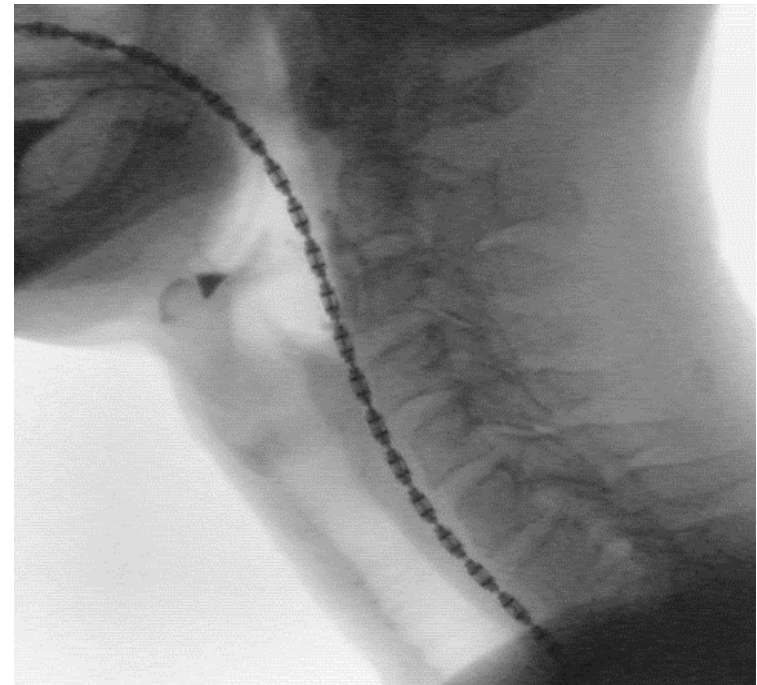
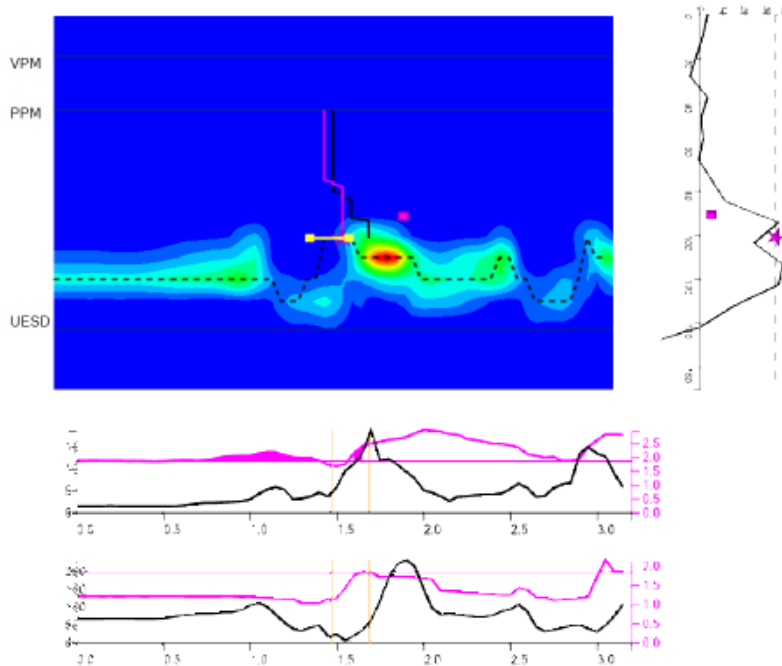


Variable	Measurement
Swallow Risk Index	19.8
UES Max Adm	4.97 mS
IBP	83.40 mmHg
UES IRP	40.84 mmHg
UES Open Time	0.580 ms
UES BP	15.60 mmHg
VTI	153.27 mmHg.cm.s
PeakP	182.47 mmHg
UES PeakP	283.00 mmHg
BPT	0.600 ms
DCL	0.384 ms



Female pt, 66 yrs, dysphagia for solids  
 Clinical complaint : effort to swallow, difficult oral intake solids  
 ? : UES dysfunction ? Aspiration ?

# Inadequate UES opening : abnormale UES relaxatie - faryngeale hypocontractiliteit



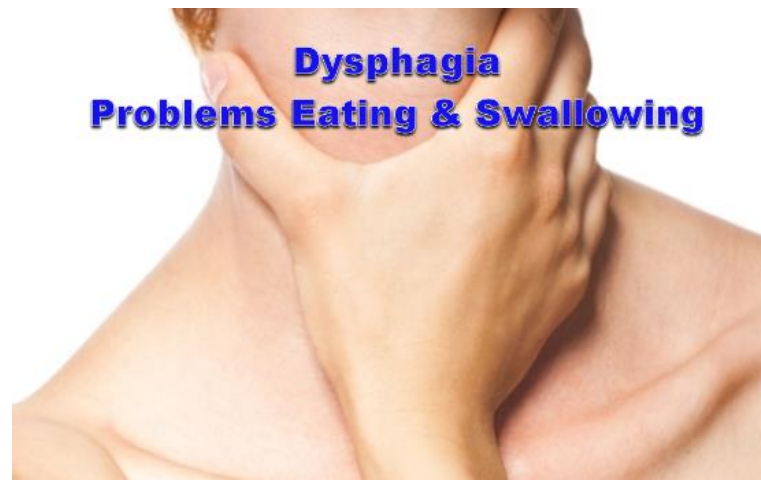
Variable	Measurement
Swallow Risk Index	102.9
UES Max Adm	1.83 mS
IBP	4.70 mmHg
UES IRP	14.78 mmHg
UES Open Time	0.220 ms
UES BP	68.90 mmHg
VTI	-14.31 mmHg.cm.s
PeakP	12.98 mmHg
UES PeakP	229.00 mmHg
BPT	3.000 ms
DCL	0.056 ms

Male pt, 59 yrs, progressive dysphagia for liquids and solids  
 Clinical complaint : choking difficult oral intake  
 ?: UES dysfunction ? Aspiration ?

# Cave : gevoel van orofaryngeale dysfagie kan expressie zijn van distale slokdarm pathologie

Globus gevoel (globus hystericus ?!)

- 60 % heeft onderliggend motorisch slokdarm probleem
- 45% heeft unilaterale laryngeale neuropathie, postinfectieus
- Gaat wel samen met dysfagie (>< Rome criteria)



# Clinical relevance of HRMI across dysphagia spectrum: ICU

*Intensive Care Med* (2020) 46:140–142  
<https://doi.org/10.1007/s00134-019-05844-2>

## LETTER

### Disordered swallowing associated with prolonged oral endotracheal intubation in critical illness



Mistyka S. Schar<sup>1</sup> , Taher I. Omari<sup>1,2\*</sup>, Robert J. Fraser<sup>1</sup>, Andrew D. Bersten<sup>1</sup> and Shailesh Bihari<sup>1</sup>

- Impaired swallow function of critically ill patients:
  - Incomplete UES relaxation and reduced opening extent
  - increased bolus presence
  - normal pharyngeal contractility
- Disordered swallowing as defined by HRPM was most prevalent in critically ill patients who underwent **7 days or more** endotracheal intubation