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How to screen for dysphagia in Parkinson's disease?
The Munich Dysphagia Test (MDT-PD) – a patient reported outcome questionnaire

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OBJECTIVE

- To evaluate the diagnostic performance of a newly developed dysphagia-screening questionnaire specified for patients with Parkinson's disease (PD).

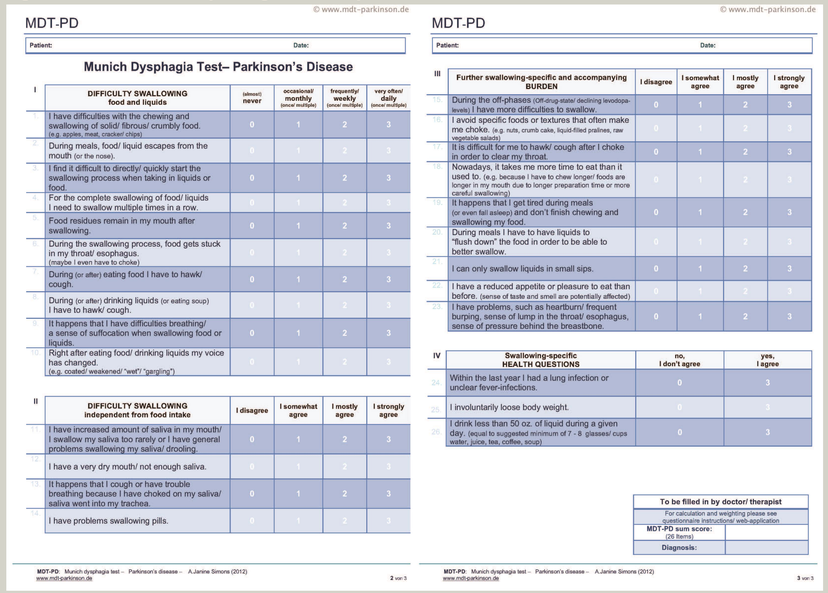
BACKGROUND

- Oropharyngeal dysphagia as well as manifested aspiration frequently occur in patients with PD.
- Especially symptoms of the early clinical syndrome are still widely underdiagnosed, leading to significant threats to health, such as aspiration pneumonia, malnutrition, or reduced quality of life.
- There are no disease-specific and sufficiently validated screening procedures available.

METHODS

- The project comprised the development (N=105) and validation phases (N=82) of the Munich Dysphagia Test (MDT-PD, **Figure 1**).
- PD patients were recruited at a German center for movement disorders; enrollment for validation purpose was consecutively (in-/out-/day-care patients).
- Patients were assessed by clinical swallowing tests and fiberoptic endoscopic evaluation using standardized protocols (90ml water, ½ slice crusted bread, dry cookie, placebo pills).
- They were assigned to the groups 'no dysphagia (N)', 'oropharyngeal dysphagia (OD)', and 'dysphagia with penetration/aspiration (P/A)' along their severity grades of underlying rating-scales.
- Resulted criteria sum scores were compared against the results of the previously answered MDT-PD.
- The internal consistency was evaluated and the diagnostic quality computed for the detection of noticeable OD, or the risk of aspiration, and proved by cross-validation.

Figure 2 MDT-PD self-reporting outcome questionnaire



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MDT-PD

Patient: Date:

Munich Dysphagia Test– Parkinson's Disease

I	DIFFICULTY SWALLOWING food and liquids	(almost) never	occasional/ monthly (once/ multiple)	frequently/ weekly (once/ multiple)	very often/ daily (once/ multiple)
1.	I have difficulties with the chewing and swallowing of solid/ fibrous/ crumbly food. (e.g. apples, meat, cracker/ chips)	0	1	2	3
2.	During meals, food/ liquid escapes from the mouth (or the nose).	0	1	2	3
3.	I find it difficult to directly/ quickly start the swallowing process when taking in liquids or food.	0	1	2	3
4.	For the complete swallowing of food/ liquids I need to swallow multiple times in a row.	0	1	2	3
5.	Food residues remain in my mouth after swallowing.	0	1	2	3
6.	During the swallowing process, food gets stuck in my throat/ esophagus. (maybe I even have to choke)	0	1	2	3
7.	During (or after) eating food I have to hawk/ cough.	0	1	2	3
8.	During (or after) drinking liquids (or eating soup) I have to hawk/ cough.	0	1	2	3
9.	It happens that I have difficulties breathing/ a sense of suffocation when swallowing food or liquids.	0	1	2	3
10.	Right after eating food/ drinking liquids my voice has changed. (e.g. coated/ weakened/ "wet"/ "gargling")	0	1	2	3

II	DIFFICULTY SWALLOWING independent from food intake	I disagree	I somewhat agree	I mostly agree	I strongly agree
11.	I have increased amount of saliva in my mouth/ I swallow my saliva too rarely or I have general problems swallowing my saliva/ drooling.	0	1	2	3
12.	I have a very dry mouth/ not enough saliva.	0	1	2	3
13.	It happens that I cough or have trouble breathing because I have choked on my saliva/ saliva went into my trachea.	0	1	2	3
14.	I have problems swallowing pills.	0	1	2	3

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MDT-PD

Patient: Date:

III	Further swallowing-specific and accompanying BURDEN	I disagree	I somewhat agree	I mostly agree	I strongly agree
15.	During the off-phases (Off-drug-state/ declining levodopa-levels) I have more difficulties to swallow.	0	1	2	3
16.	I avoid specific foods or textures that often make me choke. (e.g. nuts, crumb cake, liquid-filled pralines, raw vegetable salads)	0	1	2	3
17.	It is difficult for me to hawk/ cough after I choke in order to clear my throat.	0	1	2	3
18.	Nowadays, it takes me more time to eat than it used to. (e.g. because I have to chew longer/ foods are longer in my mouth due to longer preparation time or more careful swallowing)	0	1	2	3
19.	It happens that I get tired during meals (or even fall asleep) and don't finish chewing and swallowing my food.	0	1	2	3
20.	During meals I have to have liquids to "flush down" the food in order to be able to better swallow.	0	1	2	3
21.	I can only swallow liquids in small sips.	0	1	2	3
22.	I have a reduced appetite or pleasure to eat than before. (sense of taste and smell are potentially affected)	0	1	2	3
23.	I have problems, such as heartburn/ frequent burping, sense of lump in the throat/ esophagus, sense of pressure behind the breastbone.	0	1	2	3

IV	Swallowing-specific HEALTH QUESTIONS	no, I don't agree	yes, I agree
24.	Within the last year I had a lung infection or unclear fever-infections.	0	3
25.	I involuntarily loose body weight.	0	3
26.	I drink less than 50 oz. of liquid during a given day. (equal to suggested minimum of 7 - 8 glasses/ cups water, juice, tea, coffee, soup)	0	3

To be filled in by doctor/ therapist

For calculation and weighting please see questionnaire instructions/ web-application

MDT-PD sum score: (26 items)

Diagnosis:

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Figure 1 MDT-PD project phases (N = 187)

Phase I – Development

Part 1 – Questionnaire and diagnostic scale construction
Step 1 – Questionnaire item generation/semi-structured interviews, N = 10+10*: initial 46-item version
Step 2 – Psychometric tests/questionnaires, N = 20; modification and reduction: 39-item version
Step 3 – Parameter generation for clinical symptom scale and FEES incl. gold standard (10+19 parameters), N = 20*

*healthy relatives of PD patients

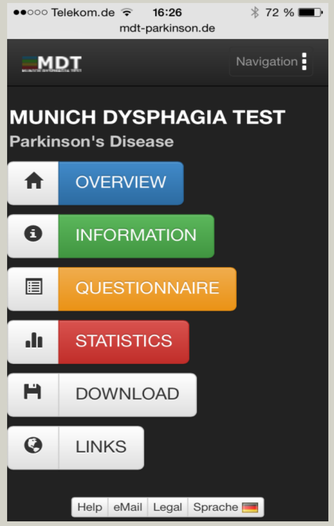
Part 2 – Pilot study, N = 45
Step 1 – Testing construct validity and proceeding feasibility/ precision study of questionnaire and diagnostic scale drafts
Step 2 – Questionnaire item reduction to final 26-item version
Step 3 – Diagnostic scales modification (29 parameters)

Phase II – Validation

Validation study, N = 82
- Reliability analysis
- Dysphagia classifications & criteria sum score
- Validation procedure: weighting of items, correlation with criteria sum score, discriminatory analyses of items, determination of cut-off values, cross-validation

Add on
- German to English translation by decentering method
- Web-app programming for result evaluation

Figure 3 MDT-PD web app*



* **Web app** runs on all popular operating systems, browsers, and devices , **Outcome classifications:** no noticeable dysphagia, noticeable oropharyngeal dysphagia, dysphagia with risk of penetration/aspiration

RESULTS

- The 26-item questionnaire MDT-PD (**Figure 2**) showed high internal consistency (Cronbach's Alpha 0.91).
- Patients of the validation study (N=82) aged 70.9 ± 8.7 (mean ± SD), were Hoehn & Yahr stage of 3 in median and scored 29.5 ± 13.3 in the UPDRS motor part.
- Dysphagia prevalence was 73% (44% OD, 29% P/A).
- A positive correlation was found between the criteria sum score and weighted MDT-PD sum score (r= 0.70, p<0.001).
- Diagnostic quality to discriminate between N and OD as well as N and P/A resulted in good to very high values, with similar results in cross-validation (**Table 1**).

Table 1 MDT-PD Diagnostic quality

Dysphagia groups	not noticeable (N) vs. noticeable (OD)		not noticeable (N) vs. risk of aspiration (P/A)	
	Validation	Cross-validation	Validation	Cross-validation
Sens (CI)	82.4% (0.696–0.952)	82.4% (0.696–0.952)	90.0% (0.775–1.025)	90.0% (0.775–1.025)
Spec (CI)	71.4% (0.521–0.907)	61.9% (0.411–0.827)	85.7% (0.707–1.007)	81.0% (0.642–0.978)
PPV / NPV	82.4% / 71.4%	77.8% / 68.4%	87.0% / 90.0%	81.8% / 89.5%
YI	0.54	0.44	0.76	0.71
LR+ / LR-	2.9 / 0.2	2.2 / 0.3	6.3 / 0.1	4.7 / 0.1
Cut off	3.65	3.63	4.79	4.75

Sensitivity (Sens), specificity (Spec), confidence interval (CI), positive/negative predictive value (PPV/ NPV), Youden index (YI), likelihood ratio+/- (LR+/-); cut-off point (Cut off)

CONCLUSION

- **In medical practice the MDT-PD[1] can be used for a valid detection of dysphagia and initial graduation of dysphagia severity.**
- Patient's answers can be easily evaluated using a web application (**Figure 3**); clinical interpretation is provided additionally.
- Questionnaire & web app is available in German & English language.

MDT MUNICH DYSPHAGIA TEST

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REFERENCE 1. Simons JA, et al. Development and validation of a new screening questionnaire for dysphagia in early stages of Parkinson's disease. Parkinsonism Relat Disord 2014; 20(9): 992 – 998

DISCLOSURE Nothing to report.

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