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本邦と欧州（北欧）のiNPH重症度分類の違い



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Background

iNPHの評価方法

- iNPHのそれぞれの症状に対する的確な評価法は、治療効果を判定する上で、重要な基準となる。
- 3徴に代表されるiNPHの症状を日本ではガイドラインではmRS、重症度分類尺度（iNPHGS）を基本としそれぞれの症状に対し、
 - 歩行：Time Up & Go Test（歩行速度、歩数）、Gait Status Scale-Revised
 - 排尿障害：重症度分類尺度のみ
 - 認知障害：MMSE、FAB、TMT-A(B)を推奨している。
- 国際的な評価方法と我が国の評価方法の差異を検討し、現時点のiNPH評価基準を確認することは、今後iNPH病態研究を進めるうえで取り組むべき課題である。

評価方法による相違（認知障害）

Table 2
Comparison of cognitive domain, Mini-Mental State Examination (MMSE) and Frontal Assessment Battery (FAB) in iNPH patients.

Cognitive domain	Scale	iNPH patients (n=14)		Controls (n=14)	
		Mean (SD)	Range	Mean (SD)	Range
MMSE	30	22.5 (3.5)	18-28	28.5 (1.5)	27-30
FAB	18	12.5 (3.5)	8-16	16.5 (1.5)	15-18

MMSEとFAB、とくにTMT-Aは相関性が乏しかった。

Nakajima et al. Journal of Neurological Sciences 2015

iNPH grading scale

Grade	Cognitive impairment	Gait disturbance	Urinary disturbance
0	normal	normal	normal
1	Complaints of amnesia or inattention but no objective memory and attentional impairment	Complaints of dizziness of drift and dysbasia but no objective gait disturbance	Pollakiuria or urinary urgency
2	Existence of amnesia or inattention but no disorientation of time and place	Unstable but independent gait	Occasional urinary incontinence (1-3 or more times per week but less than once per day)
3	Existence of disorientation of time and place but conversation is possible	Walking with any support	Continuous urinary incontinence (1 or more times per day)
4	Disorientation for the situation or meaningful conversation impossible	Walking not possible	Bladder function is almost or completely deficient

Neurologica

A new scale for assessment of severity and outcome in iNPH

Therefore, we decided to design a new iNPH scale in which severity and change are measured in the four domains of gait, neuroscholology, balance and continence. It was calibrated and

歩行、認知障害、バランス、排尿障害の4つのドメインを評価

Hellström et al. Acta Neurol Scand. 2012



歩行障害

*点数化には Walk 10mの歩数、タイムも考慮

*Grade	EU GS Gait	Grade	Japan GS Gait
1	Normal	0	Normal
2	Slight disturbance of tandem walk and turning	1	Complaints of dizziness of drift and dysbasia but no objective gait disturbance
3	Wide-based gait with sway, without foot corrections	2	Unstable but independent gait
4	Tendency of fall, with foot corrections	3	Walking with any support
5	Walking with cane		
6	Bi-manual support needed	4	Walking not possible
7	Aided		
8	Wheelchair bound		

1 = 100, 2 = 86, 3 = 71, 4 = 57, 5 = 43, 6 = 29, 7 = 14, 8 = 0

バランス

New GS Balance

Grade	Description
1	Able to stand independently for more than 30s on either lower extremity alone
2	Able to stand independently for < 30s on either lower extremity alone
3	Able to stand independently with the feet together (at the heels) for more than 30s
4	Able to stand independently with the feet together for < 30s
5	Able to stand independently with the feet apart (one foot length) for more than 30s
6	Able to stand independently with the feet apart for < 30s
7	Unable to stand without assistance

片足立ち
直立
仁王立ち

1 = 100, 2 = 83, 3 = 67, 4 = 50, 5 = 33, 6 = 17, 7 = 0

排尿障害

Grade	New GS Continence	Grade	Japan GS Continence
1	Normal	0	Normal
2	Urgency without incontinence	1	Pollakiuria or urinary urgency
3	Infrequent incontinence without napkin	2	Occasional urinary incontinence (1-3 or more times per week but less than once per day)
4	Frequent incontinence with napkin	3	Continuous urinary incontinence (1 or more times per day)
5	Bladder incontinence	4	Bladder function is almost or completely deficient
6	Bladder and bowel incontinence		

1 = 100, 2 = 80, 3 = 60, 4 = 40, 5 = 20, 6 = 0

認知障害

New GS Neuropsychology

P. Hellström¹, P. Klinge², J. Tans³, C. Wikkelso⁴

- The Grooved pegboard
- The Rey Auditory Verbal Learning Test (RAVLT)
- The Swedish Stroop test

100個×2枚

Demonstration: Stroop Test
Read the words as fast as possible.

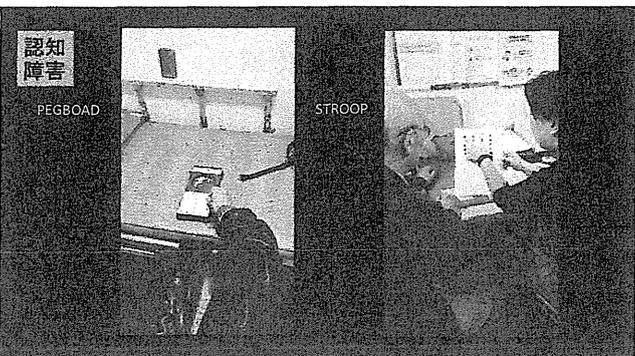
15個×5施行の合計数

認知障害

STROOP TEST (日本版)

Read the words as fast as possible.

Read the words as fast as possible.



認知障害

Neuropsychological testの点数化

Table 3 Conversion of results on neuropsychological tests

Grooved pegboard, fastest trial	Rey, sum	Stroop, colour naming	Stroop, interference
<79 = 100	>44 = 100	<83 = 100	<132 = 100
79-87 = 90	30-44 = 90	83-97 = 90	132-150 = 90
88-96 = 80	32-37 = 80	78-81 = 80	161-180 = 80
97-105 = 70	30-31 = 70	82-87 = 70	189-210 = 70
106-114 = 60	26-29 = 60	86-88 = 60	211-238 = 60
115-128 = 50	26-27 = 50	87-100 = 50	246-296 = 50
129-164 = 40	22-25 = 40	101-121 = 40	299-305 = 40
145-172 = 30	19-21 = 30	122-134 = 30	308-630 = 30
174-245 = 20	15-18 = 20	135-171 = 20	>500 = 20
246-300 = 10	11-14 = 10	172-300 = 10	Fail = 10
>300 or fail = 0	<11 or fail = 0	>300 or fail = 0	

The domain score is the mean value of the available converted scores.

The results on the neuropsychological tests are converted according to Table 3.

Hellström et al. Acta Neurol Scand. 2012

認知障害

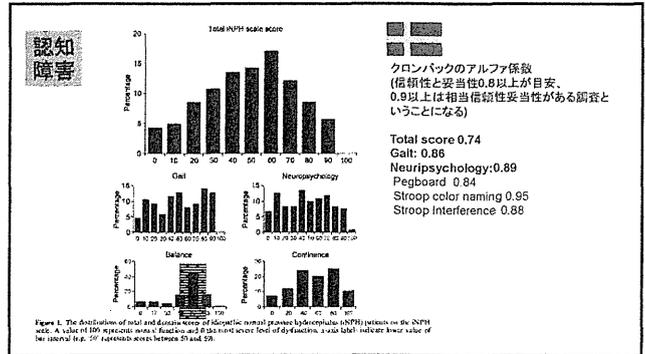
Total score

The total score on the iNPH scale is the mean of the domain scores. However, the gait domain is given twice the weight of the other domains.

$$2 \times \text{Gait} + \text{Neuropsychology} + \text{Balance} + \text{Continence}$$

5

Hellström et al. Acta Neurol Scand. 2012



検査項目		測定単位		測定単位	
MMSE	Total /30	MMSE	Total /30		
FAB	Total /18	FAB	Total /18		
	か 個/分		か 個/分		
Grooved Pegboard	fastest trial (sec.)	converted score	Grooved Pegboard	fastest trial (sec.)	converted score
Rey AVLT	sum of 5 trials	converted score	Rey AVLT	sum of 5 trials	converted score
	Trial 1		Trial 1		
	Trial 2		Trial 2		
	Trial 3		Trial 3		
	Trial 4		Trial 4		
	Trial 5		Trial 5		
Stroop	color time	converted score	Stroop	color time	converted score
	interference time	converted score		interference time	converted score
	Interference errors			Interference errors	
TMT-A	Time (sec)		TMT-A	Time (sec)	
コメント					

Grooved Pegboard:
1行目を2分以内に完了できなければFailとする。
Rey AVLT:
もし最初の2施行で1番も算出できなければFailとする。
Stroop:
Color 1行目を30秒以内にできなければFailとする。
Interference 6個の練習で理解できなければFailとする。

Table 3 Conversion of results on neuropsychological tests

Grooved pegboard, fastest trial	Rey, sum	Stroop, colour naming	Stroop, interference
<79 = 100	>44 = 100	<68 = 100	<132 = 100
78 87 = 90	38 44 = 90	68 77 = 90	132 160 = 90
88 95 = 80	32 37 = 80	78 81 = 80	151 188 = 80
97 105 = 70	30 31 = 70	82 87 = 70	189 210 = 70
106 114 = 60	28 29 = 60	88 98 = 60	211 239 = 60
115 128 = 50	26 27 = 50	97 106 = 50	240 258 = 50
123 144 = 40	22 25 = 40	107 121 = 40	289 355 = 40
145 173 = 30	19 21 = 30	122 134 = 30	286 600 = 30
174 245 = 20	15 18 = 20	135 171 = 20	>600 = 20
246 600 = 10	11 14 = 10	172 300 = 10	Fail = 10
>600 or fail = 0	<11 or fail = 0	>300 or fail = 0	

The domain score is the mean value of the available converted scores.

問題点まとめ

- 本邦のiNPH重症度分類は簡便であり、世界的にも汎用されているが、問題点として主治医の主観が入りやすい点が挙げられる。
- iNPHの国際的協力研究を行うためには、共通した評価方法で治療効果を判断することは有用であるが、煩雑な検査を必要とする評価法は、一般化しない可能性がある。
- 欧州の新しい重症度分類は比重を、歩行障害(バランス障害)に高く設定されている。バランス障害のドメインは偏りが大きい。
- 排尿障害の重症度を明確に分類するものはない。
⇒ まだ完成されたものではなく、改善余地がある。

将来への展望

- 主治医の主観要素をできるだけ減らした重症度分類(点数化)の作成を実現できるか。
- 本邦では欧州の重症度分類を共通基準にするのかor参考にしつつ、新たな世界的に共通する重症度分類を作成していくか。
- iNPH重症度分類を汎用性を重要視した簡便法と研究的評価を意識したフルスタディの2種類(以上)を作成していくか。

歩行障害 + 排尿障害 + 認知障害 + バランス + ①

IV. 研究成果の刊行に関する一覧表

研究成果の刊行に関する一覧表

【書籍】

著者氏名	論文タイトル名	書籍全体の編集者名	書籍名	出版社名	出版地	出版年	ページ
数井裕光	特発性正常圧水頭症.	西村恒彦, 武田雅俊 編	認知症の脳画像診断－早期検出と鑑別をめざして－	メジカルビュー社	東京	2015	107-18
数井裕光	CMAI(せん妄).MMSE(認知症).MENFIS(認知症).	山内俊雄, 鹿島晴雄 総編集	精神・心理機能評価ハンドブック	中山書店	東京	2015	421-3,427-9,439-43
数井裕光	レビー小体型認知症と特発性正常圧水頭症	中村純 編	他科からの依頼患者の診方と対応	医学書院	東京	2015	108-19
加藤丈夫	特発性正常圧水頭症	山口 徹, 北原光夫	今日の治療指針 2015	医学書院	東京	2015	906-907
栗山長門 (分担執筆).	その他の症状.	新井一(編集), 石川正恒 (監修), 森悦朗(監修)	特発性正常圧水頭症の診療.	金芳堂.	京都	2014	83-86
橋本康弘, 星京香, 本多たかし, 新井一, 宮嶋雅一, 荒井啓行, 古川勝敏	脳型トランスフェリンの基礎と臨床:疾患マーカーとしての糖鎖修飾		Annual Review神経 2015	(株)中外医学社	東京	2015年	100-106

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Kanemoto H, Kazui H, Suzuki Y, Sato S, Kishima H, Yoshimine T, Yoshiyama K.	Effect of lumbo-peritoneal shunt surgery on neuropsychiatric symptoms in patients with idiopathic normal pressure hydrocephalus.	Journal of the neurological sciences	361	206-12	2016

Kazui H, Miyajima M, Mori E, Ishikawa M; SINPHONI-2 Investigators.	Lumboperitoneal shunt surgery for idiopathic normal pressure hydrocephalus (SINPHONI-2): an open-label randomised trial.	Lancet Neurol.	14(6)	585-94	2015
Sakakibara R, Uchida Y, Ishii K, Hashimoto M, Ishikawa M, Kazui H, Yamamoto T, Uchiyama T, Tateno F, Kishi M, Tsuyusaki Y, Aiba Y, Tateno H, Nagao T, Terada H, Inaoka T; Members of SINPHONI (Study of Idiopathic Normal Pressure Hydrocephalus On Neurological Improvement).	Bladder recovery relates with increased mid-cingulate perfusion after shunt surgery in idiopathic normal-pressure hydrocephalus: a single-photon emission tomography study.	Int Urol Nephrol.	Nov 17		2015
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数井裕光, 吉山顕次.	根本的治療の可能性のある認知症 特発性正常圧水頭症.	日本医事新報.	4749	36-41	2015
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鐘本英輝, 数井裕光.	認知症の神経心理検査とは?	Monthly book medical rehabilitation.	183	26-30	2015
吉山顕次, 数井裕光.	認知症の薬物療法・BPSD とその対応は?	Monthly book medical rehabilitation.	183	61-5	2015
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橋本康弘,星京香	アルツハイマー病の発症メカニズ ム: 髄液糖鎖マーカーの探索	日本臨床検査医学 会東北支部会誌			In press
Naokazu HayasHi,Mitsunori MatsuMae, satoshi yatsusHiro, akihiro HirayaMa, afnizanfaizal abdullaH, and Kagayaki Kuroda	Quantitative Analysis of Cerebrospinal Fluid Pressure Gradients in Healthy Volunteers and Patients with Normal Pressure Hydrocephalus	Neurol Med Chir	55	657-662	2015
Kazui H, Miyajima M, Mori M, Ishikawa M.	Effect of lumbo-peritoneal shunt surgery in idiopathic normal pressure hydrocephalus (SINPHONI-2): an open-label randomised controlled trial.	Lancet Neurol	14	585-594	2015
Odagiri H, Baba T, Nishio Y, Iizuka O, Narita W, Matsuda M, Mori E.	Clinical characteristics of idiopathic normal pressure hydrocephalus with Lewy body diseases.	J Neurol Sci	359	309-311	2015
Miyajima M, Kazui H, Mori E, Ishikawa M.	One-year outcome in patients with idiopathic normal-pressure hydrocephalus: comparison of lumbo-peritoneal shunt to ventriculo-peritoneal shunt.	J Neurosurg,		印刷中	

