



External Validation of the Kumamoto Criteria in Transthyretin Amyloid Cardiomyopathy Screening — A Retrospective Cohort Study —

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Supplementary Table 1. Clinical Characteristics of the Study Population in Each Cohort

	NMS cohort from Tokyo (n=138)	Fukuoka cohort^{10,11} (n=98)	Kochi cohort⁹ (n=150)	Kumamoto cohort⁸ (n=181)
Age (years)	73 [63–82]	79 ± 11	79 [74–84]	79 ± 6
Male sex	89 (65)	56 (57)	117 (78)	127 (70)
Hypertension	98 (71)	NA	95 (63)	109 (60)
Atrial fibrillation	61 (44)	41 (42)	61 (41)	63 (35)
Spinal canal stenosis	20 (15)	NA	20 (13)	NA
Carpal tunnel syndrome	8 (5.8)	NA	41 (27)	NA
Laboratory parameters				
Hs-cTnT (ng/mL)	0.035 [0.021–0.054]	NA	0.057 [0.033–0.079]	0.037 [0.021–0.059]
BNP (pg/mL)	NA	NA	304 [187–569]	220 [100–428]
NT-proBNP (pg/mL)	1,325 [395–3,524]	NA	NA	NA
ECG parameters				
Wide QRS	41 (30)	NA	45 (30)	53 (29)
Prolonged PR interval	39 (28)	NA	24 (16)	53 (29)
Low voltage	14 (10)	7 (7.1)	45 (30)	22 (12)
Poor R progression	27 (20)	28 (29)	45 (30)	27 (15)
Echocardiographic parameters				
LVEF (%)	56 [44–69]	NA	52 [43–63]	55 ± 12
LVEDD (mm)	48 ± 8	NA	47 [42–53]	45 ± 8
LVESD (mm)	32 [27–41]	NA	34 [29–40]	31 ± 9
IVS thickness (mm)	12 [9–13]	NA	13 [11–14]	14 ± 3
PW thickness (mm)	11 [9–13]	NA	12 [10–13]	13 ± 3

Categorical data presented as n (%). Continuous data presented as median values [interquartile range] or mean values ± standard deviation.

^{99m}Tc-PYP, technetium-99m pyrophosphate; Hs-cTnT, high-sensitivity cardiac troponin T; BNP, brain natriuretic peptide; NT-proBNP, N-terminal pro-brain natriuretic peptide; ECG, electrocardiogram; LVEF, left ventricular ejection fraction; LVEDD, left ventricular end-diastolic diameter; LVESD, left ventricular end-systolic diameter; IVS, interventricular septal; PW, posterior wall.

Supplementary Table 2. Clinical Characteristics of Each Patients With ^{99m}Tc-PYP Scintigraphy Positive Uptake in the NMS Cohort

No.	Kumamoto criteria	^{99m} Tc- PYP grade	Age (years)	Male sex	NYHA class	TTR amyloid deposition	Genetic testing	Spinal canal stenosis	Carpal tunnel syndrome	Hs- cTnT (ng/mL)	NT- proBNP (pg/mL)	QRS duration (ms)	PWT (mm)	Monoclonal protein
1	3	3	84	(+)	III	NA	NA	(+)	(-)	0.049	3104	120	17	(-)
2	3	3	87	(+)	III	Not confirmed [†]	Wild-type	(+)	(-)	0.103	2192	140	17	(+)
3	3	3	82	(+)	III	Confirmed	Wild-type	(+)	(-)	0.172	11307	150	19	(-)
4	3	2	76	(+)	II	Confirmed	Wild-type	(+)	(+)	0.034	5138	122	19	(-)
5	3	3	79	(+)	II	NA	NA	(-)	(-)	0.038	1174	138	14	(-)
6	2	3	82	(+)	II	NA	NA	(+)	(-)	0.054	211 [‡]	96	14	(-)
7	2	3	89	(+)	II	NA	NA	(-)	(-)	0.272	871 [‡]	186	12	(-)
8	2	3	88	(-)	II	Confirmed	Wild-type	(+)	(-)	0.075	2559	88	15	(-)
9	2	3	92	(+)	II	Confirmed	Wild-type	(+)	(-)	0.081	4376	142	7	(-)
10	2	3	85	(-)	I	Confirmed	Wild-type	(+)	(-)	0.037	1001	114	15	(-)
11	2	2	77	(+)	II	Confirmed	NA	(-)	(-)	0.057	1863	80	15	(-)
12	2	3	85	(-)	II	Confirmed	Wild-type	(-)	(+)	0.070	2904	94	17	(-)
13	1	3	68	(+)	II	Confirmed	Wild-type	(+)	(+)	0.045	1819	104	12	(-)
14	1	3	74	(+)	II	Confirmed	Wild-type	(+)	(-)	0.019	734	142	12	(-)
15	1	3	84	(+)	II	Confirmed	Wild-type	(+)	(+)	0.048	2315	104	11	(-)
16	1	2	83	(+)	II	Confirmed	Wild-type	(+)	(-)	0.026	431	173	11	(-)

17	1	3	75	(+)	II	Confirmed	Wild-type	(-)	(+)	0.061	2426	78	13	(-)
18	1	3	91	(-)	III	NA	NA	(-)	(-)	0.052	1450	80	13	(-)

† The patient underwent only abdominal fat pad biopsy without endomyocardial biopsy; however, no amyloid was identified.

‡ BNP values were shown because NT-proBNP value was not evaluated.

^{99m}Tc-PYP, technetium-99m pyrophosphate; NYHA, New York Heart Association; TTR, transthyretin; Hs-cTnT, high-sensitivity cardiac troponin T; NT-proBNP, N-terminal pro-brain natriuretic peptide; BNP, brain natriuretic peptide; PWT, posterior wall thickness.

Supplementary Table 3. Clinical Characteristics of the NMS Cohort Over 70 Years

	All patients (n=83)	^{99m} Tc-PYP negative (n=66)	^{99m} Tc-PYP positive (n=17)	P value
Age (years)	80 [75–84]	80 [74–84]	84 [78–88]	0.019
Sex (Male)	51 (61)	38 (58)	13 (77)	0.153
NYHA functional class				0.435
I	15 (18)	14 (21)	1 (5.9)	
II	53 (64)	41 (62)	12 (71)	
III	14 (17)	10 (15)	4 (24)	
IV	1 (1.2)	1 (1.5)	0	
Hypertension	57 (69)	44 (67)	13 (77)	0.437
Atrial fibrillation	46 (55)	34 (52)	12 (71)	0.158
Spinal canal stenosis	18 (22)	7 (11)	11 (65)	<0.001
Carpal tunnel syndrome	6 (7.2)	2 (3.0)	4 (24)	0.015
Pacemaker implantation	15 (18)	12 (18)	3 (18)	1.000
Laboratory parameters				
Albumin (g/dL)	3.7 [3.3–4.1]	3.7 [3.3–4.0]	4.0 [3.6–4.4]	0.036
Creatinine (mg/dL)	1.1 [0.9–1.5]	1.1 [0.9–1.6]	1.1 [0.9–1.4]	0.782
Hs-cTnT (ng/mL)	0.039 [0.026–0.062]	0.037 [0.025–0.059]	0.054 [0.038–0.078]	0.027
NT-proBNP (pg/mL)	2,165 [695–4,716]	2,019 [620–5,629]	2,315 [1,174–3,104]	0.835
ECG parameters				
Heart rate (beats/min)	69 [60–79]	69 [62–80]	60 [56–77]	0.119
Prolonged PR interval	24 (29)	16 (24)	8 (47)	0.078
Wide QRS	26 (31)	17 (26)	9 (53)	0.042
RBBB	15 (18)	12 (18)	3 (18)	1.000
LBBB	8 (9.6)	3 (4.5)	5 (29)	0.008
Low voltage	13 (16)	9 (14)	4 (24)	0.453
Poor R progression	18 (22)	12 (18)	6 (35)	0.184
Echocardiographic parameters				
LVEF (%)	61 [45–69]	62 [45–69]	56 [45–69]	0.611
LVEDD (mm)	46 ± 7	47 ± 7	42 ± 6	0.015
LVESD (mm)	30 [25–38]	31 [25–39]	28 [25–36]	0.400
IVS thickness (mm)	12 [10–14]	12 [10–13]	13 [12–15]	0.031

PW thickness (mm)	11 [9–13]	10 [9–12]	14 [12–17]	<0.001
Left atrium diameter (mm)	43 ± 7	43 ± 8	43 ± 7	0.829
E/A ratio	0.9 [0.6–1.6]	0.8 [0.5–1.3]	1.6 [1.0–3.0]	0.008
E-wave deceleration time (ms)	196 [155–258]	187 [147–257]	211 [169–314]	0.232
E/e' ratio	18 [13–26]	17 [13–25]	20 [15–32]	0.149
Aortic stenosis	13 (16)	11 (17)	2 (12)	1.000
Pericardial effusion	27 (33)	22 (33)	5 (29)	0.758

Categorical data presented as n (%). Continuous data presented as median values [interquartile range] or mean values ± standard deviation in an appropriate manner.

^{99m}Tc-PYP, technetium-99m pyrophosphate; NYHA, New York Heart Association; Hs-cTnT, high-sensitivity cardiac troponin T; NT-proBNP, N-terminal pro-brain natriuretic peptide; ECG, electrocardiogram; RBBB, right bundle branch block; LBBB, left bundle branch block; LVEF, left ventricular ejection fraction; LVEDD, left ventricular end-diastolic diameter; LVESD, left ventricular end-systolic diameter; IVS, interventricular septal; PW, posterior wall.