腎不全、腎移植患者に対する腎臓リハビリテーション

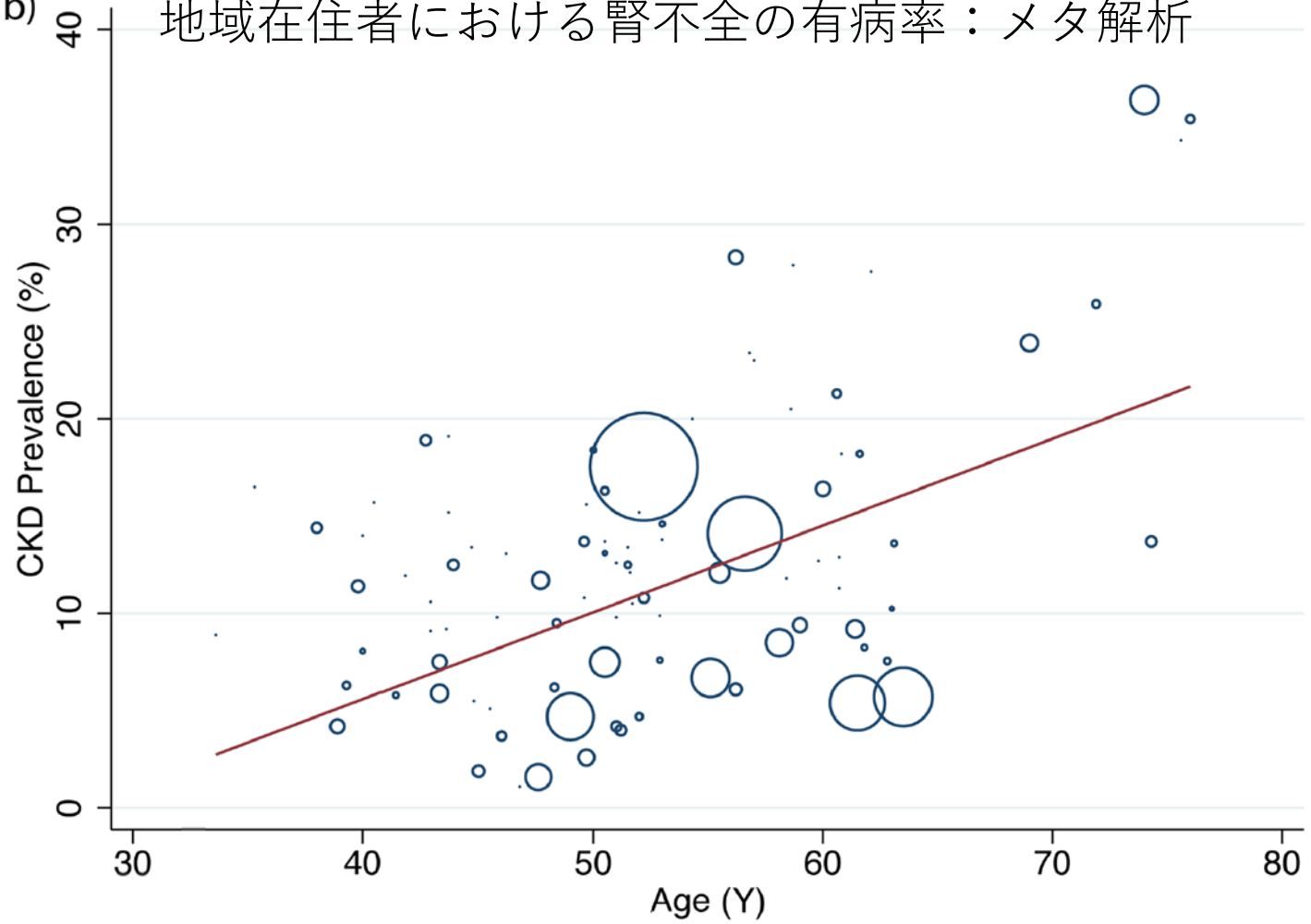
兵庫医療大学リハビリテーション学部
松沢良太

COI開示

筆頭発表者名：　松沢 良太

演題発表に関連し、開示すべきCOI関係にある
企業などはありません。

b) 地域在住者における腎不全の有病率：メタ解析



- 生命予後悪化
- 腎代替療法

✓ 透析（血液透析、腹膜透析）

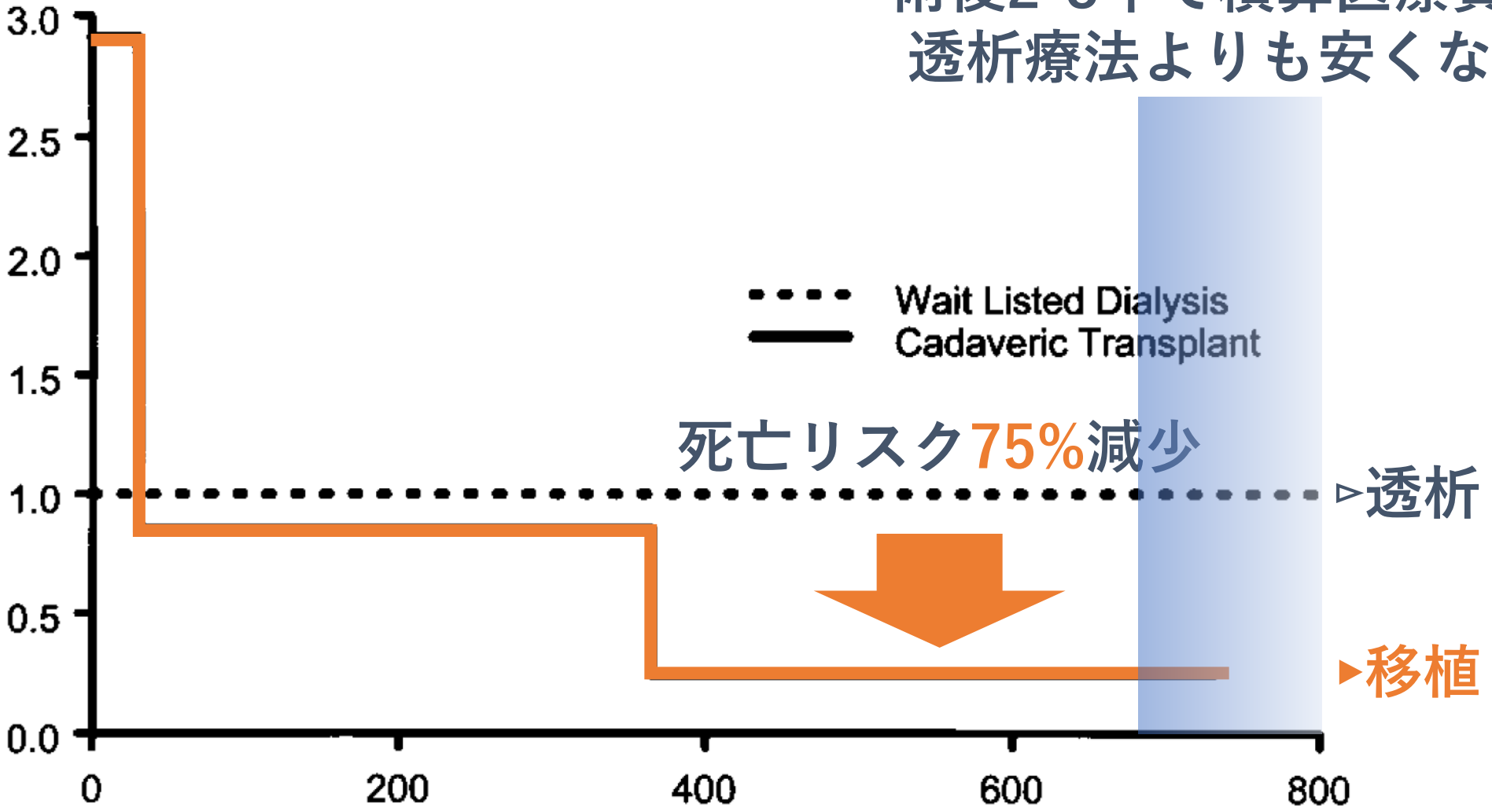
✓ 腎移植（生体、献腎）

	Stage 1 to 5		Stages 3 to 5	
	N*	Prevalence (%)	N*	Prevalence (%)
Japan, S Korea, Oceania	654,832	13.74 (10.75, 16.72)	298,000	11.73 (5.36, 18.10)

Hill NR et al. Plos One. 2016

腎移植の予後改善効果

術後2-3年で積算医療費は
透析療法よりも安くなる



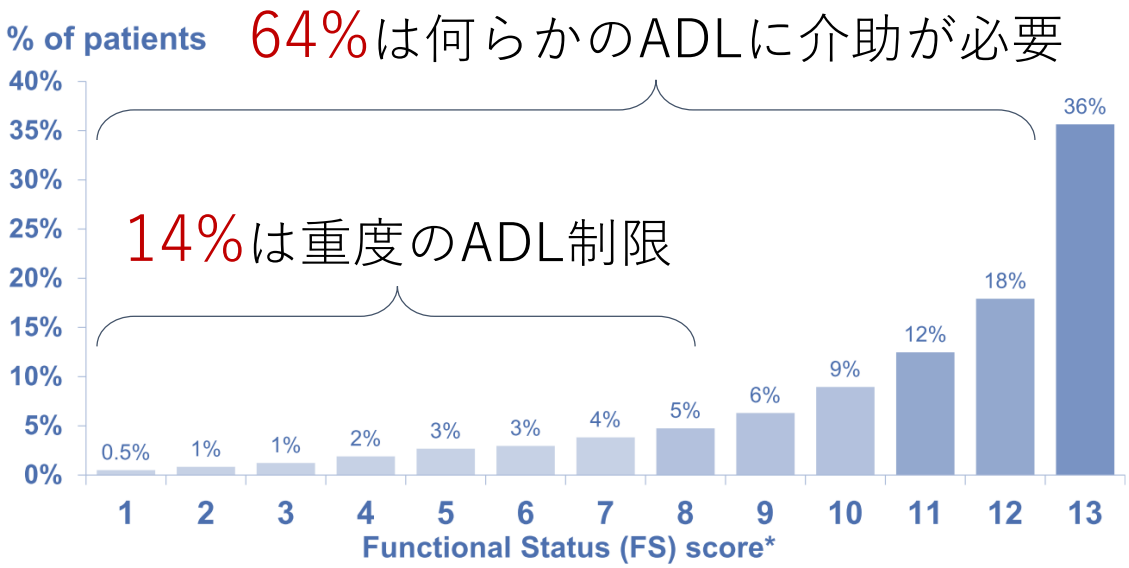
Rabbat CG. J Am Soc Nephrol. 2000

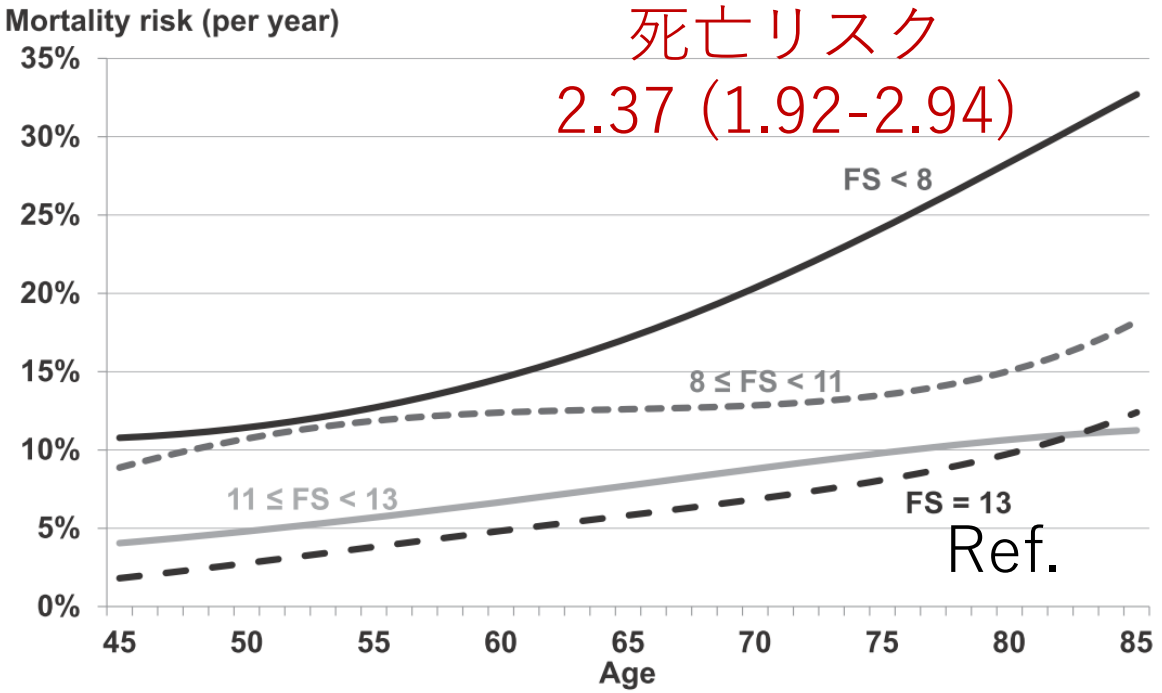
AJKD

Original Investigation

Functional Dependence and Mortality in the International Dialysis Outcomes and Practice Patterns Study (DOPPS)

S. Vanita Jassal, MSc, MB, BChir, MD,[1] Angelo Karaboyas, MS,[2] Leah A. Comment, MPH, MS,[2,3] Brian A. Bieber, MPH, MS,[2] Hal Morgenstern, PhD,[4,5,6] Ananda Sen, PhD,[3] Brenda W. Gillespie, PhD,[2,3] Patricia De Sequera, MD,[7] Mark R. Marshall, MD,[8,9,10] Shunichi Fukuhara, MD, MS, DMS,[11,12] Bruce M. Robinson, MD, MS,[2,3] Ronald L. Pisoni, PhD, MS,[2] and Francesca Tentori, MD, MS[2,13]



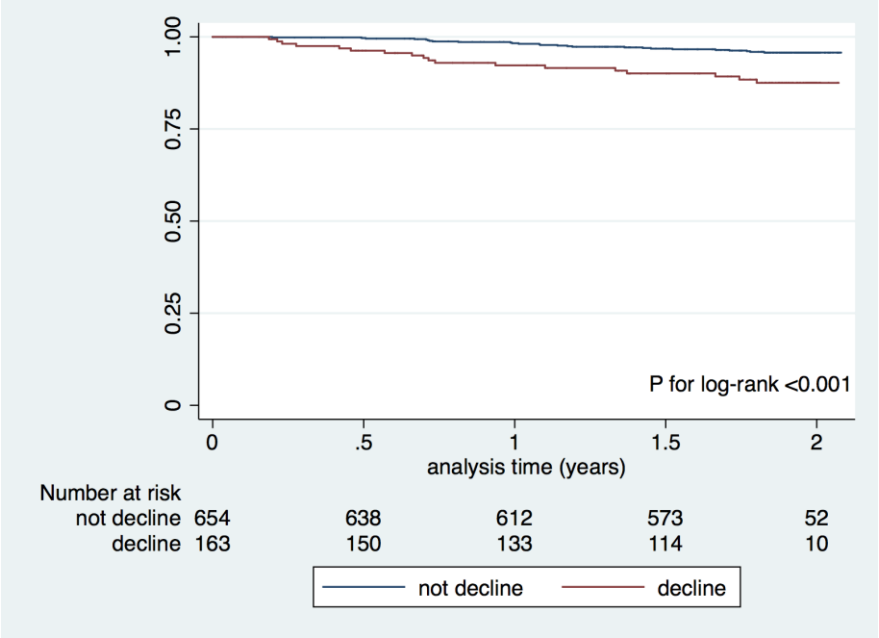


Jassal SV et al. Am J Kidney Dis. 2016

ORIGINAL RESEARCH

Decline in the Functional Status and Mortality in Patients on Hemodialysis: Results from the Japan Dialysis Outcome and Practice Patterns Study

Ryota Matsuzawa, PT, PhD,* Tsukasa Kamitani, PT, MPH,† Baback Roshanravan, MD, MS,‡ Shingo Fukuma, MD, PhD,§ Nobuhiko Joki, MD, PhD,¶ and Masafumi Fukagawa, MD, PhD**



ADLの経年的低下なし

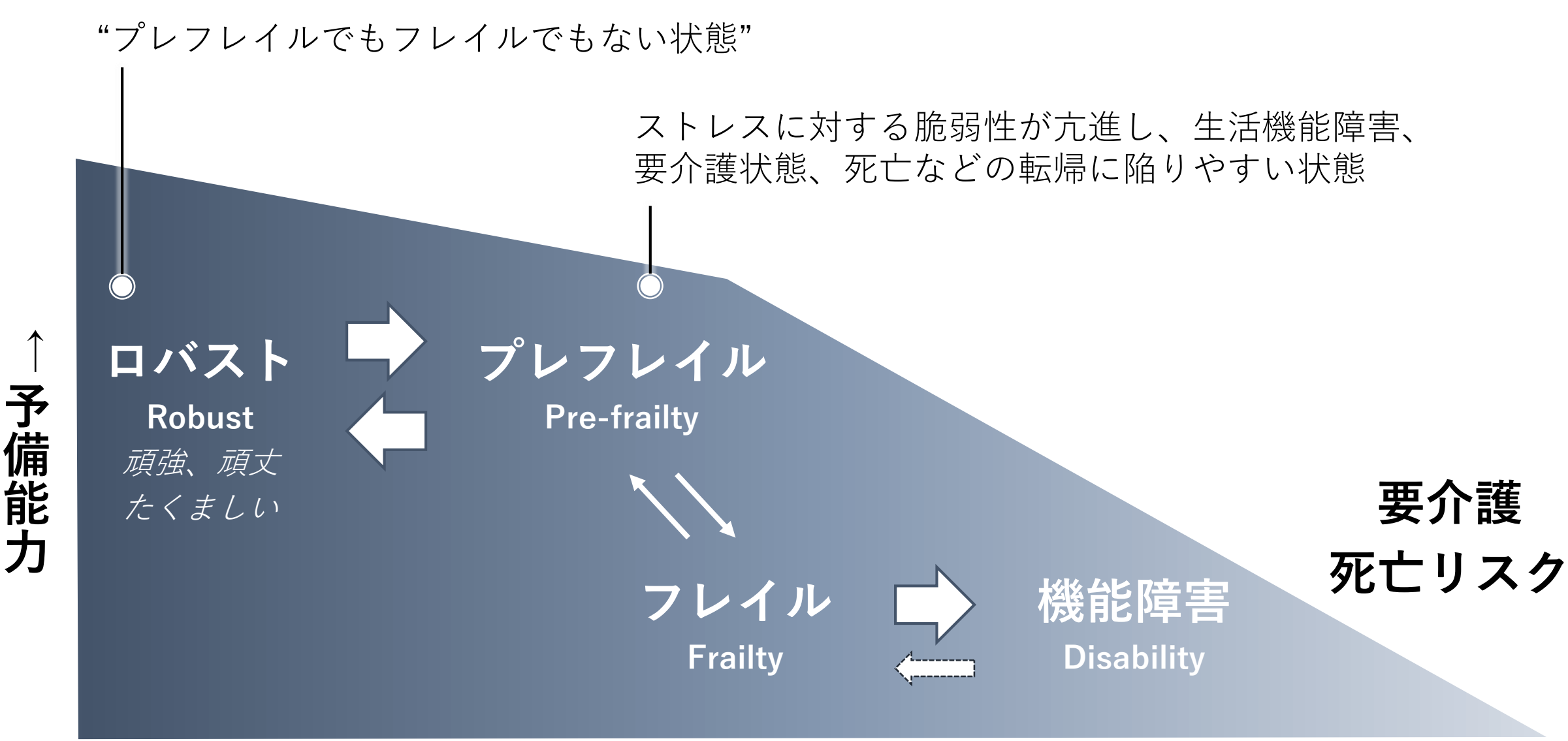
ADLの経年的低下あり

			All-cause mortality	
	N	Incidence rate[a]	Crude HR (95%CI)	Adjusted HR[b] (95%CI)
Functional status score				
not declined	654	2.2	ref	ref
declined	163	7.0	3.19 (1.75 – 5.82)	**2.68 (1.31 – 5.50)**

HR, hazard ratio; CI, confidence interval.
[a]Incidence rate per 100 person-years.
[b]Cox proportional hazards model with adjustment for age, sex, body mass index, years on dialysis, smoking status, albumin, phosphorus, baseline functional status score, and 13 comorbidities.

Part of Dialysis Outcomes and Practice Pattern Study (DOPPS) since 1999

Matsuzawa R et al. J Ren Nutr. 2018



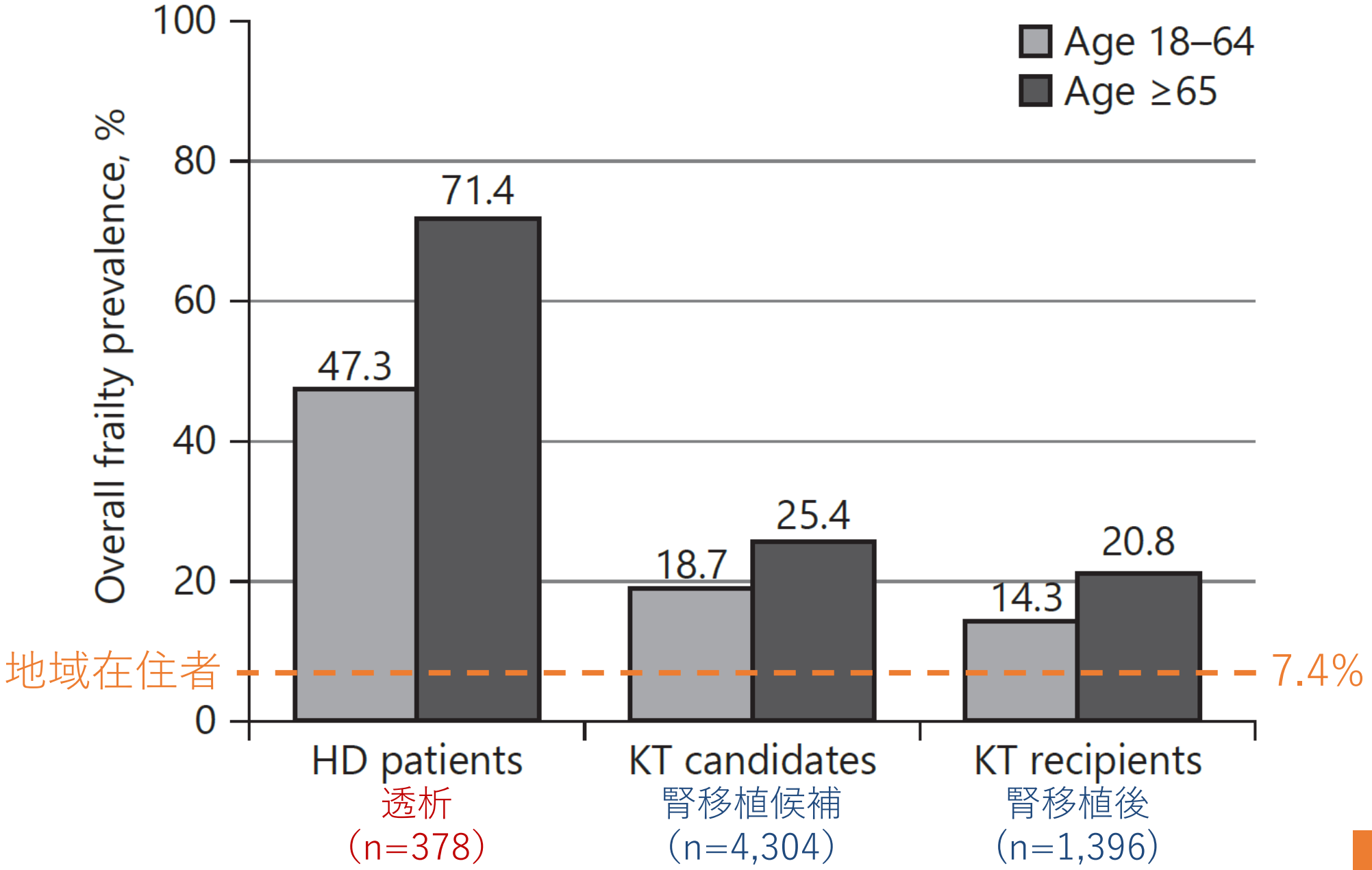
スライド作成者：兵庫医療大学　松沢良太

フレイルの判別（改訂版日本版CHS基準）

項目	質問と測定	答え
体重減少	「6ヵ月間で2kg以上の体重減少がありましたか？」	Yes=1
筋力低下	握力低下（男：28kg未満、女：18kg未満）	Yes=1
疲労	「（ここ2週間）理由なく疲れたような感じがしますか？」の問いに「はい」と回答	Yes=1
歩行速度の低下	快適歩行速度低下（<1.0m/s）	Yes=1
身体活動の低下	①健康目的に適度な運動やスポーツをしていますか？ ②健康目的に低レベルの運動をしていますか？	いずれもNo=1

3項目以上に該当：フレイル
1-2項目に該当：プレフレイル
} 該当なし：ロバスト

Satake S et al. Geriatr Gerontol Int. 2020



Kojima G. Int Urol Nephrol. 2017; Chu NM. Am J Nephrol. 2020.

Frailty and Access to Kidney Transplantation

Christine E. Haugen,[1] Nadia M. Chu,[1,2] Hao Ying,[1] Fatima Warsame,[1] Courtenay M. Holscher,[1] Niraj M. Desai,[1] Miranda R. Jones,[2] Silas P. Norman,[3] Daniel C. Brennan,[4] Jacqueline Garonzik-Wang,[1] Jeremy D. Walston,[5] Adam W. Bingaman,[6] Dorry L. Segev,[1,2] and Mara McAdams-DeMarco[1,2]

対象：7078例の腎移植候補者（prospective）

Table 1. Cumulative incidence (%) of listing, waitlist mortality, and kidney transplantation

Outcome by Frailty Status	*n*	Cumulative Incidence, %				Multivariable Models	
		6 mo	1 yr	3 yr	5 yr		
Chance of listing						Adjusted HR (95% CI)	*P* value
Nonfrail			56	62	N/A	Reference	
Frail	957	33	41	46	N/A	0.62 (0.56 to 0.69)	<0.001
Risk of waitlist mortality						Adjusted SHR (95% CI)	*P* value
Nonfrail		1	2	10	18	Reference	
Frail	561	2	4	18	33	1.70 (1.36 to 2.14)	<0.001
Chance of kidney transplantation						Adjusted IRR (95% CI)	*P* value
Nonfrail	3991	14	21	35	43	Reference	
Frail	561	11	16	28	34	0.68 (0.58 to 0.81)	<0.001

Cox proportional hazards were adjusted for age, sex, and race for chance of kidney transplantation listing. Competing risk models were used to quantify the risk of waitlist mortality by frailty status in kidney transplant waitlist candidates. Transplant was treated as a competing risk, and models were adjusted for age, sex, race, body mass index, cause of ESKD, and blood type. Poisson regression was used to calculate the incidence rate ratio of kidney transplant and adjusted for age, sex, race, body mass index, cause of ESKD, and blood type. HR, hazard ratio; 95% CI, 95% confidence interval; N/A, not available; SHR, subhazard ratio; IRR, incidence rate ratio.

リストに挙がる機会 38%↓

移植待機中の死亡 70%↑

移植に至る 32%↓

Haugen CE. Clin J Am Soc Nephrol. 2019

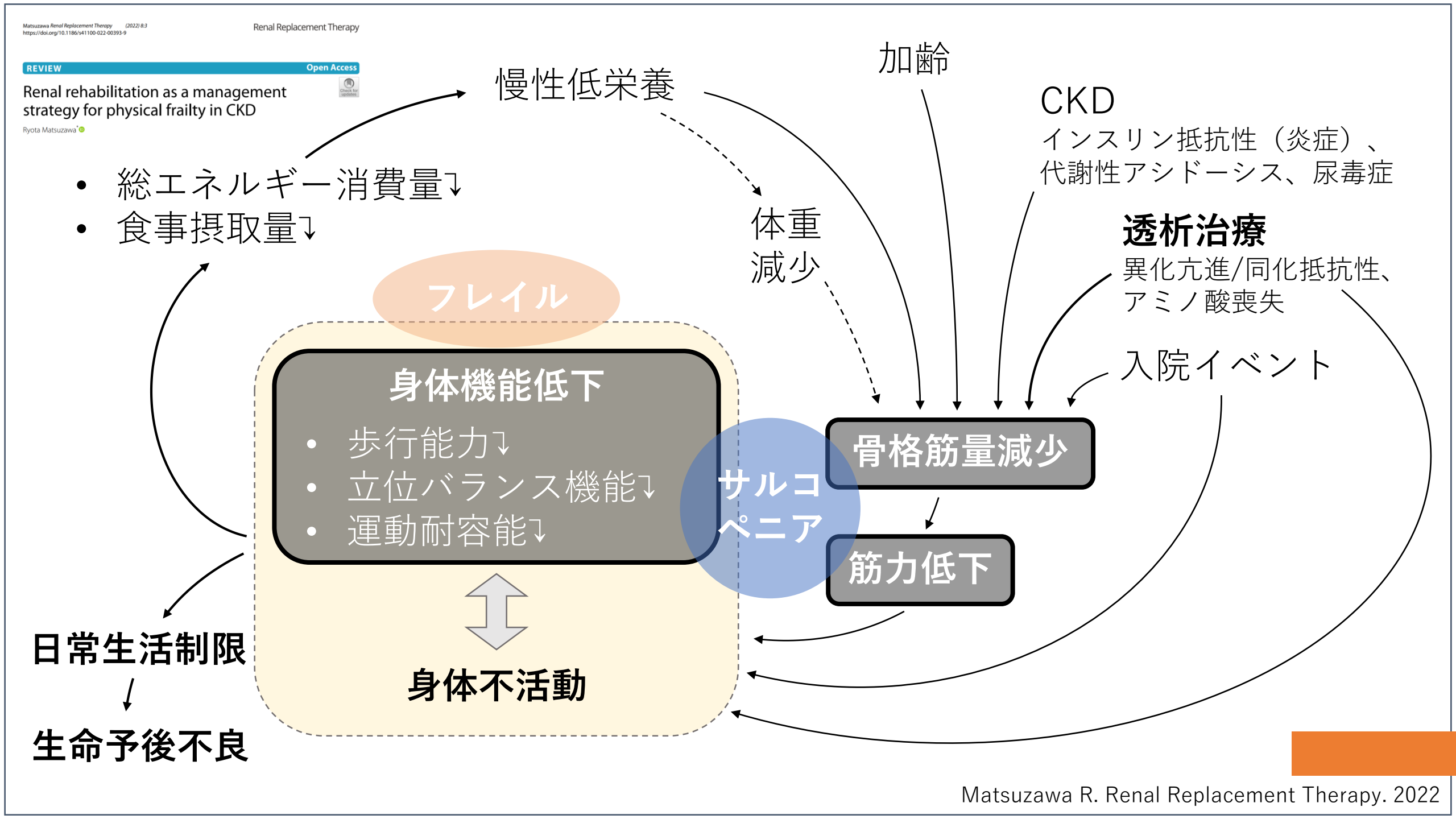
Matsuzawa *Renal Replacement Therapy* (2022) 8:3
https://doi.org/10.1186/s41100-022-00393-9

Renal Replacement Therapy

REVIEW Open Access

Renal rehabilitation as a management strategy for physical frailty in CKD

Ryota Matsuzawa*



Matsuzawa R. Renal Replacement Therapy. 2022

Matsuzawa *Renal Replacement Therapy* (2022) 8:3
https://doi.org/10.1186/s41100-022-00393-9

REVIEW

Renal rehabilitation as a management strategy for physical frailty in CKD

Ryota Matsuzawa*

主治医が臨床的に安定していると判断した者

移動能力評価
1. **快適歩行速度 （< 1.0 m/秒）　　or**
2. **Short Physical Performance Battery（< 12点）**

移動能力低下あり

原因検索
1. 合併症の重症度
2. 服薬内容
3. 透析治療内容

1～3に問題がある場合、
主治医に治療方針の確認を行う。

4. 身体機能評価
   - 運動耐容能（6分間歩行距離）　・筋力（sit-to-stand）
   - 立位バランス機能（片脚立ち時間、timed up and go test）

身体機能低下あり

監視型運動療法
- **有酸素運動　・筋力トレーニング**
- **バランストレーニング　・ストレッチ　　など**

移動能力低下なし

活動量評価
1. 歩数計 or 活動量計
   - 非透析日の歩数（< 4000歩） or
2. 問診
   - 30分以上の散歩（< 5日/週）

活動量低下あり

動機づけ
- **歩数計を用いた介入**
- **自宅での運動指導**
- **監視型運動療法　など**

活動量低下なし

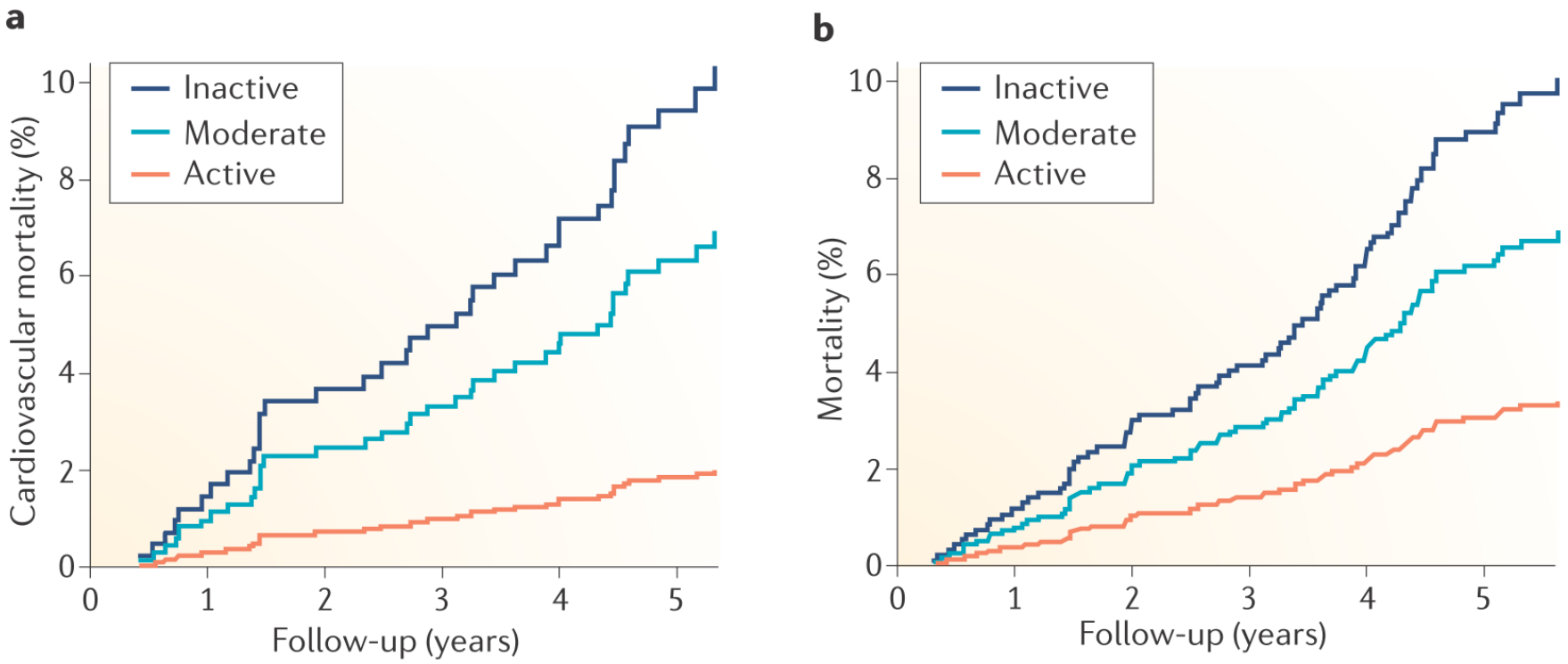
- **6か月後or 1年後の定期評価へ**
- **入院イベントの後**

Matsuzawa R et al. Renal Replacement Therapy. 2022

REVIEWS

Physical inactivity: a risk factor and target for intervention in renal care

Dorien M. Zelle[1], Gerald Klaassen[1]*, Edwin van Adrichem[2,3], Stephan J.L. Bakker[1], Eva Corpeleijn[4] and Gerjan Navis[1]*



Zelle DM et al. Nat Rev Nephrol. 2017

Article

Habitual Physical Activity Measured by Accelerometer and Survival in Maintenance Hemodialysis Patients

Ryota Matsuzawa,*† Atsuhiko Matsunaga,* Guoqin Wang,‡ Toshiki Kutsuna,§ Akira Ishii,‖¶ Yoshifumi Abe,* Yutaka Takagi,† Atsushi Yoshida,† and Naonobu Takahira*

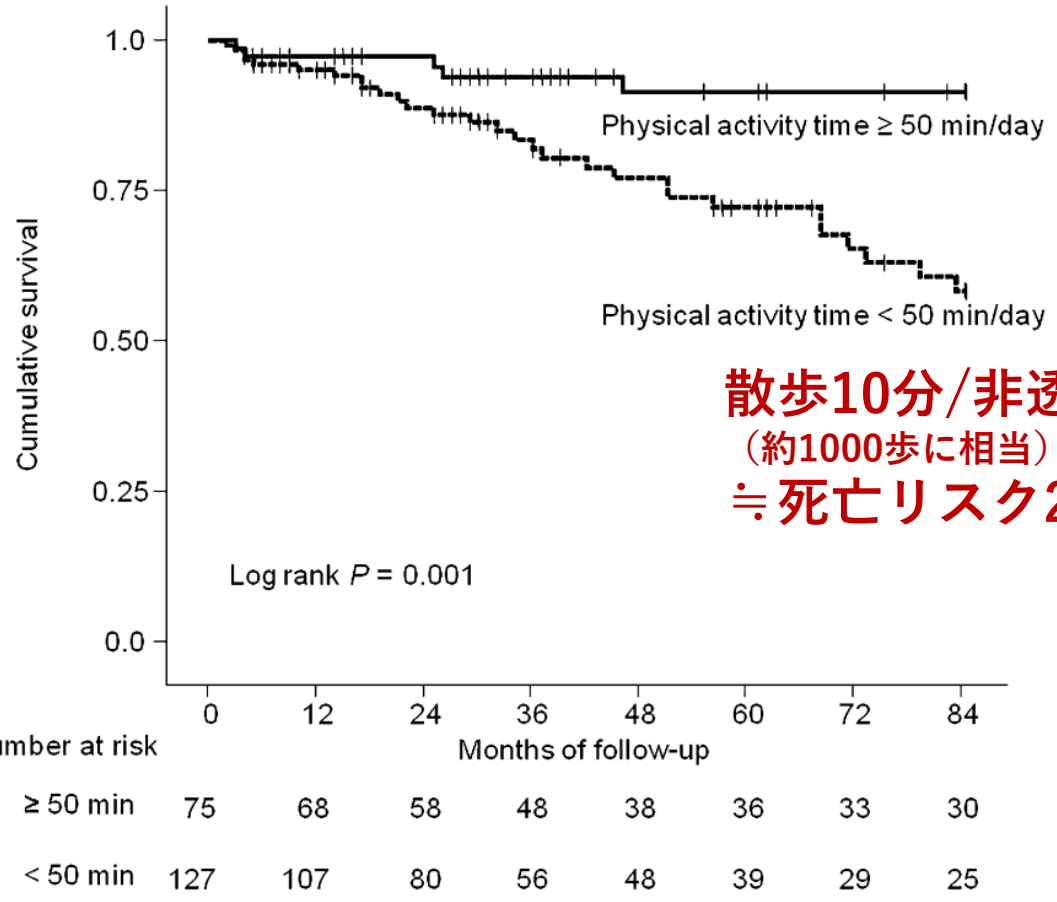
430 Japanese outpatients who were undergoing hemodialysis 3 times per week at the Department of Hemodialysis Center at Sagami junkanki Clinic from October 2002 to February 2012

95 patients who were excluded because they did not meet criteria
- 32 patients had severe cardiovascular disease
- 16 patients hospitalized or changed clinic within 3 months prior to the study
- 11 patients needed assistance in walking or daily activities
- 5 patients amputated their leg or toe
- 32 had other reasons

335 patients who were eligible for the study

133 patients who did not agree with participating in the study

202 patients who agreed with participation for the study and were followed up to 7 years



散歩10分/非透析日
（約1000歩に相当）
≒死亡リスク22%減少

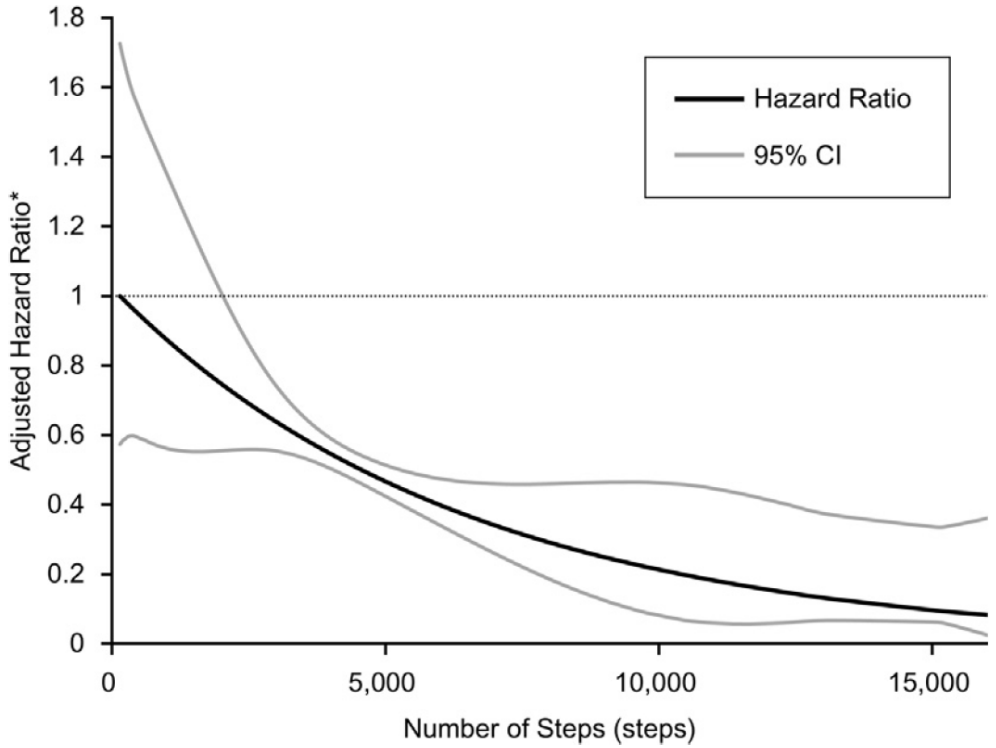
Matsuzawa R. Clin J Am Soc Nephrol. 2012

ORIGINAL RESEARCH

Physical Activity Dose for Hemodialysis Patients: Where to Begin? Results from a Prospective Cohort Study

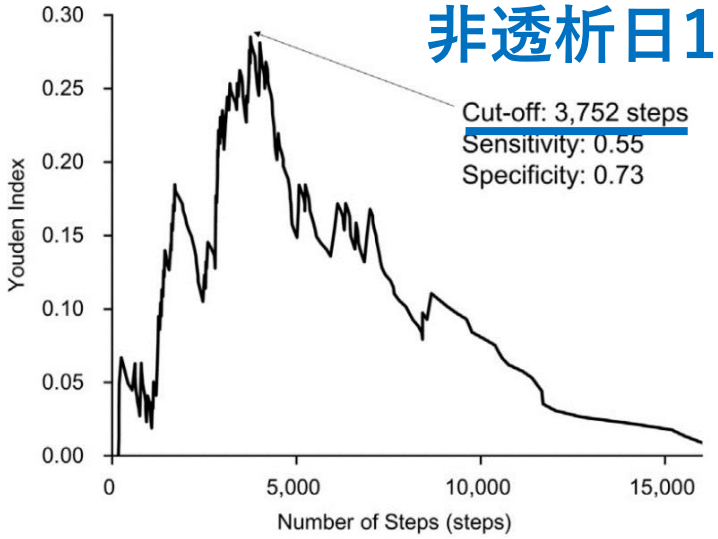
Ryota Matsuzawa, PT, PhD, Baback Roshanravan, MD, MS,† Takahiro Shimoda, PT, MS,‡ Noritaka Mamorita, ME, PhD,§ Kei Yoneki, PT, MS,‡ Manae Harada, PT, MS,‡ Takaaki Watanabe, PT, MS,‡ Atsushi Yoshida, MD, PhD,¶ Yasuo Takeuchi, MD, PhD,** and Atsuhiko Matsunaga, PT, PhD‡*

	All (n = 282)
Age, y	64.8 ± 10.6
≥65 y, %	142 (50.4%)
Men, %	154 (54.6%)
Height, m	1.59 ± 0.09
Dry weight, kg	54.3 ± 10.9
Body mass index, kg/m^2	21.3 ± 3.3
Time on hemodialysis, y	7.0 ± 7.8
Number of steps (steps)	
7 day	3,920 ± 2,797
Nondialysis day	4,337 ± 3,160
Dialysis day	3,099 ± 4,337



Matsuzawa R, Matsunaga A et al. J Ren Nutr. 2018

非透析日1日あたり4000歩



	Number of Steps		
	≥4,000 Steps	<4,000 Steps	Per 1,000 Steps Increase
Model 1			
HR (95% CI)	Reference	2.92 (1.51-5.63)	0.82 (0.72-0.93)
P value	–	.001	.002
Model 2			
HR (95% CI)	Reference	2.72 (1.41-5.30)	0.83 (0.73-0.94)
P value	–	.003	.004
Model 3			
HR (95% CI)	Reference	2.58 (1.32-5.03)	0.84 (0.74-0.95)
P value	–	.006	.007
Model 4			
HR (95% CI)	Reference	2.62 (1.35-5.08)	0.83 (0.73-0.94)
P value	–	.004	.003
Model 5			
HR (95% CI)	Reference	2.37 (1.22-4.60)	0.84 (0.74-0.96)
P value	–	.010	.010

CI, confidence interval; HR, hazard ratio.

Analyses were performed using Cox proportional hazards regression. Model 1 included age, sex, time on hemodialysis, and body mass index. Model 2 added diabetes. Model 3 added peripheral vascular disease. Model 4 added cerebrovascular accident/transient ischemic attack. Model 5 added geriatric nutritional risk index and comorbidity score.

Matsuzawa R, Matsunaga A et al. J Ren Nutr. 2018

ARTICLE IN PRESS

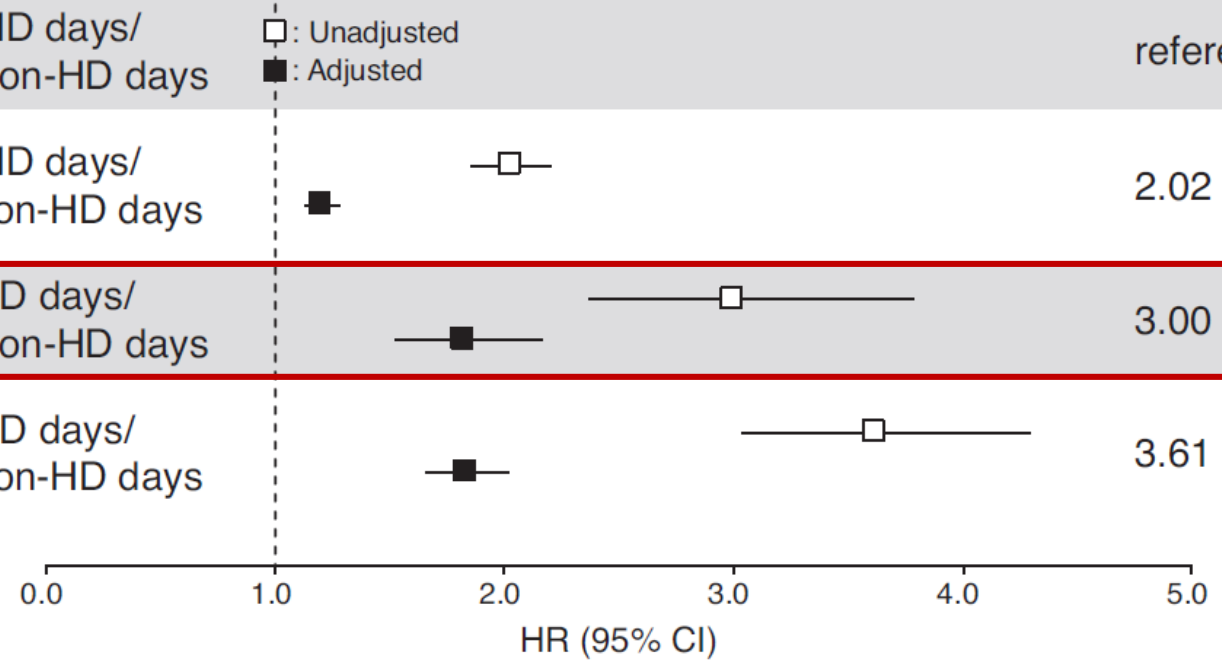
ORIGINAL RESEARCH

Impact of Physical Activity on Dialysis and Nondialysis Days and Clinical Outcomes Among Patients on Hemodialysis

Shohei Yamamoto, PT, MSc,*,† Ryota Matsuzawa, PT, PhD,‡ Keika Hoshi, DDS, PhD,§,¶ Manae Harada, PT, PhD,** Takaaki Watanabe, PT, MSc,* Yuta Suzuki, PT, MSc,* Yusuke Isobe, PT,* Keigo Imamura, PT,* Shiwori Osada, MD, PhD,†† Atsushi Yoshida, MD, PhD,‡‡ Kentaro Kamiya, PT, PhD,§§ and Atsuhiko Matsunaga, PT, PhD*,§§

A All-cause mortality

Physical activity	Unadjusted HR [a]	Adjusted HR [a]
More active on HD days/ More active on non-HD days	reference	reference
More active on HD days/ Less active on non-HD days	2.02 (1.85-2.21) [c]	1.20 (1.13-1.28) [c]
Less active on HD days/ More active on non-HD days	3.00 (2.37-3.78) [c]	1.82 (1.53-2.17) [c]
Less active on HD days/ Less active on non-HD days	3.61 (3.04-4.30) [c]	1.83 (1.65-2.02) [c]



Yamamoto S, Matsuzawa R, et al. J Ren Nutr. 2020

Exercise Training in Patients Receiving Maintenance Hemodialysis: A Systematic Review of Clinical Trials

Birinder Singh B. Cheema[a] Maria A. Fiatarone Singh[a,b,c]

[a]School of Exercise and Sport Science, and [b]Faculty of Medicine, University of Sydney, Sydney, Australia; [c]Hebrew Rehabilitation Center for the Aged and Jean Mayer USDA Human Nutrition Center on Aging, Tufts University, Boston, Mass., USA

NEPHROLOGY

Nephrology **16** (2011) 626–632

Original Article

Exercise training in haemodialysis patients: A systematic review and meta-analysis

NEIL SMART[1] and MICHAEL STEELE[2]

[1]Department of Exercise Science, University of New England, Armidale, New South Wales, and [2]Faculty of Health Science and Medicine, Bond University, Robina, Queensland, Australia

AJKD

Original Investigation

Exercise Training in Adults With CKD: A Systematic Review and Meta-analysis

Susanne Heiwe, RPT, PhD,[1,2,3] and Stefan H. Jacobson, MD, PhD[1,4]

Intradialytic Exercise in Hemodialysis Patients: A Systematic Review and Meta-Analysis

Kaixiang Sheng[a] Ping Zhang[a] Lili Chen[b] Jun Cheng[a] Congcong Wu[a] Jianghua Chen[a]

[a]Kidney Disease Center, The First Affiliated Hospital, College of Medicine, Zhejiang University, Hangzhou, Zhejiang Province, and [b]The Nephrology Department, Zhejiang Hospital, Hangzhou, China

KI REPORTS
KIReports.org
CLINICAL RESEARCH

Exercise Training in Elderly People Undergoing Hemodialysis: A Systematic Review and Meta-analysis

Ryota Matsuzawa[1], Keika Hoshi[2], Kei Yoneki[3], Manae Harada[3], Takaaki Watanabe[3], Takahiro Shimoda[3], Shuhei Yamamoto[4] and Atsuhiko Matsunaga[3]

[1]Department of Rehabilitation, Kitasato University Hospital, Sagamihara, Japan; [2]Department of Hygiene, Kitasato University School of Medicine, Sagamihara, Japan; [3]Department of Rehabilitation Sciences, Kitasato University Graduate School of Medical Sciences, Sagamihara, Japan; and [4]Department of Rehabilitation, Shinshu University Hospital, Nagano, Japan

Introduction: Previous reviews have indicated the effectiveness of exercise in people undergoing hemodialysis. However, these analyses did not take into account whether the subjects were elderly. We performed a systematic review of the effects of exercise training in elderly people undergoing hemodialysis and updated the evidence of exercise for people undergoing hemodialysis by adding recent research data.

Methods: We searched 8 electronic databases up to June 2016. Inclusion criteria were as follows: randomized controlled trial, English publication, subjects aged 18 and older undergoing hemodialysis, evaluation of physical function as an outcome of exercise intervention. We defined elderly as age 60 years and older. The main outcomes were exercise tolerance (peak/maximum oxygen consumption) and walking ability (6-minute walk distance). Secondary outcomes were lower extremity muscle strength and quality of life.

Results: After screening of 10,923 references, 30 comparisons were entered into the analysis. However, because we found only 1 study in which elderly subjects were treated, we could not perform a meta-analysis for these people. For the general population undergoing hemodialysis, supervised exercise training was shown to significantly increase peak/maximum oxygen consumption (standard mean difference, 0.62; 95% confidence interval 0.38–0.87; $P < 0.001$), 6-minute walk distance (standard mean difference, 0.58; 95% confidence interval 0.24–0.93; $P < 0.001$), lower extremity muscle strength (standard mean difference, 0.94; 95% confidence interval 0.67–1.21; $P < 0.001$), and quality of life (standard mean difference, 0.53; 95% confidence interval 0.52–0.82; $P < 0.001$).

Discussion: Our analysis on the effectiveness of exercise training in elderly people undergoing hemodialysis as compared with nonelderly people was somewhat inconclusive. Future studies should be carried out for elderly people to identify the most favorable exercise program for this population.

Kidney Int Rep (2017) **2**, 1096–1110; http://dx.doi.org/10.1016/j.ekir.2017.06.008
KEYWORDS: dialysis; elderly; exercise; meta-analysis; renal replacement therapy

An aging population and the increasing prevalence of lifestyle-related diseases, such as diabetes, hypertension, and cardiovascular disease, have led to a worldwide increase in the rate of chronic kidney disease requiring renal replacement therapy, including hemodialysis.[1] The mean age of people undergoing dialysis has been on the rise because of improved survival in this patient population, as well as the reduced availability of transplants for elderly patients. Significant increases in age of people undergoing dialysis were observed in almost all 12 nations included in the Dialysis Outcomes and Practice Patterns Study, an international cohort study.[2] Other studies from the United States, Europe, and Japan also report a significant proportion of elderly patients undergoing dialysis.[1–3] In particular, the mean age in the Japanese dialysis population was 66.9 years in 2012, showing an 11.6-year increase since the end of 1991. Furthermore, the proportions of people aged 60 years and older

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Matsuzawa R, Matsunaga A et al. Kidney Int Rep. 2017

Journal of PHYSIOTHERAPY
journal homepage: www.elsevier.com/locate/jphys

Research

Intradialytic neuromuscular electrical stimulation improves functional capacity and muscle strength in people receiving haemodialysis: a systematic review

Pedro L Valenzuela [a,b], Javier S Morales [c], Luis M Ruilope [d], Pedro de la Villa [a,e], Alejandro Santos-Lozano [d,f], Alejandro Lucia [c,d,g]

[a] Department of Systems Biology, University of Alcalá; [b] Department of Sport and Health, Spanish Agency for Health Protection in Sport (AEPSAD); [c] Faculty of Sport Sciences, Universidad Europea de Madrid; [d] Hypertension Unit and Cardiorenal Translational Laboratory, Research Institute of the Hospital 12 de Octubre ("imas12"), Madrid; [e] Ramón y Cajal Health Research Institute (IRYCIS), Madrid; [f] i+HeALTH, Department of Health Sciences, European University Miguel de Cervantes, Valladolid; [g] Centro de Investigación Biomédica en Red de Fragilidad y Envejecimiento Saludable (CIBERFES), Madrid, Spain

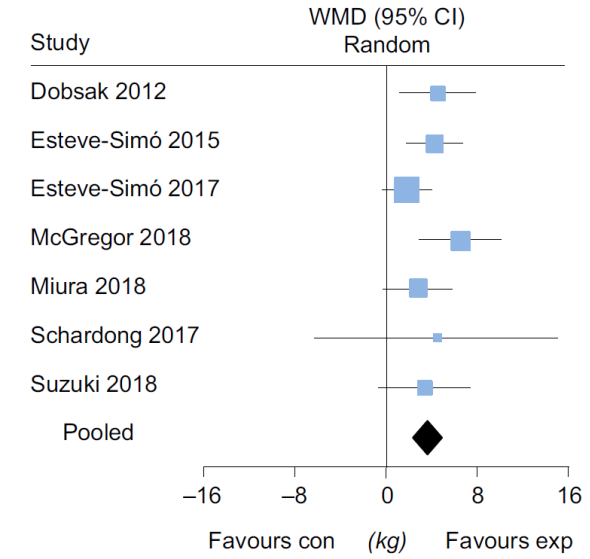

Figure 6. Weighted mean difference (95% CI) of effect of neuromuscular electrical stimulation on the strength of the knee extensors.

下肢筋力 ↑

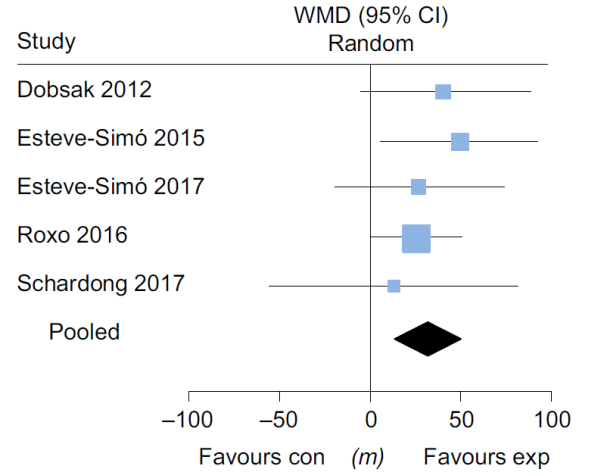

Figure 2. Weighted mean difference (95% CI) of effect of neuromuscular electrical stimulation on the 6-minute walk distance.

6分間歩行距離 ↑

Valenzuela PL et al. J Physiother. 2020

Kidney & Blood Pressure Research
Kidney Blood Press Res 2018;43:0-0
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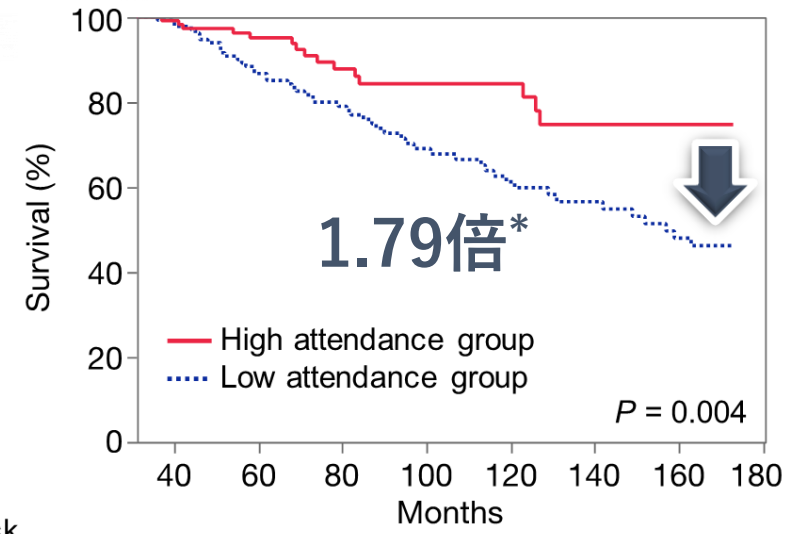
www.karger.com/kbr

Review / Original Paper

Utility of Regular Management of Physical Activity and Physical Function in Hemodialysis Patients

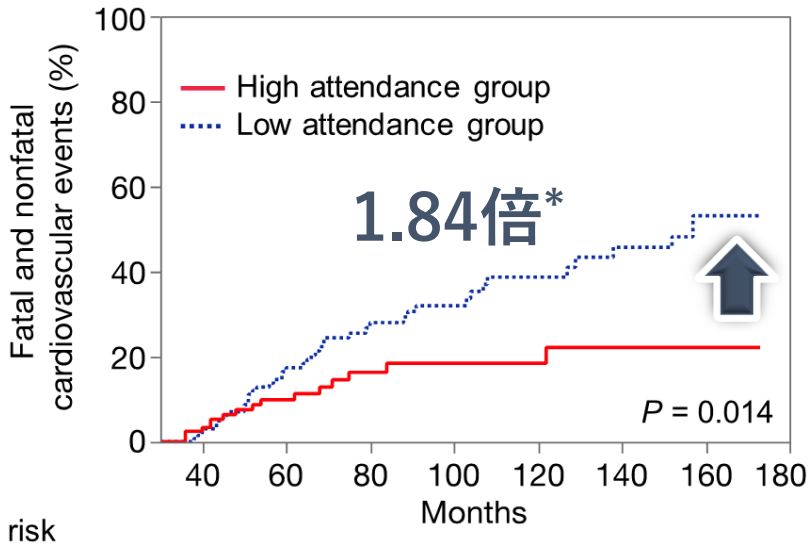
Shohei Yamamoto[a] Ryota Matsuzawa[b] Yoshifumi Abe[a,c] Keika Hoshi[d]
Kei Yoneki[a] Manae Harada[a] Takaaki Watanabe[a] Takahiro Shimoda[a]
Yuta Suzuki[a] Yusuke Matsunaga[e] Kentaro Kamiya[a,f] Atsushi Yoshida[g]
Atsuhiko Matsunaga[a,f]

A 全死亡



No. at risk								
High attendance	112	79	51	33	28	23	21	6
Low attendance	134	108	83	57	46	34	29	3

B 心血管イベント



No. at risk								
High attendance	109	67	41	27	23	19	16	5
Low attendance	129	90	58	44	33	24	19	3

*調整変数：年齢、性別、BMI、Alb、CRP、身体活動量、歩行速度
合併症スコア、ベースライン3年間の入院イベント

Yamamoto S, Matsuzawa R et al. Kidney Blood Press Res. 2018

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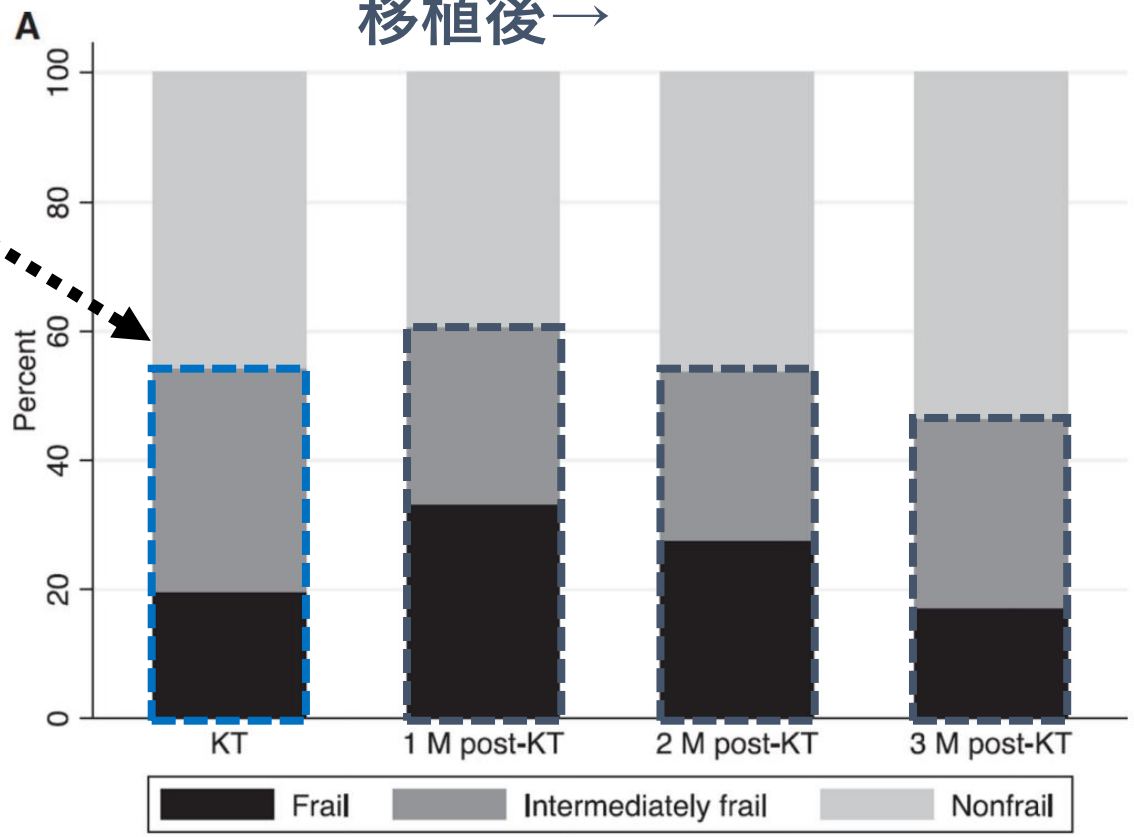
J Am Geriatr Soc. 2015 October ; 63(10): 2152–2157. doi:10.1111/jgs.13657.

Changes in Frailty After Kidney Transplantation

Mara A. McAdams-DeMarco, PhD[*,†], **Kyra Isaacs, BS**[*], **Louisa Darko**[*], **Megan L. Salter, PhD**[†], **Natasha Gupta, BS**[*], **Elizabeth A. King, MD**[*], **Jeremy Walston, MD**[‡], and **Dorry L. Segev, MD, PhD**[*,†]

フレイル
＋
プレフレイル

移植後→



McAdams-DeMarco MA. J Am Geriatr Soc. 2015.

References	Subjects	Predictor	Outcome	Adjusted Hazard Ratio
McAdams-DeMarco MA. (2015)	腎移植者 (537名)	Frailty Pre-frail	全死亡	**Frailty: 2.17 [1.01-4.65]** Pre-frail: 1.49 [0.73-3.06]
McAdams-DeMarco MA. (2013)	腎移植者 (383名)	Frailty	入院	**Frailty: 1.59 [1.17-2.17]**
Rosas SE. (2012)	腎移植者 (454名)	PA ・Moderate ・Active	全死亡	Moderate: 0.87 [0.56-1.35] **Active: 0.52 [0.31-0.87]**
Zelle DM. (2011)	腎移植者 (540名)	PA ・log-MET-min/day	全死亡 心血管死	**0.75 [0.60-0.94]** **0.62 [0.45-0.86]**

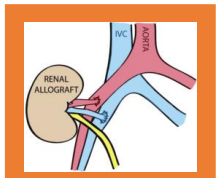
McAdams-DeMarco MA. Am J Transplant. 2015; McAdams-DeMarco MA. Am J Transplant. 2013; Rosas SE, Am J Nephrol. 2012; Zelle DM. Clin J Am Soc Nephrol. 2011

ORIGINAL RESEARCH

Efficacy of Exercise Therapy Initiated in the Early Phase After Kidney Transplantation: A Pilot Study

Shohei Yamamoto, PT, MSc, Ryota Matsuzawa, PT, PhD,† Tsukasa Kamitani, PT, MPH,‡ Keika Hoshi, DDS, PhD,§¶ Daisuke Ishii, MD, PhD,** Fumino Noguchi, RN,†† Nobuaki Hamasaki, PT, PhD,‡‡ Kohei Nozaki, PT, MSc,‡‡ Takafumi Ichikawa, PT, BSc,‡‡ Emi Maekawa, MD, PhD,§§ Atsuhiko Matsunaga, PT, PhD,* and Kazunari Yoshida, MD, PhD¶¶*

移植前評価（外来）



退院

移植後評価（２ヵ月時）

Usual care（n=14）

2016年1月～2017年1月

入院

運動療法（n=10）

2017年2月～

入院

運動療法+活動指導・記録

- 有酸素運動30-40分×2回/日
- 活動目標の設定と歩数計の装着・記録

Yamamoto S, Matsuzawa R, Yoshida K. J Ren Nutr. 2020

ORIGINAL RESEARCH

Efficacy of Exercise Therapy Initiated in the Early Phase After Kidney Transplantation: A Pilot Study

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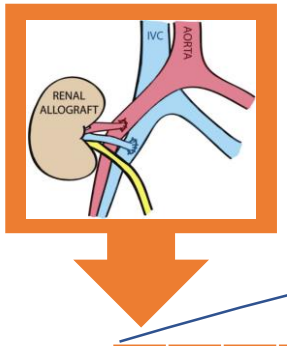

入院期間（3-4W）　外来

Day 6　Day 60

運動療法

- 準備体操＋30-40分の有酸素運動×1-2回/日
- エルゴメータ→トレッドミルへ移行する
- 運動負荷：Borg 13（ややきつい）-15（きつい）

活動指導

- 目標歩数：3000歩→5000歩→5000歩以上＋階段昇降
- 自己管理ノートへの活動量の自己記載
- 病棟看護師および理学療法士は実施状況の確認

Yamamoto S, Matsuzawa R, Yoshida K. J Ren Nutr. 2020

運動療法実施に関する注意事項（コロナ流行前に作成）

以下のいずれかの症状を認めた場合は主治医に確認し、
運動療法の休止/中止あるいは運動負荷の調整を行う。

- ✓38度以上の熱発
- ✓VASで7/10以上の創部痛
- ✓2日以上続けてCre値が上昇している場合
- ✓前日と比較してCre値が30%以上上昇した場合
- ✓重度の貧血（Hb値<7.0 g/dL）
- ✓何らかの理由で禁食中の場合
- ✓上記以外で病棟看護師あるいは医師が運動療法に向かないと判断した場合

Yamamoto S, Matsuzawa R, Yoshida K. J Ren Nutr. 2020

ORIGINAL RESEARCH

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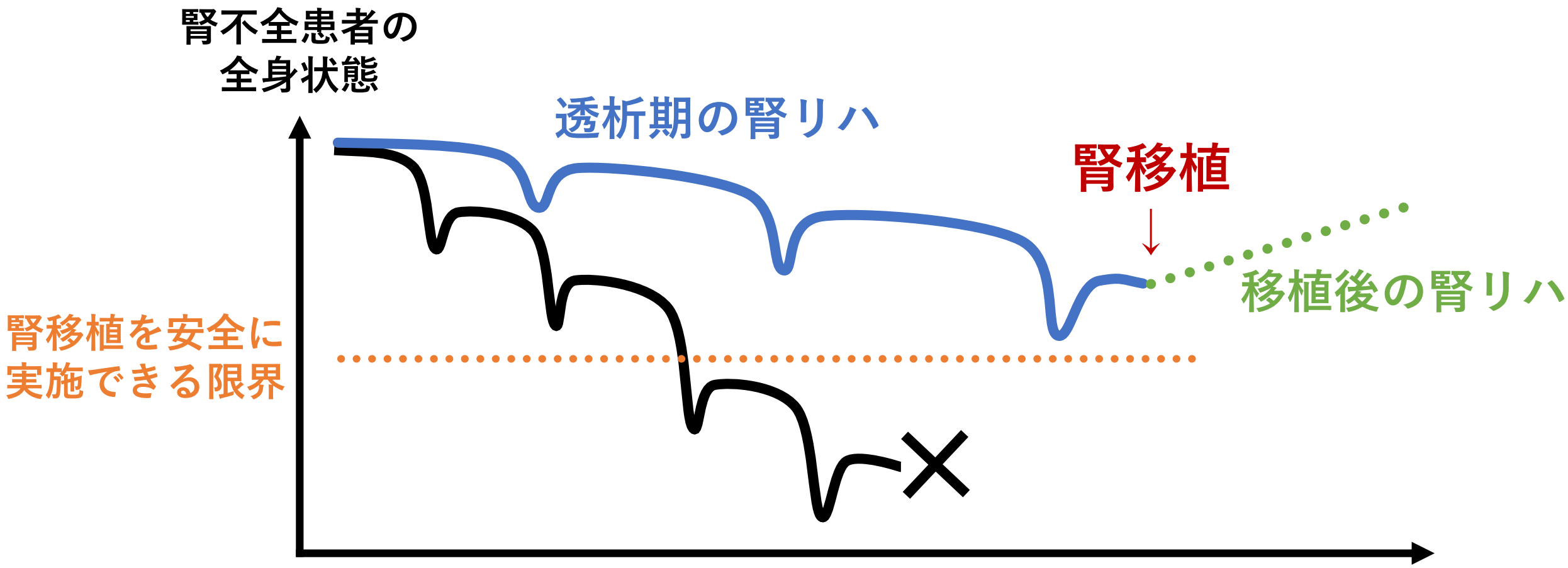
Table 2. Associations of Early Posttransplant Exercise With Physical Performance and Activity

	Exercise Group			Control Group			ANCOVA at Follow-Up	
Outcomes	At Follow-Up	Within-Group Change from Baseline	*P* Value*	At Follow-Up	Within-Group Change from Baseline	*P* Value*	Adjusted Mean Between-Group Difference†	*P* Value†
6-minute walking distance, m	612.7 (569.6 to 655.8)	45.4 (23.6 to 67.2)	.001	548.1 (457.5 to 638.7)	−0.9 (−31.2 to 29.4)	.95	44.4 (6.0 to 82.7)	.03
Isometric knee extensor strength, %BW	64.3 (55.0 to 73.5)	6.2 (0.8 to 11.6)	.03	58.5 (49.6 to 67.5)	−2.4 (−7.9 to 3.0)	.35	8.1 (0.7 to 15.4)	.03
10m usual gait speed, m/s	1.46 (1.34 to 1.59)	0.10 (−0.08 to 0.28)	.25	1.35 (1.16 to 1.53)	0.02 (−0.04 to .008)	.42	0.08 (−0.07 to 0.23)	.27
10m maximum gait speed, m/s	2.01 (1.82 to 2.19)	−0.04 (−0.20 to 0.11)	.56	1.81 (1.52 to 2.11)	−0.15 (−0.39 to 0.10)	.21	0.14 (−0.13 to 0.41)	.29
Activity time‡, min/d	20.0 (7.5 to 32.5)	0.5 (−9.8 to 10.8)	.93	20.4 (9.7 to 31.1)	1.0 (−10.3 to 12.3)	.85	−0.5 (−14.9 to 14.0)	.95
Number of steps, steps/d	5589 (3848 to 7329)	−1320 (−3206 to 566)	.28	5238 (3297 to 7179)	−41 (−1745 to 1663)	.96	−583 (−3036 to 1869)	.62

ANCOVA, analysis of covariance; BW, body weight; m, meters.
Values are expressed as mean and 95% confidence interval.
*Analyzed using the paired Student's t-test or Wilcoxon signed-rank test for within-group differences in change from baseline to follow-up.
†Analyzed using ANCOVA, with adjustment for baseline values, for between-group differences in follow-up values.
‡Moderate-to-vigorous intensity activity time (at an intensity >3 metabolic equivalents).

Yamamoto S, Matsuzawa R, Yoshida K. J Ren Nutr. 2020



スライド作成者：兵庫医療大学　松沢良太

まとめ

- 腎移植は透析療法を回避あるいは離脱するための唯一の手段で透析療法の継続より生命予後が良好
- 末期腎不全患者のフレイル化
- 腎移植を見据えて透析期の腎リハが極めて重要
- 腎移植後の特に入院期からの運動療法が効果的