

Pre-habilitace pacientů zařazených k transplantaci jater

Petr Píza

KARIP IKEM

14.6.2023 XXV. Dny intenzivní medicíny Kroměříž

IKE
M INSTITUT
KLINICKÉ
A EXPERIMENTÁLNÍ
MEDICÍNY



MOTTO: „Transplantace nabízí nemocným příležitost ke zlepšení kvality života a větší sociální nezávislost!

Transplantace není prospěšná pouze pro jednotlivce, ale představuje také hodnotu pro větší “ekonomiku zdraví”. Někteří pacienti se navíc mohou vrátit do práce, a tím jsou méně závislí na státní podpoře.“

“Cílem je maximalizovat roky života získané transplantací dárcovského orgánu”.



Waiting List - "Kdo nečeká, není léčen!"





Prehabilitation for solid organ transplant candidates

Overview of recommendations based on the literature to discuss during the TLJ 3.0 meeting in Prague, November 13th-15th 2022.



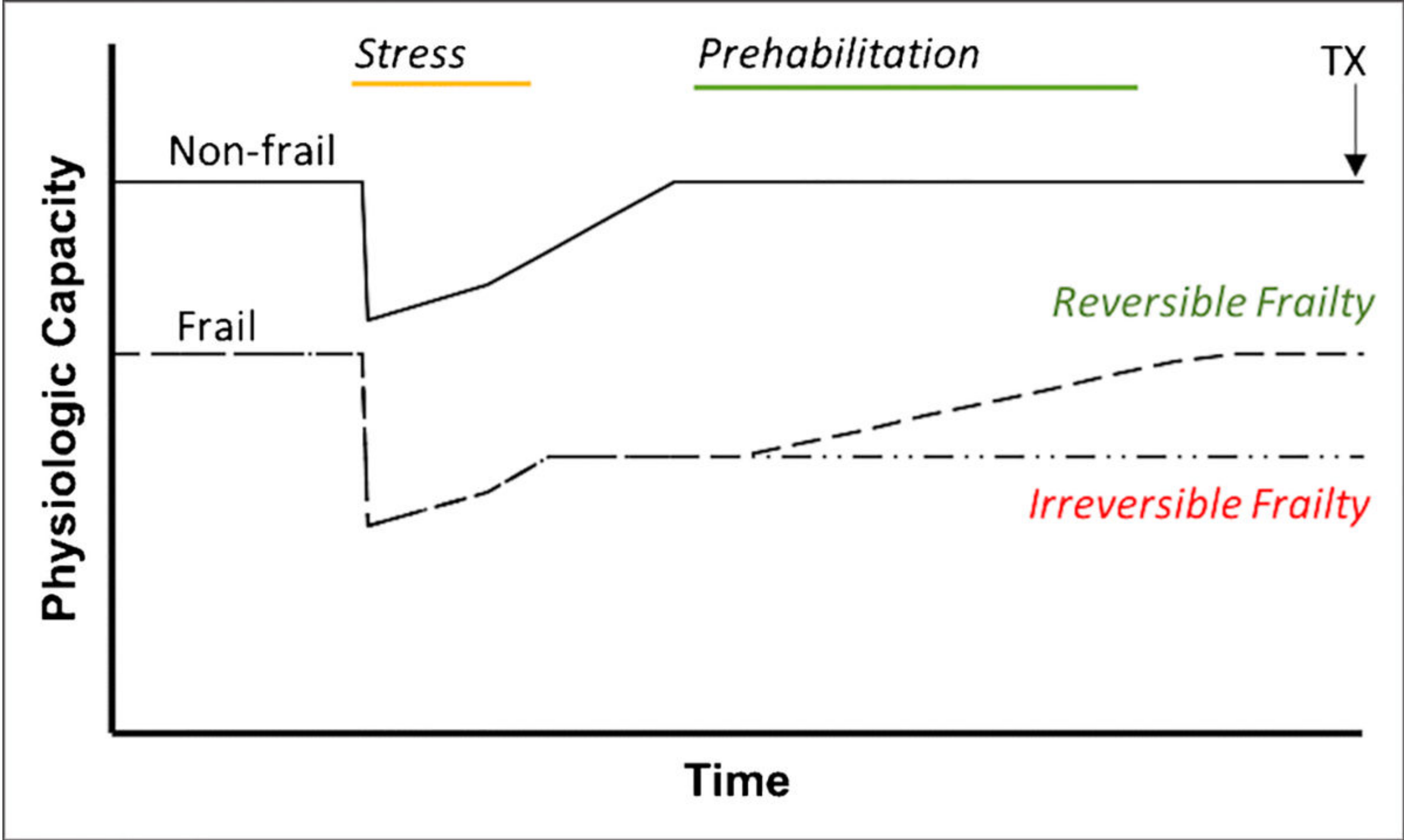
Prehabilitace označuje proces **optimalizace celkového stavu pacienta před operací s cílem zvýšit jeho schopnost odolávat zátěži operace a urychlit rekonvalescenci po operaci.**

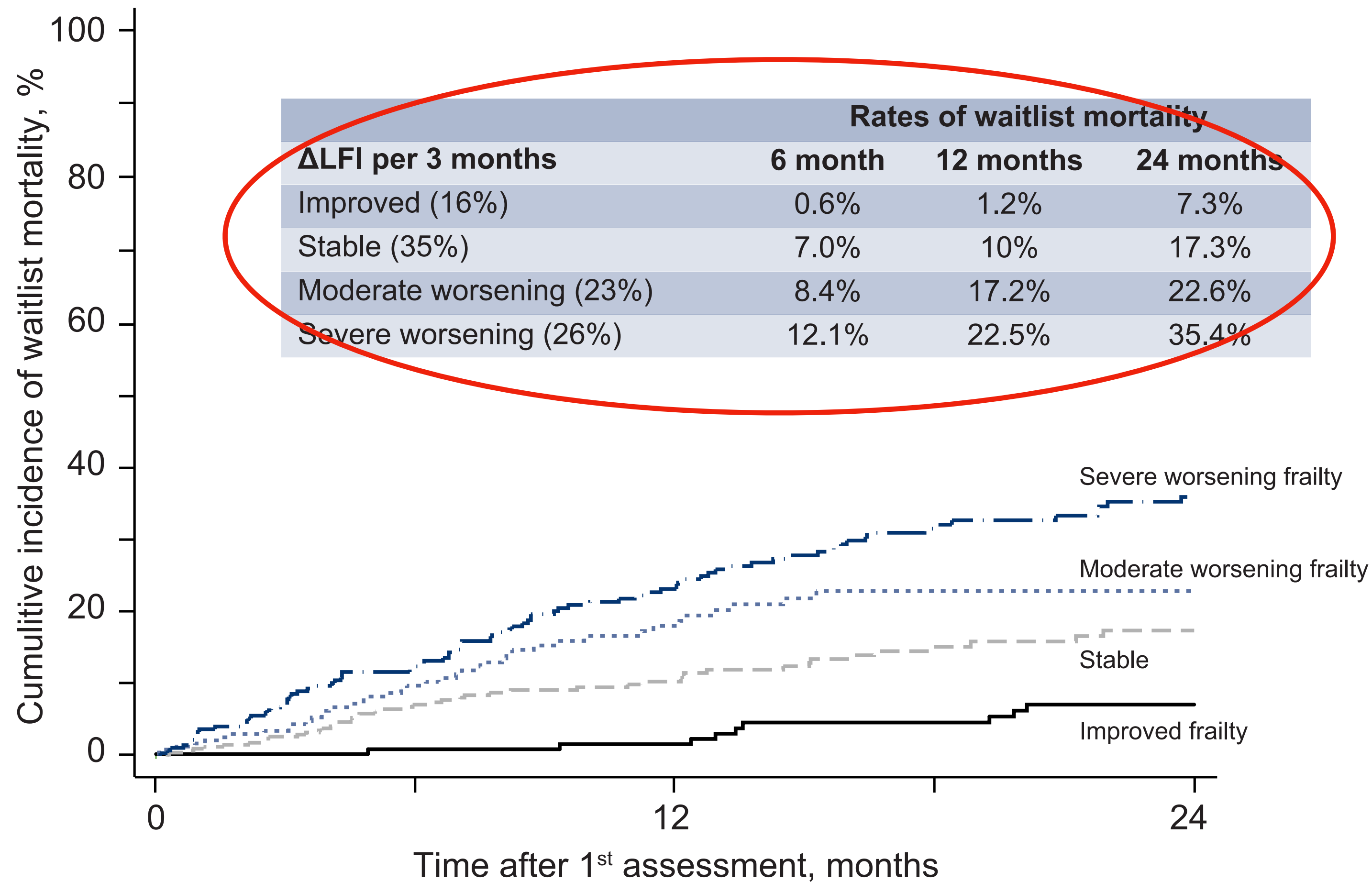
Rehabilitace se zaměřuje na dosažení změn životního stylu, aby se snížilo riziko komplikací souvisejících s chirurgickým zákrokem, a měla by zahrnovat alespoň **fyzický trénink, dietní režim a psychologické intervence.**

Cíl: udržitelný zdravý životní styl, zlepšit zdraví a kvalitu života, zlepšit klinické výsledky, např. nižší míra komplikací, kratší doba hospitalizace a lepší míra přežití.



Randomizace mezi tréninkem a “dosavadním přístupem” již není eticky ospraveditelná, protože různé studie prokázali výhody zlepšení fyzického stavu kapacita, fyzické aktivity a stavu kosterních svalů a samotné operace.





U pacientů s cirhózou byly změny frailty **významně spojeny s úmrtím/ vyřazením ze seznamu**

Pacienti s cirhózou, u kterých došlo ke zlepšení stavu v průběhu času, měli **nižší riziko úmrtí/vyřazení ze seznamu**

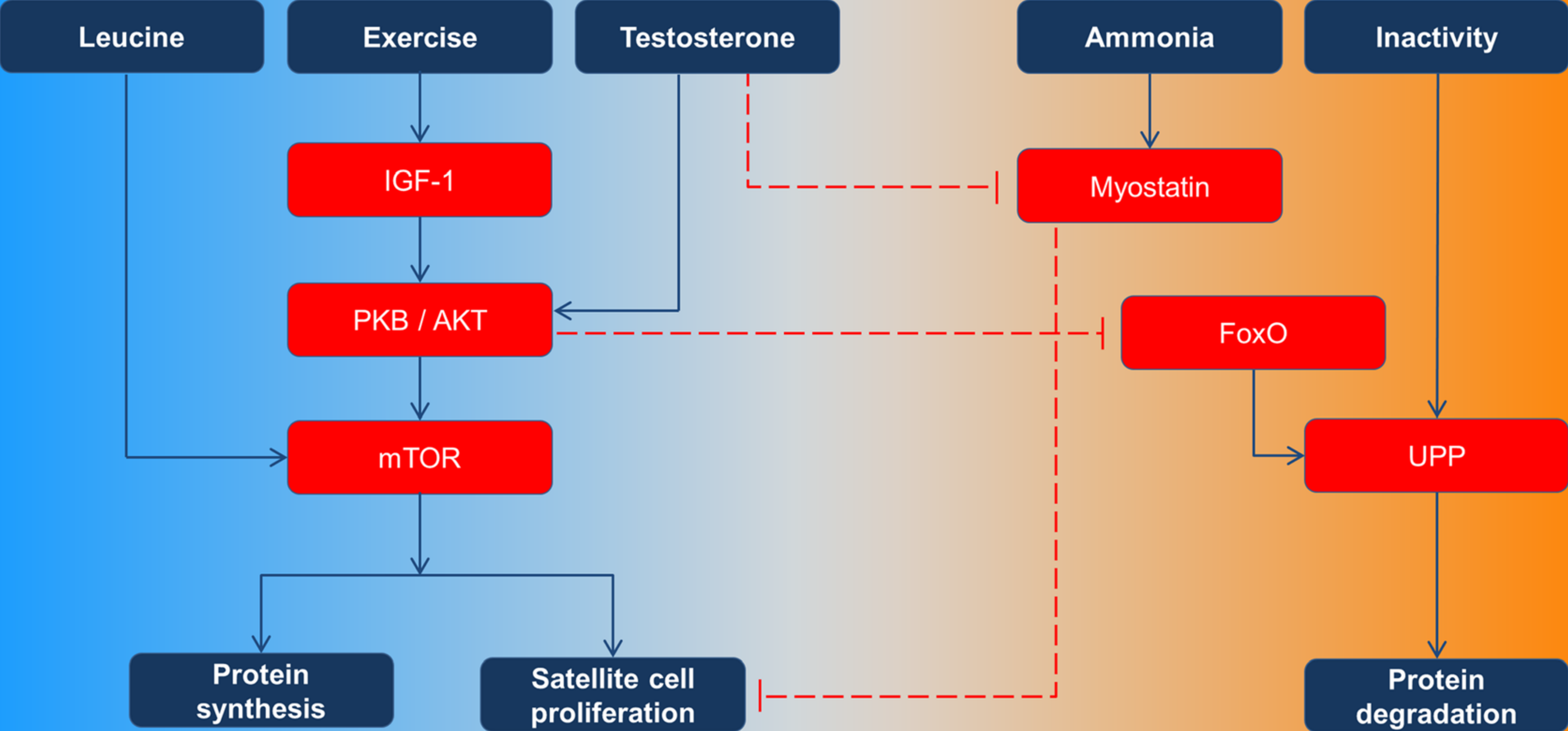
Data podporují longitudinální měření křehkosti u pacientů s cirhózou.

Changes in frailty are associated with waitlist mortality in patients with cirrhosis

Jennifer C. Lai, Jennifer L. Dodge, Matthew R. Kappus, ..., Daniela P. Ladner, Dorry L. Segev, Elizabeth C. Verna

Muscle build-up

Muscle degradation



Zhodnocení, testování

Patient Components

Synthetic dysfunction
Portal hypertension

Cardiac function

Renal function

Other co-morbidities

Muscle wasting
Under-nutrition
Physical inactivity

Measurement Tools

MELDNa
Child Pugh Score

Vital signs
Echocardiogram

Creatinine
Urinalysis

Spirometry,
Hemoglobin A1c,
Colonoscopy

Eyeball test

Objective Frailty Tool Kit

**Global
Assessment of
Transplant
Candidacy**



“...I know it when I see it!”

...???

ALE..., stačí motivace nemocného?

Tool	Components	Test results	Advantages and disadvantages
Fried Frailty Index	Unintentional weight loss (≥ 10 lbs/yr) Jamar hand grip Exhaustion Low activity level Gait speed (per 15 ft)	Frailty score ≥ 3 is abnormal	Has subjective, self-reported components. Categorical score. Limited in individuals with severe HE, ascites, or edema
Liver Frailty Index (LFI)	Grip strength Chair stands Balance testing	Score: <3.2 – non-frail 3.2 – <4.5 -pre- frail ≥ 4.5 – frail	Developed for LT candidates. Performance based, on continuous scale. May be more suitable to monitor changes over time
The 6-minute walk test (6MWT)	Walking distance over 6 min period	> 300 m – normal ≤ 300 m – low endurance < 250 m – frail	May be easily accessible in routine clinical care
Gait speed	Usual pace gait speed (5 meters; m/s) Use of assistive devices allowed	1 m/s is normal	Not applicable to patients who are wheelchair bound
Short Physical Performance Battery Protocol (SPPB)	Gait speed balance Timed repeated chair stands	Maximum 4 points/category Score < 9 is abnormal	Quick to complete (takes 2–3 minutes) as an outpatient May be difficult to perform in patients with moderate to severe HE
Activities of daily living (ADL)	Ability to feed, toilet, dress, bathe, and transfer	Points: 3 – independent 2 – needs assistance 1 – dependent Score < 12 abnormal	Can be performed by nurses It is subjective as it is self-reported
The Braden Scale	Physical exam and assessment of 6 criteria: skin sensory perception, moisture, activity, mobility, nutrition, and friction (ability to hold a comfortable position in a chair and bed).	Score of 23 – no risk Score of 16 – requires intervention	Can be performed by nurses

Testy ke zhodnocení frailty sy u ESLD

Frailty Index dle Friedové

Liver Frailty Index (LFI)

6-minutový test chůze (6MWT)

Test chůze (Gait)

SPPB - krátká baterie pro test fyz. zdatnosti

ADL - zhodnocení aktivit denního života

Bradenova škála

Table 12.1 Select frailty measurement tools in candidates for liver transplantation

Tool	Advantages in liver transplant population	Estimated time for assessment	Populations studied	Criteria for high frailty
Karnofsky Performance Score	Intuitive to clinicians and patients Applicable even to critically ill patients Low cost Fast	<10 seconds	Inpatient Outpatient	0–40
ADLs/IADLs	Patient reported No cost Well-associated with outcomes across patient populations	3–4 minutes	Inpatient Outpatient	Difficulty with ≥ 2 ADLs
Liver frailty index	Objective, performance based Applicable to outpatient setting Easy to perform	<10 minutes	Outpatient	≥ 4.5
6-minute walk test	Objective, performance based Continuous scale No specialized equipment	~6 minutes	Outpatient	<250 m





The Liver Frailty Index

liverfrailtyindex.ucsf.edu

Grip

+

Chair stands

+

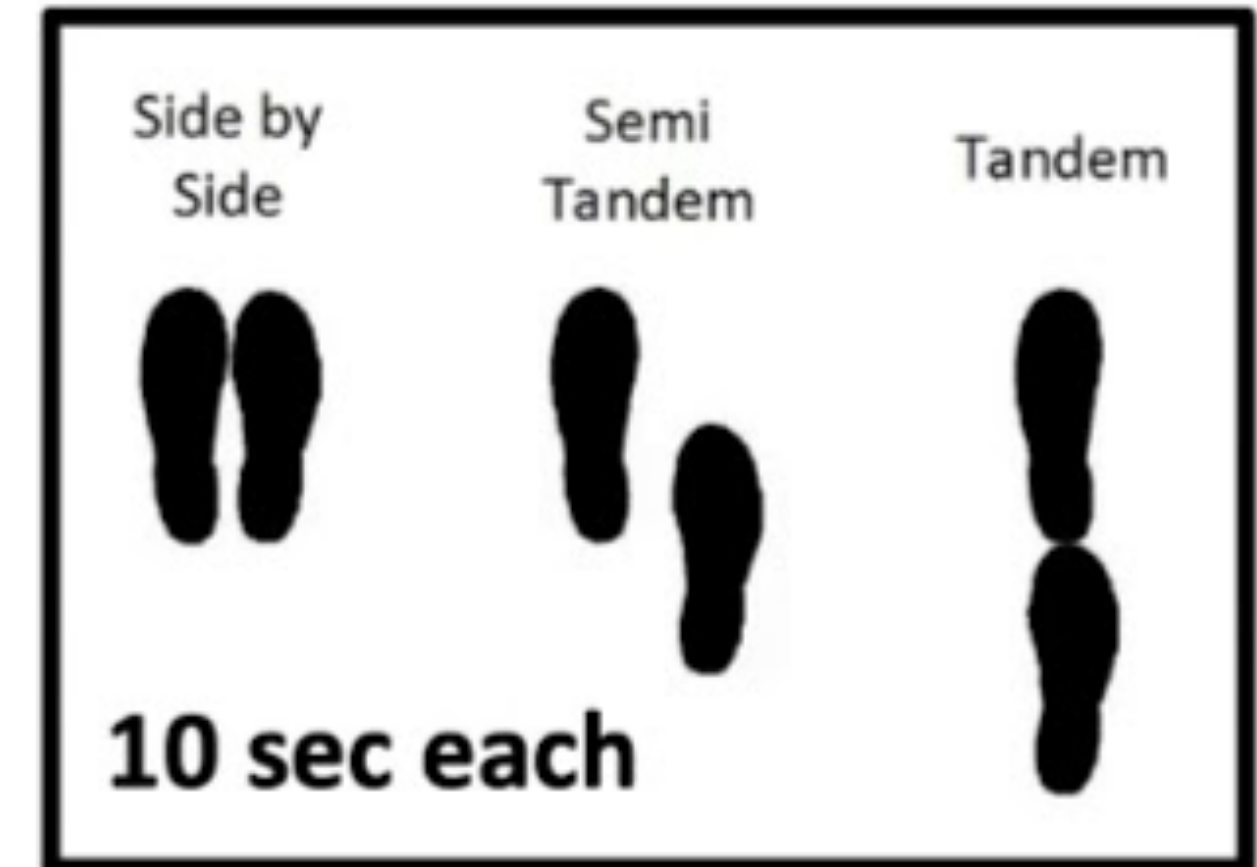
Balance



Nutrition



Muscle strength



Neuromotor coordination



Implementation of the frailty assessment to improve liver transplant outcomes

Mattia Corradi¹ · Chiara Mazzarelli² · Matteo Cesari³ · Raffaella Viganò² · Luca Saverio Belli²

Zhodnocení komplexitu křehkosti u této podskupiny pacientů:
Dle Friedové anebo J.Lai et al. — —> omezení použití při sledování
pacientů s OLT

“nový” FI-39 pro pacienty s OLTx

FI se jeví jako **spolehlivější než pouhé použití kritérií věku, protože poskytuje objektivní numerický parametr odrážející biologický věk pacienta.**

AST abnormality (> 40 U/L)
ALT abnormality (> 45 U/L)
Bilirubin abnormality (> 1.0 mg/dL)
Hemoglobin abnormality (< 14.1 g/dL)
Creatinine abnormality (> 1.17 mg/dL)
Gamma-glutamyl transferase abnormality (> 50 mg/dL)
Alkaline phosphatase abnormality (> 129 mg/dL)
Systolic blood pressure abnormality (< 100 or > 140 mmHg)
Diastolic blood pressure abnormality (< 60 or > 90 mmHg)
Muscle weakness assessed using dynamometer
Obesity
Need help for eating
Need help for housekeeping
Need help with finances
Disability in transportation
Balance disorders
Mobility disability
Memory complaints
Self-reported insomnia
Hearing impairment
Vision impairment
Tremors
Osteoporosis
Urinary incontinence
Thyroid disease
Gastrointestinal disease
Renal disease
Skin disease
Biliary tract disease
Chronic respiratory disease
Cerebrovascular disease
History of myocardial infarction
Signs of cardiac decompensation
Cardiac arrhythmias
Diabetes
Cancer
Osteoarthritis
Asthenia
History/family history of neurodegenerative diseases

Method	Equipment Needed	Advantages	Disadvantages	Outcomes Studied	Summary Notes
Anthropometrics ^(142,171) (MAMC, triceps skinfold thickness)	Tape measure, skinfold thickness, calipers	Safe, rapid, bedside tool, accessible, minimal training, repeatable	Low reproducibility; affected by fluid overload, adipose tissue loss; weak correlation with cross-sectional imaging	Concordance between DEXA and CT, post-liver transplant morbidity and mortality	Practical for large patient populations but poor accuracy and precision; interpret with caution
Anthropometrics (pediatric) ⁽¹⁵⁰⁾				Comparison between MAMC and CT	
BIA ⁽¹³⁵⁻¹³⁹⁾	BIA device	Safe, rapid, accessible, minimal to moderate training, repeatable	Strict parameters around nutritional intake and exercise before the test, positioning challenging in patients with obesity	Hepatic decompensation, pretransplant mortality	Fluid retention may impact the reliability of lean body mass estimates; data using phase angle show good reliability even in patients with fluid retention
Ultrasound ^(165,172,173)	Ultrasound device	Safe, rapid, accessible, repeatable	Operator-dependent, challenging in patients with obesity, lack of normative data	Ultrasound of psoas compared with CT-based SMI, hospitalizations and mortality, severity of liver disease	More data are needed to standardize technique; able to provide echogenicity data for tissue integrity
MRI ^(134,174)	MRI machine, image analysis software	Accurate, no radiation, measures muscle quantity and quality	Costly, limited availability	Validated against CT imaging, acute-on-chronic liver failure and mortality	Muscle mass has been defined by fat-free muscle area
DEXA ^(142,144,145,158,175)	DEXA scanner	Safe, rapid	Radiation exposure (low), edema can limit accuracy	Mortality	Low concordance between DEXA and CT in patients with cirrhosis DEXA appendicular mass improves accuracy compared with CT
CT ^(131,154,157,159,160,166,169,176,177)	CT scanner, image analysis software	Accurate, rapid, measures muscle quantity and quality, requires a high level of training to interpret	Radiation exposure, not available at bedside, varying cut-points/sites of measurement, not easily repeatable	Waitlist mortality, post-transplant mortality, decompensation, acute care use, quality of life	Has the most evidence to support its use but has challenges with radiation exposure and repeatability Muscle mass measures that have been studied:
CT (pediatric) ^(150-152,155,156,178)				Comparison between MAMC and CT, comparison with healthy children, motor delay, infections, hospitalizations	<ul style="list-style-type: none"> Total psoas area Psoas muscle index SMI Total skeletal muscle attenuation

Malnutrition, Frailty, and Sarcopenia in Patients With Cirrhosis: 2021 Practice Guidance by the American Association for the Study of Liver Diseases

Jennifer C. Lai^{1*}, Puneeta Tandon,^{2*} William Bernal,³ Elliot B. Tapper⁴, Udemekong⁵, Srinivasan Dasarathy,⁶ and Elizabeth J. Carey⁷

Antropometrické zhodnocení

BIA

USG

MRI

DEXA

CT

Velikost a symetrie svalů
Subkutánní tuková tkáň (SAT)
Index tělesné hmotnosti (BMI)
Procento tělesného tuku
Lean Body Mass

Pouze pro výzkumné a informační účely:

Intramuskulární tuková tkáň (IMAT)

Index intramuskulární adipózní tkáně (IMAT)

Estimated Fuel Level (EFL)

Muscle Fuel Symmetry (MFS)

Muscle Fuel Rating (MFR)

Muscle Energy Status (MES)



18-25 y.o

High Muscle Mass, Low IMAT
High Muscle-Quality-BMI 22

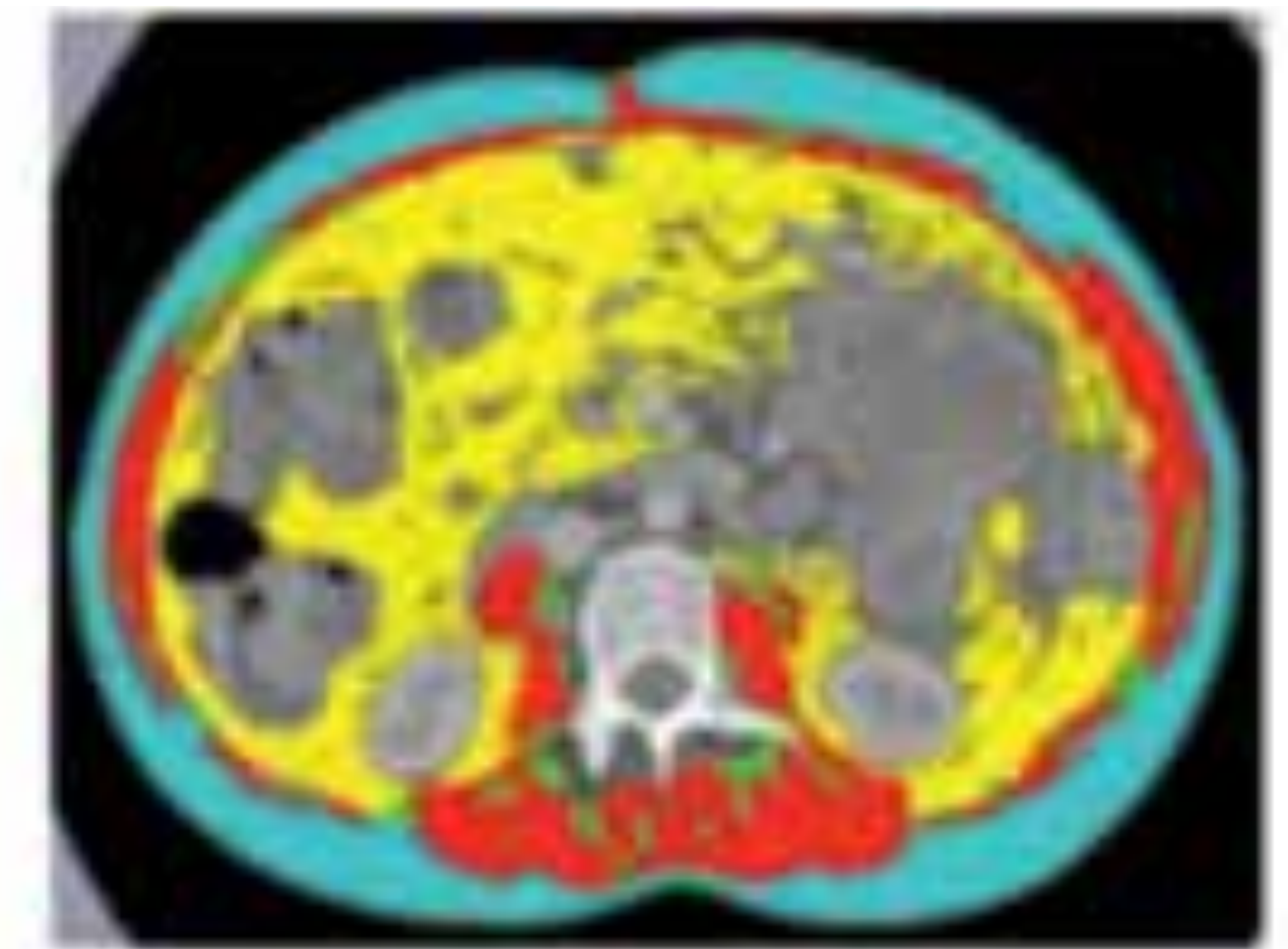
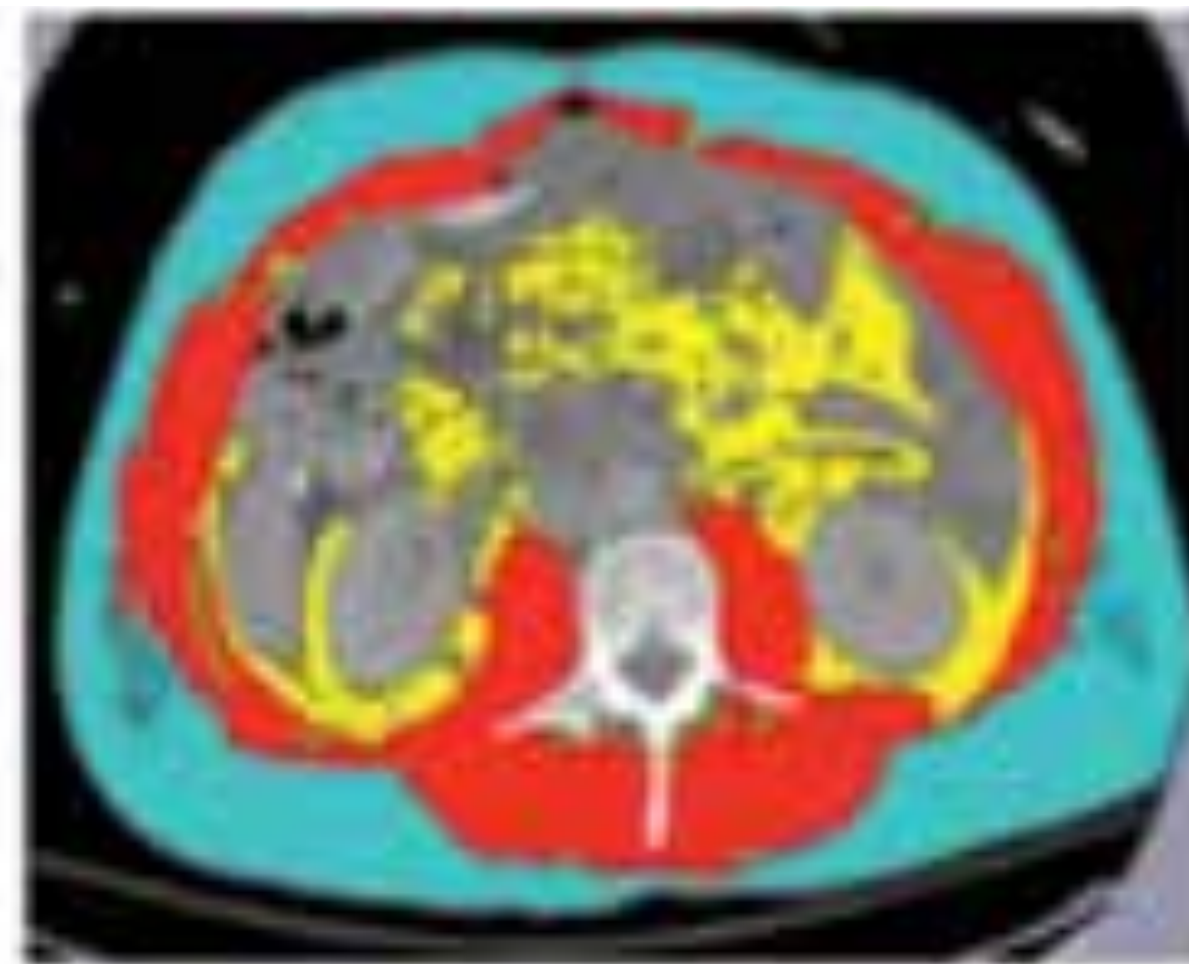
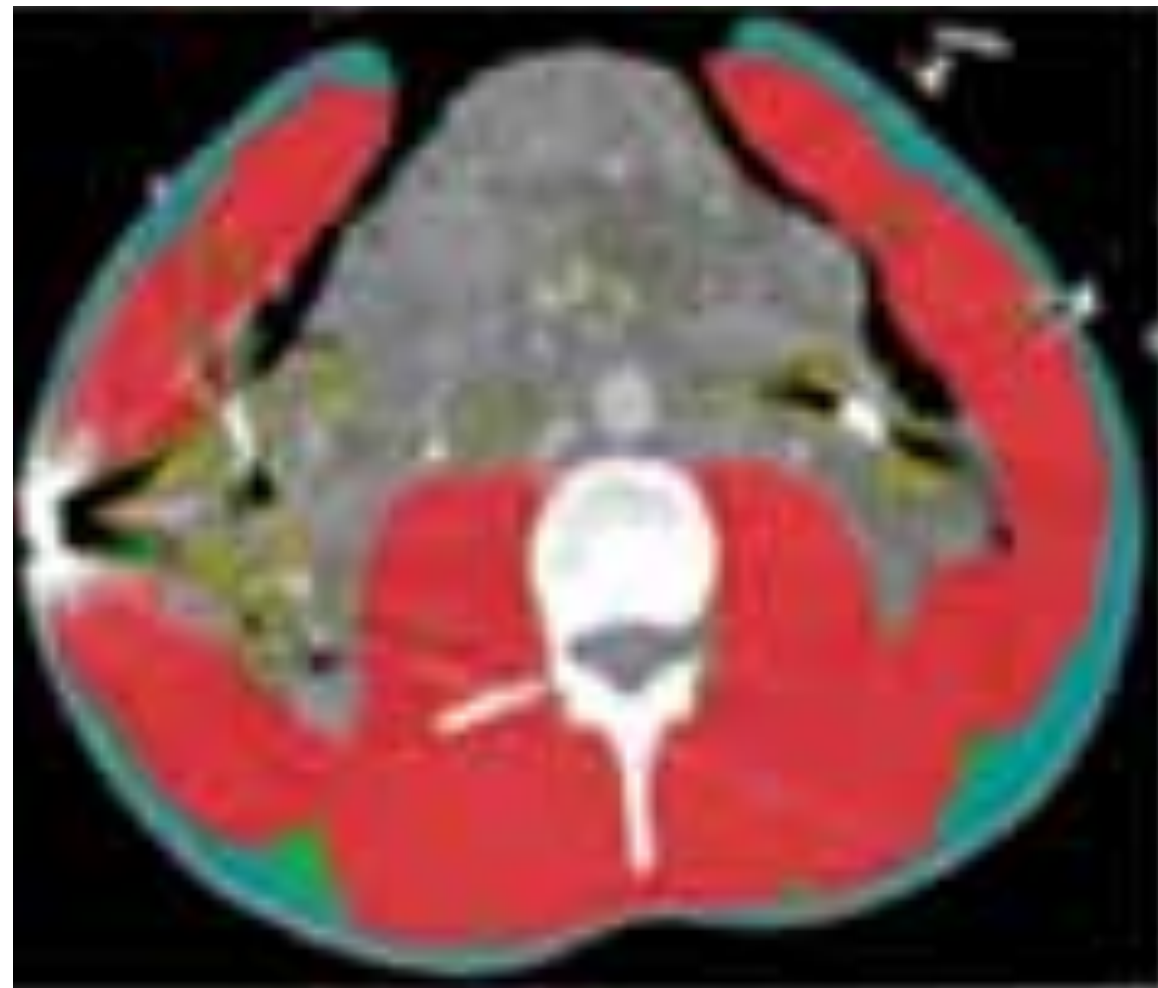
35-50 y.o

Normal Muscle Mass, Low IMAT
Normal Muscle-Quality-BMI 29

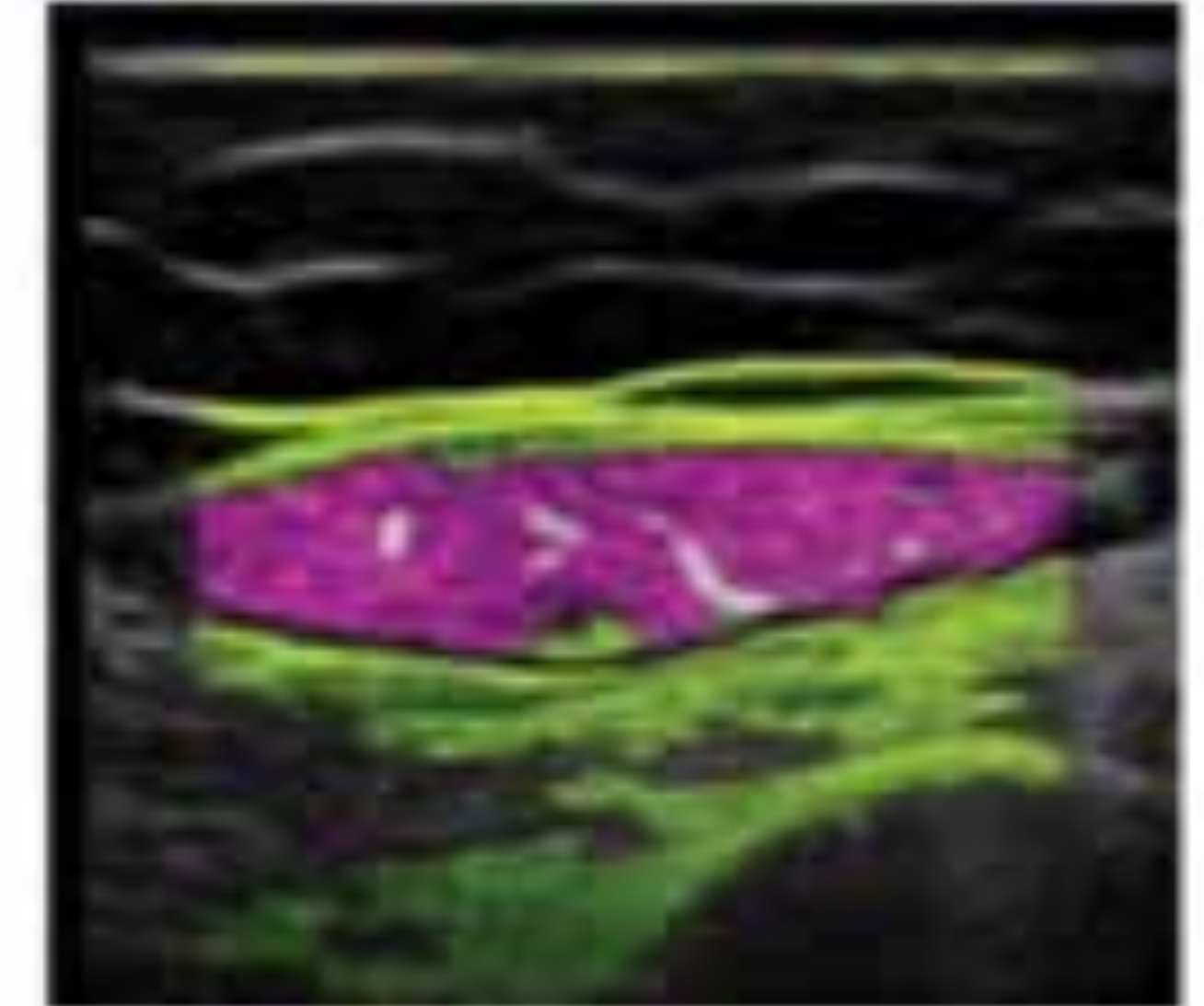
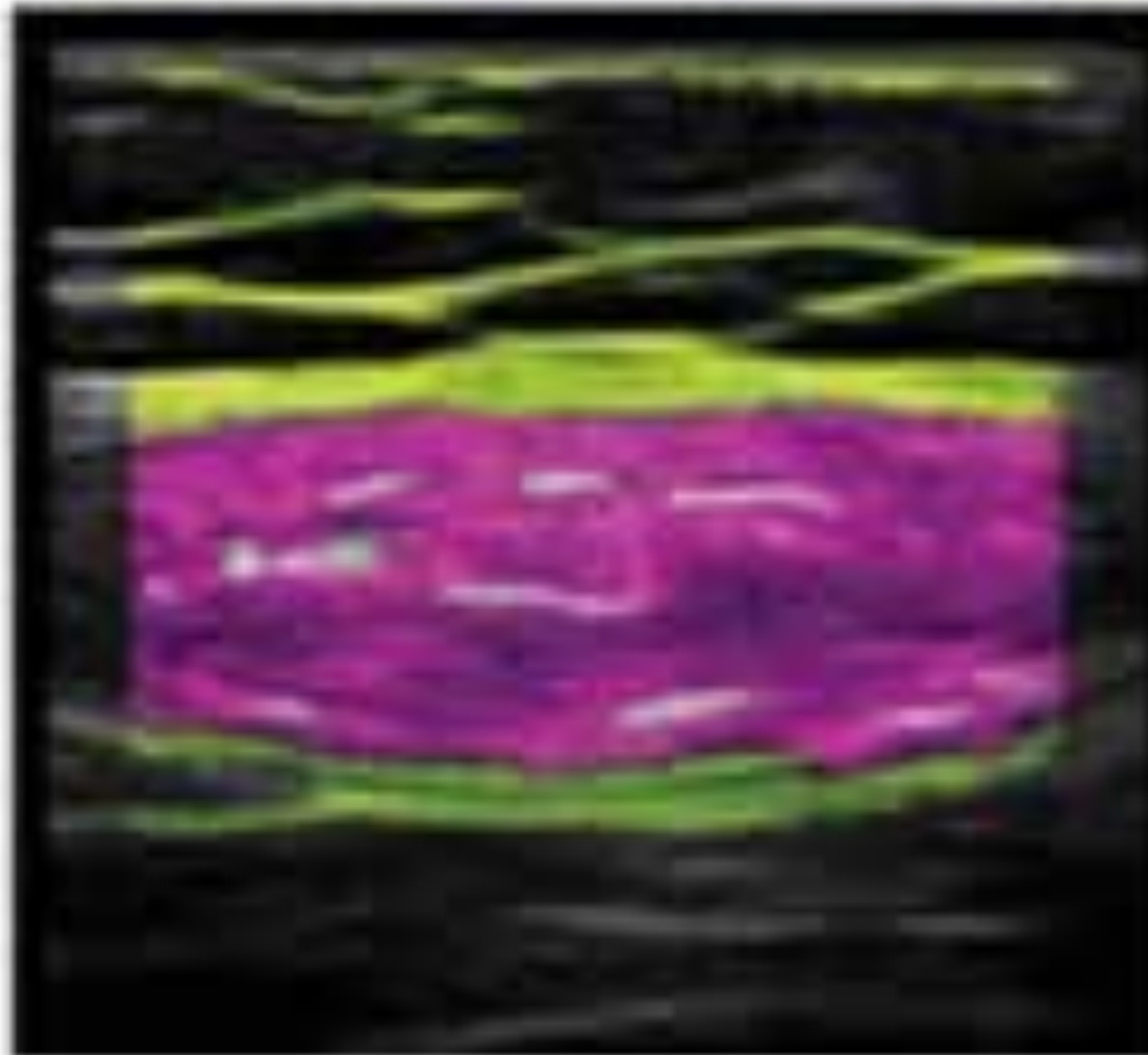
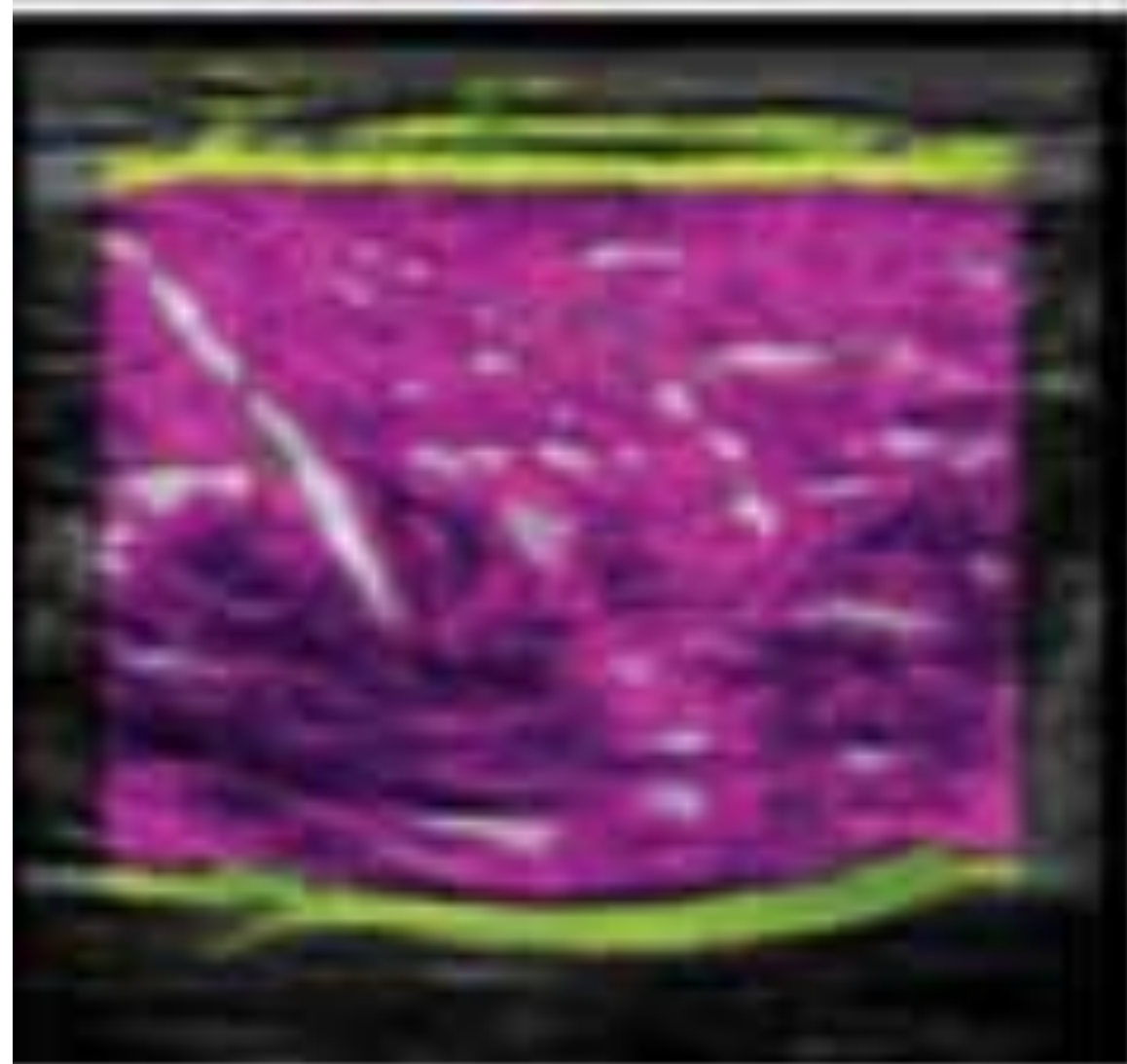
40-50 y.o

Low Muscle Mass, Low IMAT
Low Muscle-Quality-BMI 17

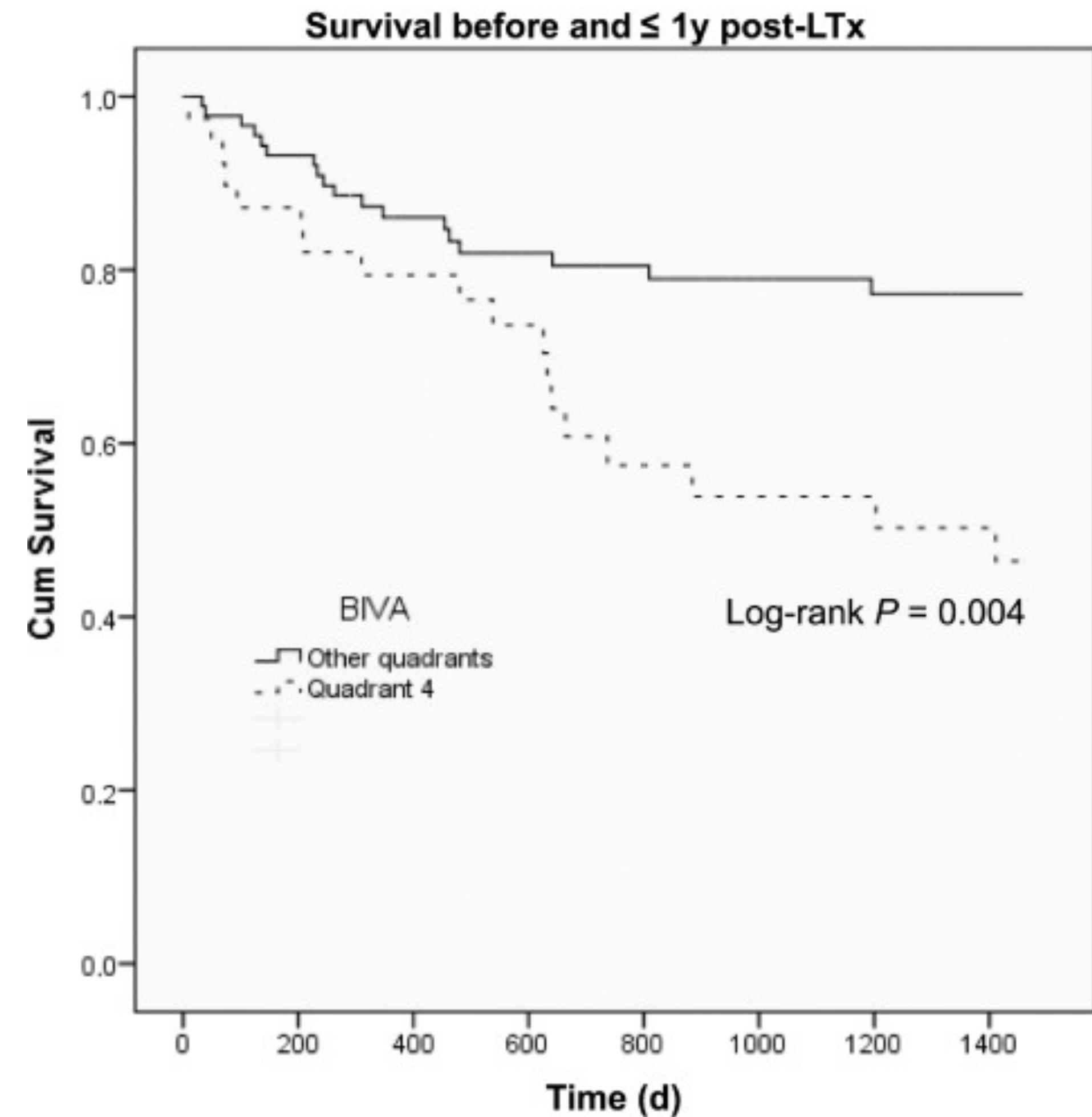
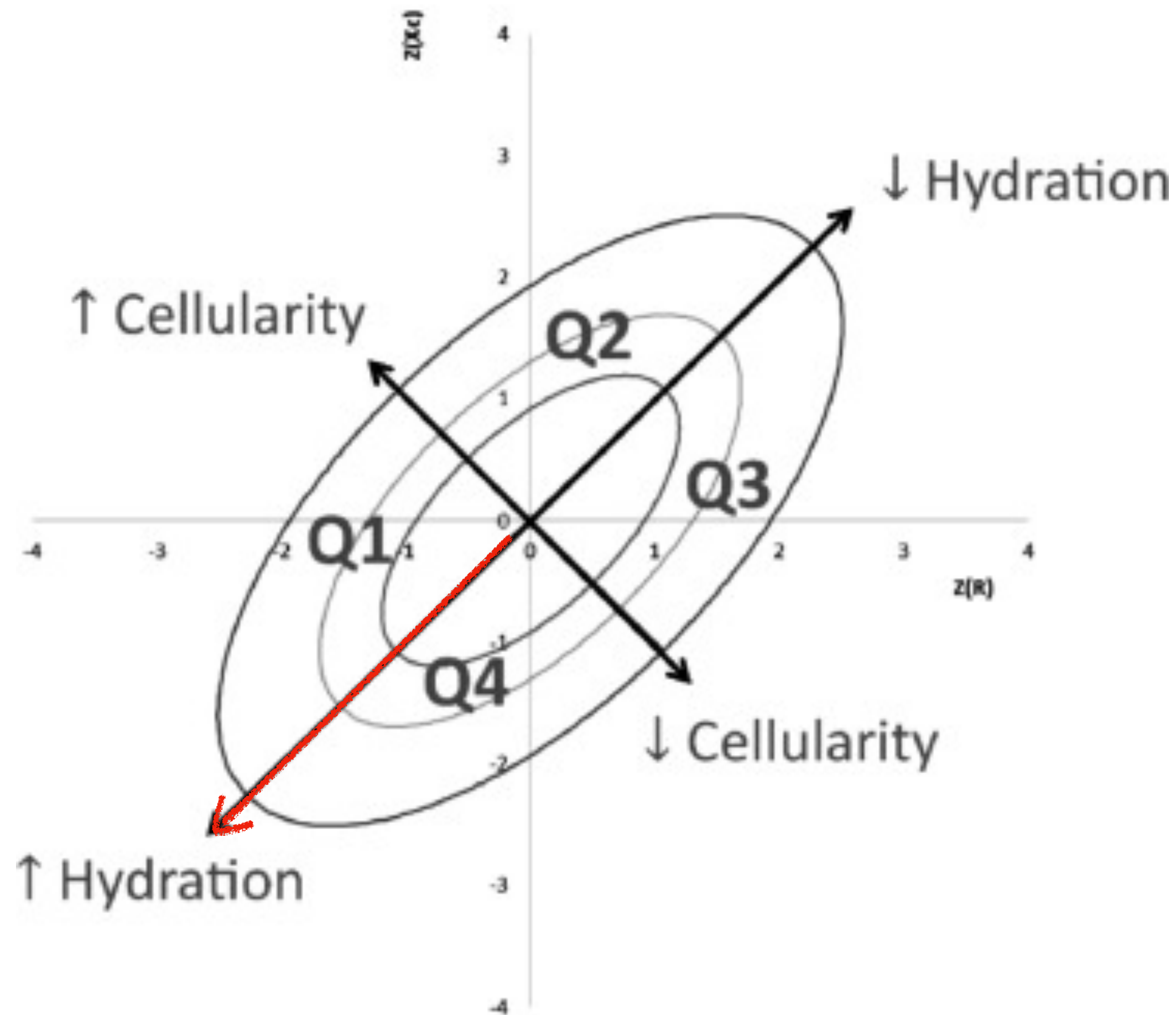
CT
Scan



Muscle-
Sound®
Ultrasound



Bioelectrical impedance vector analysis in patients on the waiting list for liver transplant: Associated factors and prognostic effects



Bioelektrická impedanční vektorová analýza je **slibnou alternativou pro hodnocení** pacientů s jaterní cirhózou.

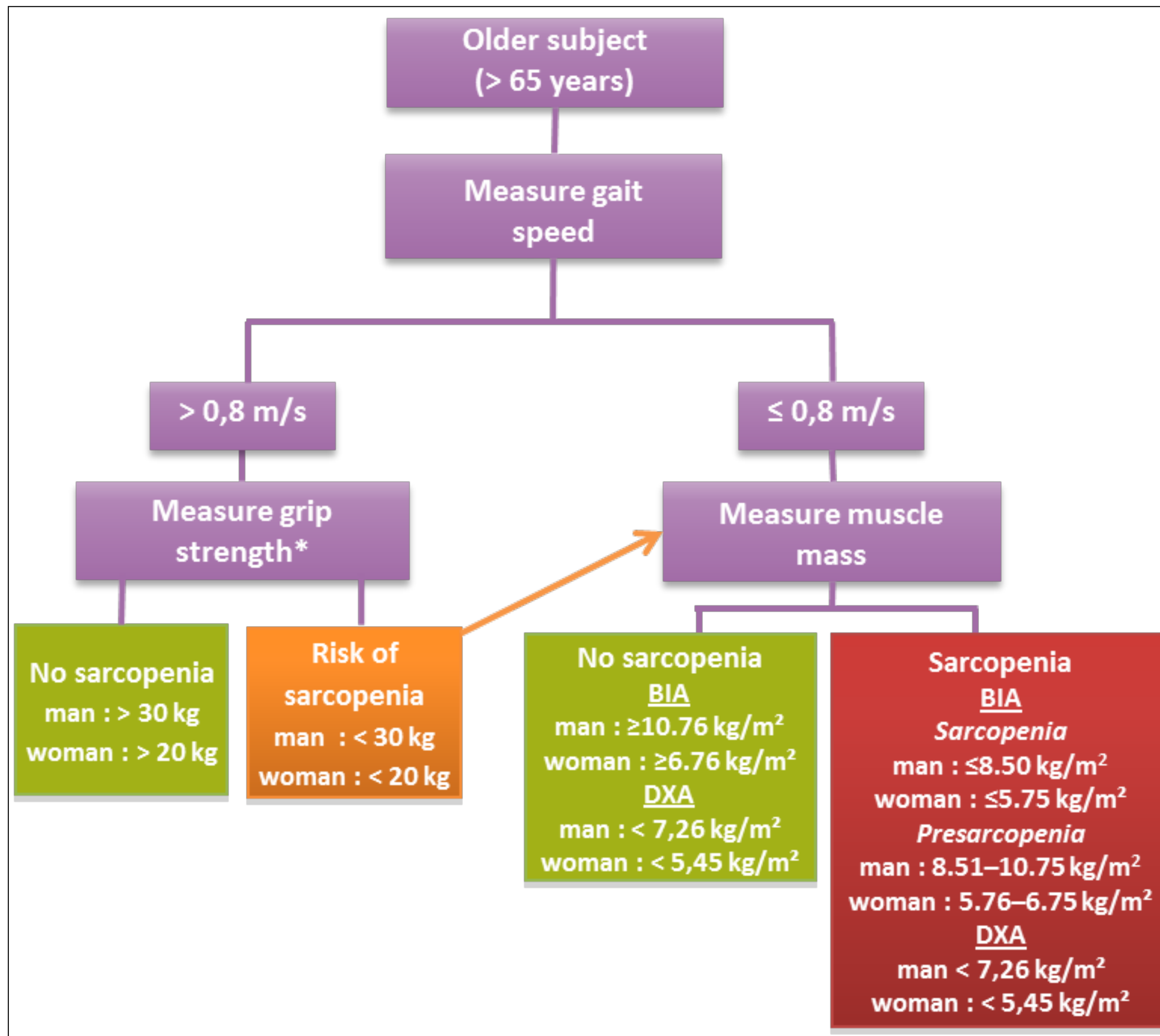
Rezistence a reaktance se používají k posouzení stavu výživy a hydratace.

Umístění vektoru mělo **prognostický účinek u pacientů čekajících na transplantaci jater**.

Evropská pracovní skupina pro sarkopénii u starších lidí (**EWGSOP**) stanovila diagnostickou metodu sarkopenie:
svalovou hmotu, svalovou sílu a fyzickou výkonnost

doporučení: kombinované posouzení svalové hmoty a funkčního stavu (svalové síly nebo výkonnosti)

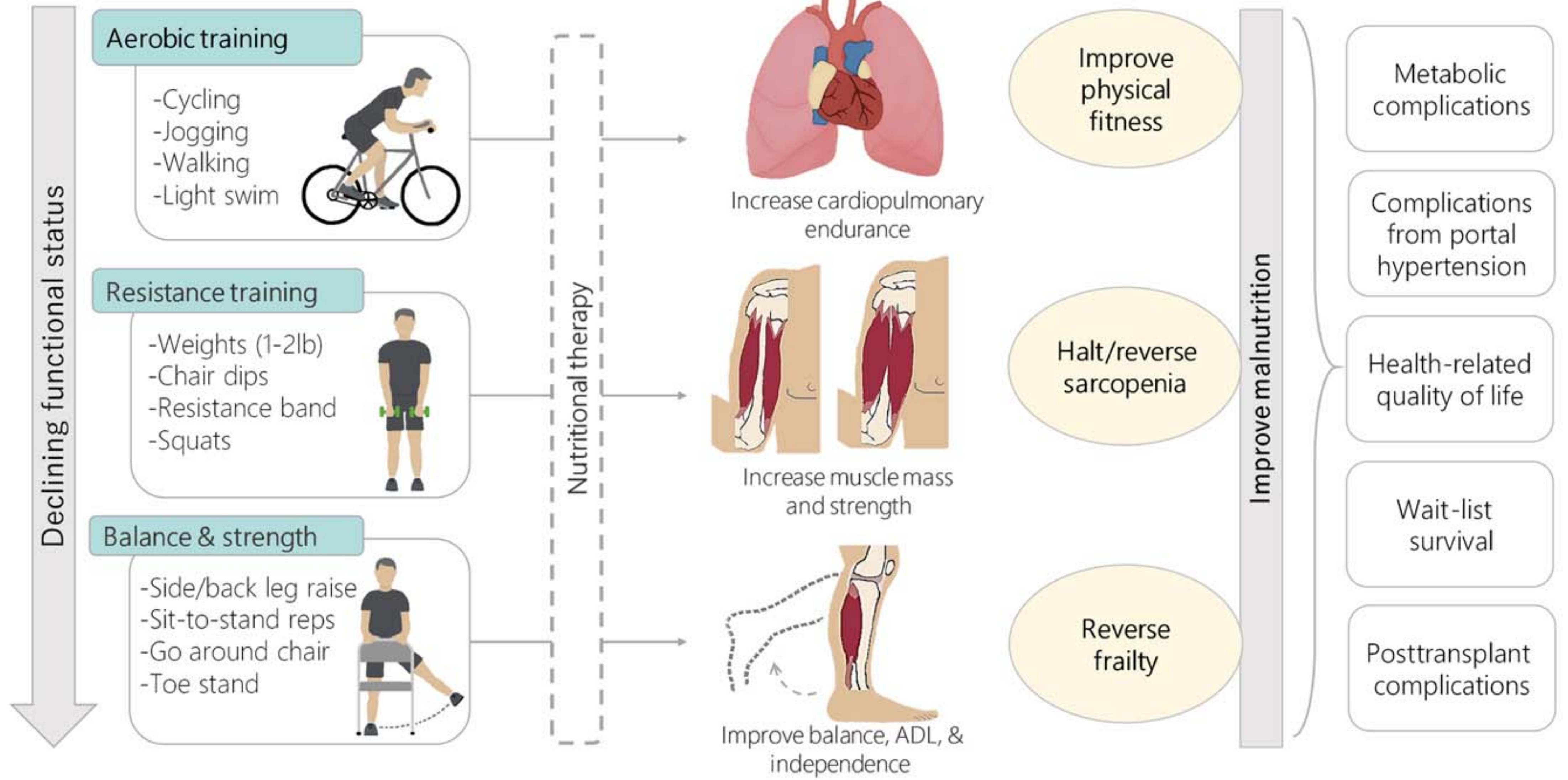
Svalovou hmotu lze kvantifikovat širokou škálou nepřímých a přímých modalit, jako je antropometrie, bioelektrická impedanční analýza (BIA), rentgenová absorpciometrie s duální energií (DEXA), ultrazvuk (US), (MRI) + (CT)



1

2

Exercise intervention	Dietary intervention	Mechanism	Target	Outcome
-----------------------	----------------------	-----------	--------	---------



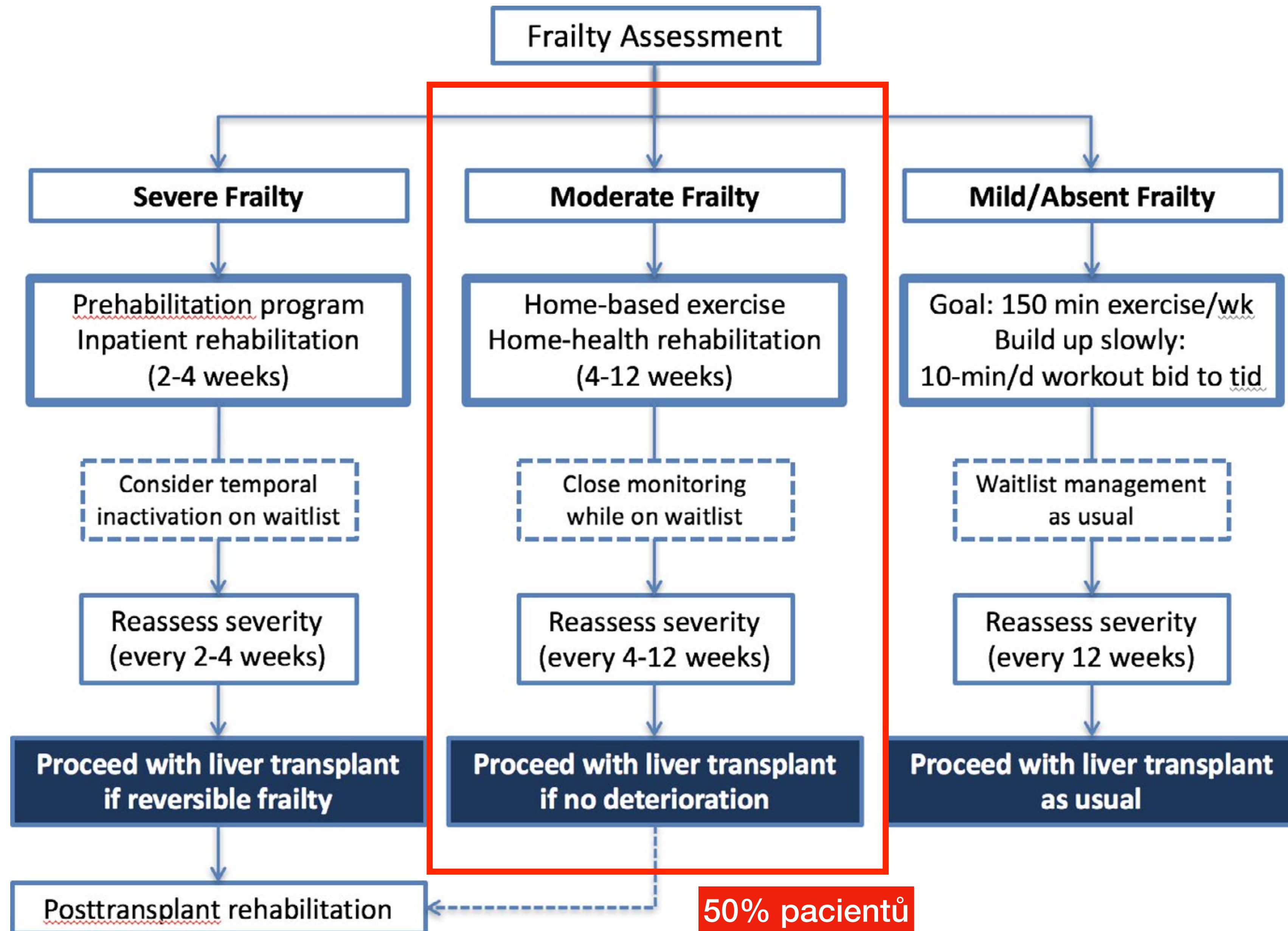
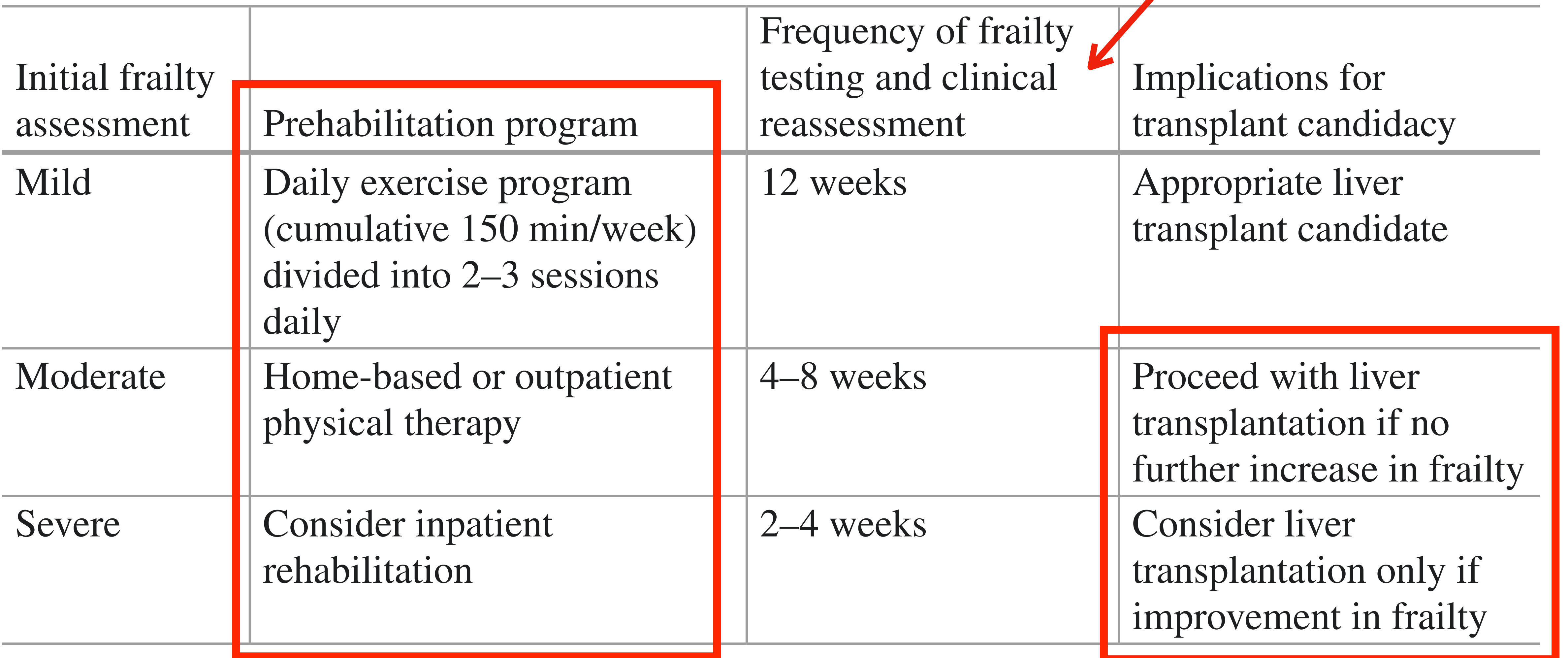
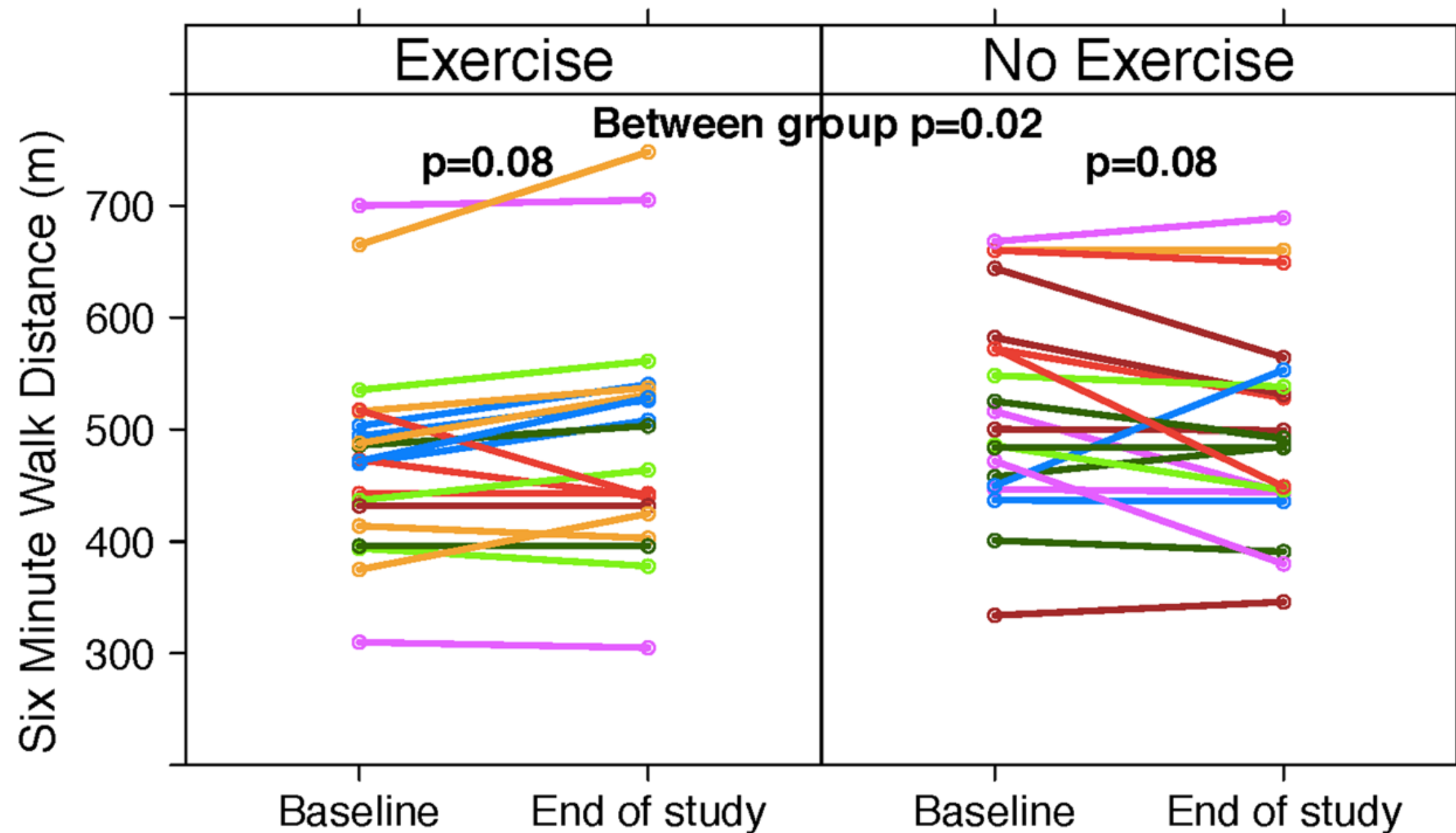
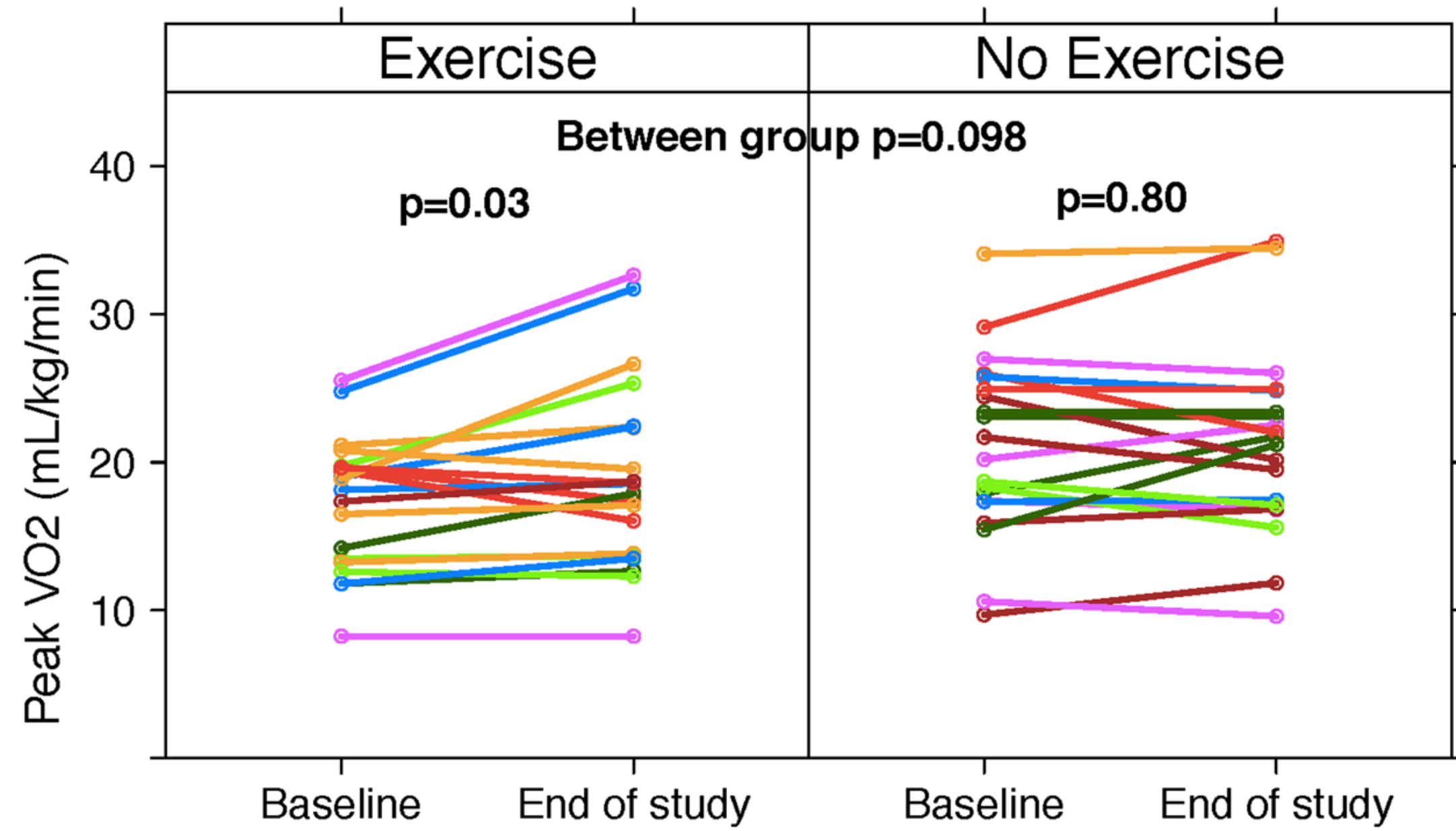


Table 12.2 Prehabilitation schematic guided by frailty assessment

Initial frailty assessment	Prehabilitation program	Frequency of frailty testing and clinical reassessment	Implications for transplant candidacy
Mild	Daily exercise program (cumulative 150 min/week) divided into 2–3 sessions daily	12 weeks	Appropriate liver transplant candidate
Moderate	Home-based or outpatient physical therapy	4–8 weeks	Proceed with liver transplantation if no further increase in frailty
Severe	Consider inpatient rehabilitation	2–4 weeks	Consider liver transplantation only if improvement in frailty

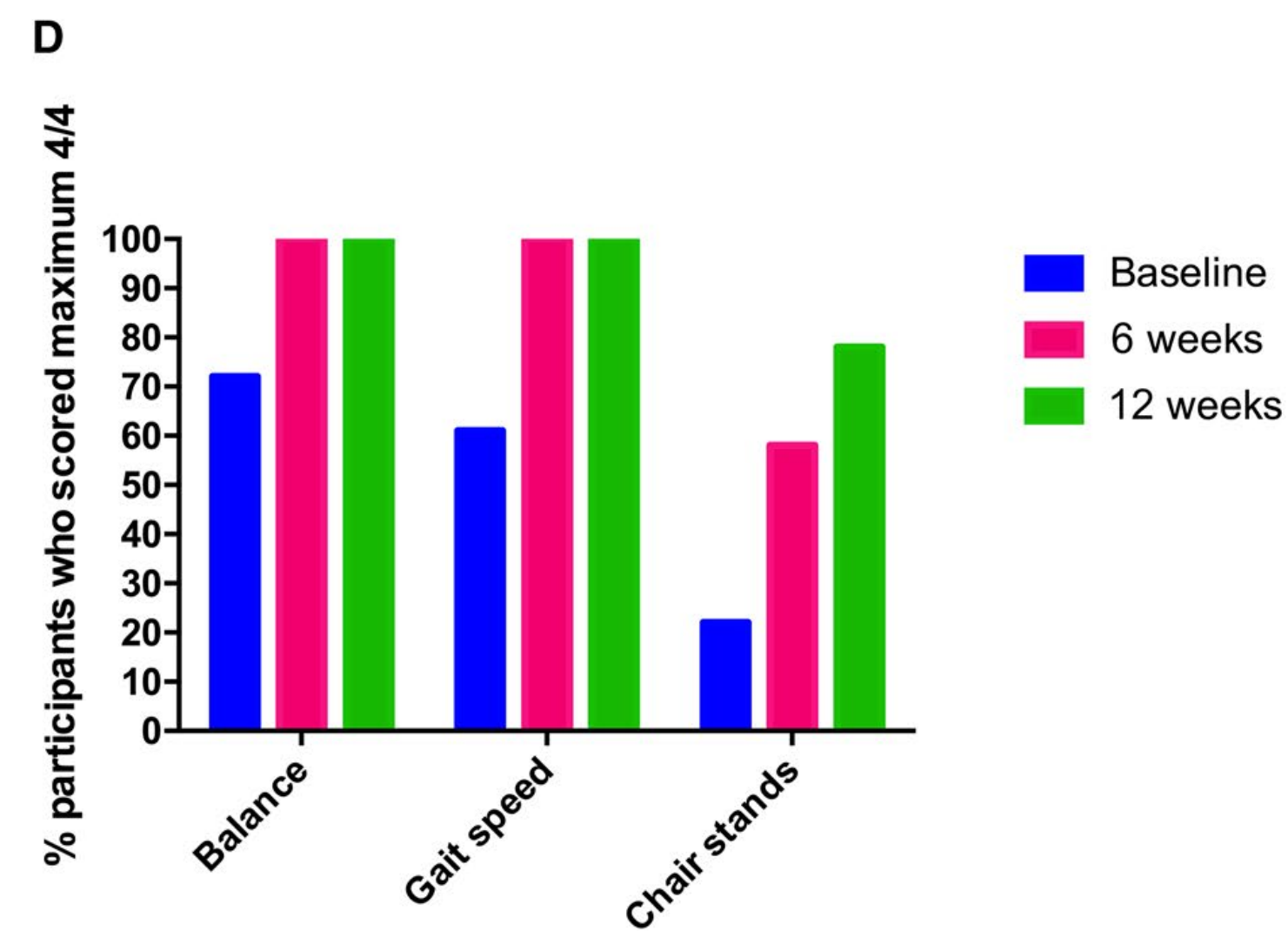
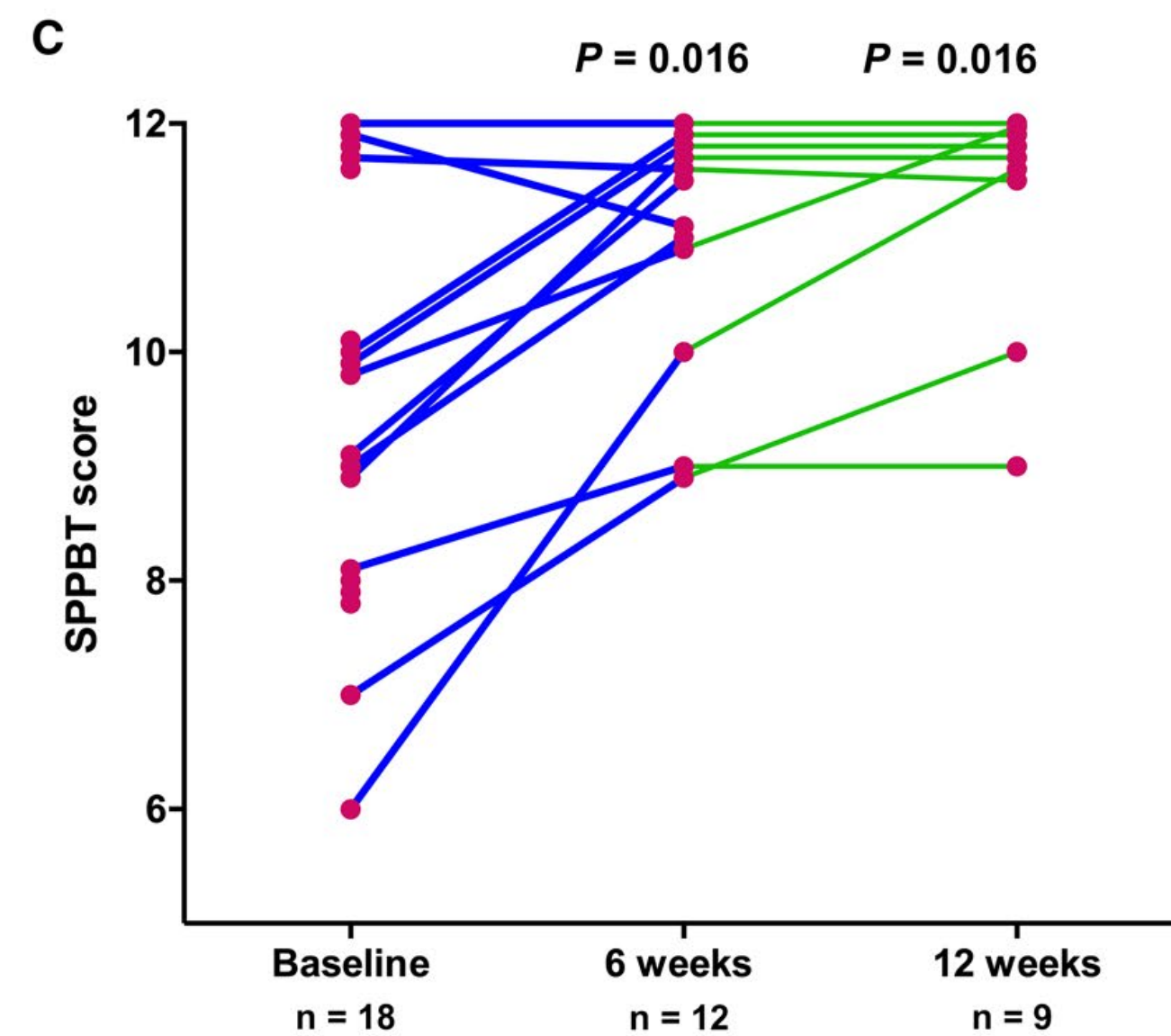
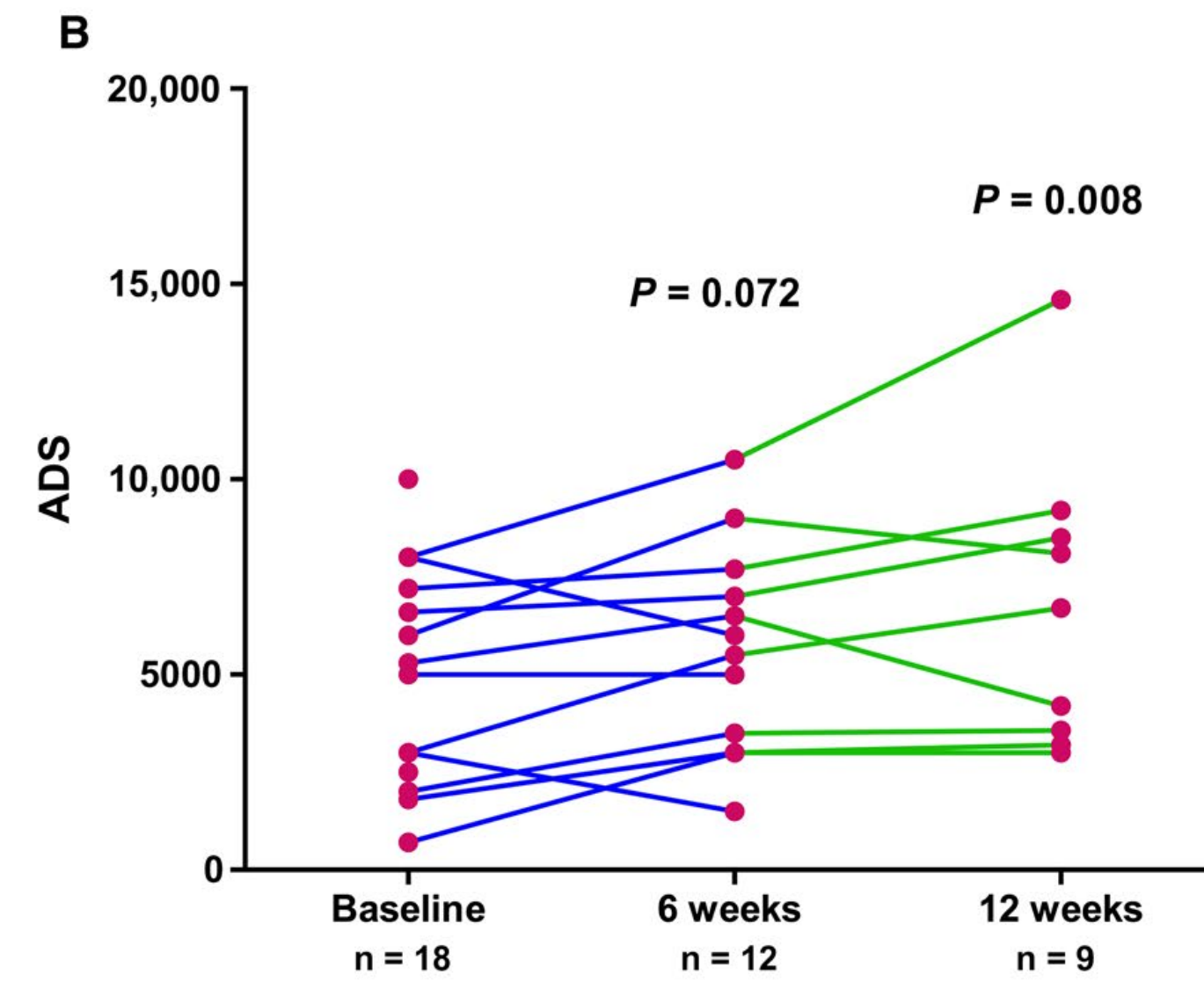
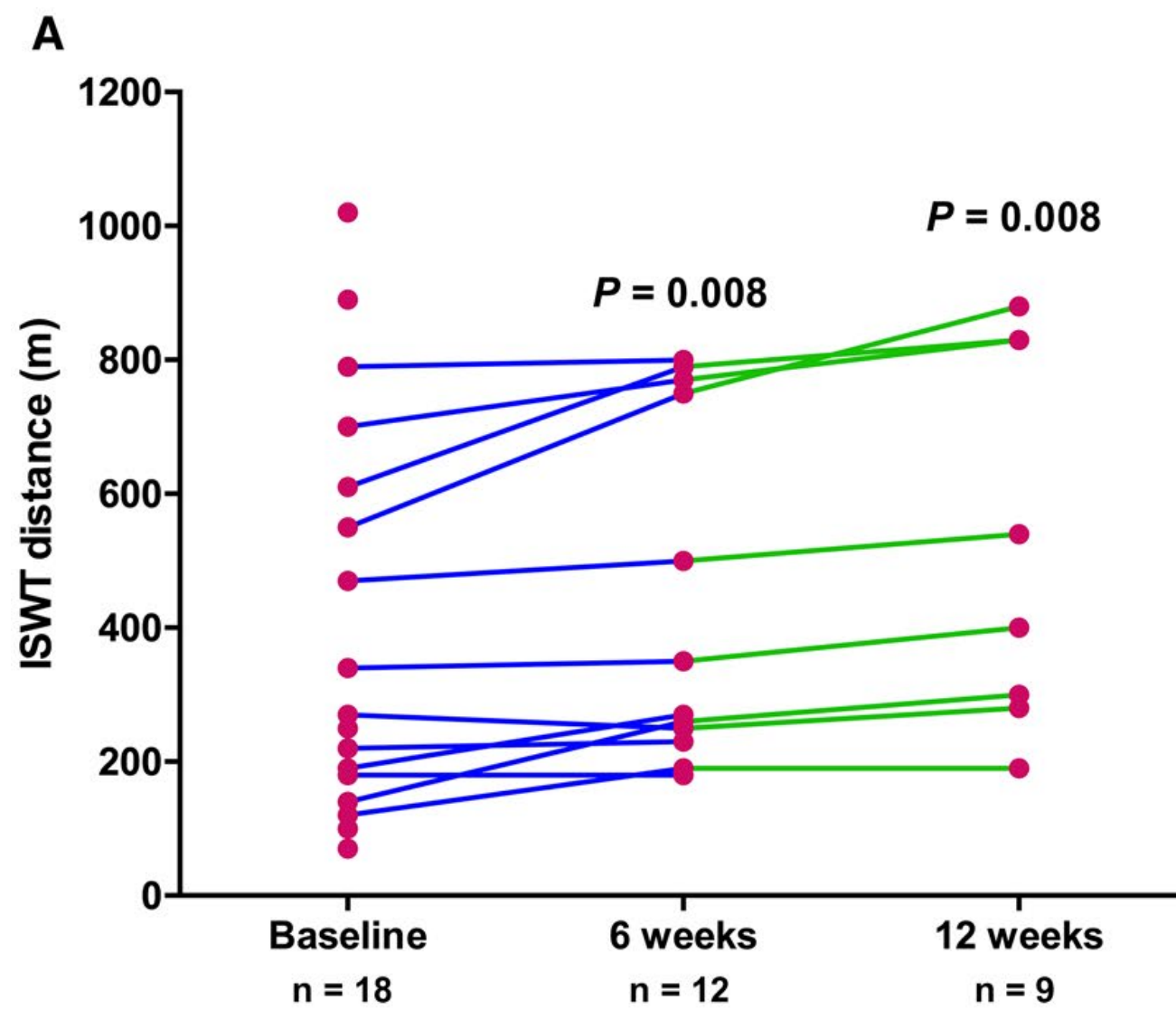


EBM



Home Exercise Training Improves Exercise Capacity in Cirrhosis Patients: Role of Exercise Adherence

Calvin Kruger^{1,2}, Margaret L. McNeely², Robert J. Bailey³, Milad Yavari², Juan G. Abraldes¹, Michelle Carbonneau¹, Kim Newnham¹, Vanessa DenHeyer¹, Mang Ma¹, Richard Thompson⁴, Ian Paterson⁵, Mark J. Haykowsky⁶ & Puneeta Tandon^{1,2}



Home-Based Exercise in Patients Awaiting Liver Transplantation: A Feasibility Study

Felicity Rhian Williams ^{1,5}, Alice Vallance ⁵, Thomas Faulkner ⁶, Jennifer Towey ⁷, Simon Durman ⁸, Derek Kyte ^{1,3}, Ahmed Mohamed Elsharkawy ^{1,4}, Tamara Perera ⁴, Andrew Holt ^{1,4}, James Ferguson ^{1,4}, Janet M. Lord ^{1,2} and Matthew James Armstrong ^{1,4}

Neexistují žádné standardizované cvičební programy, zejména **domácí cvičební programy** (HBEPs), pro pacienty WL-LT. Cíl: prozkoumat proveditelnost takového programu u pacientů čekajících na LT.

**12 týdnů
2x týdně cvičení**

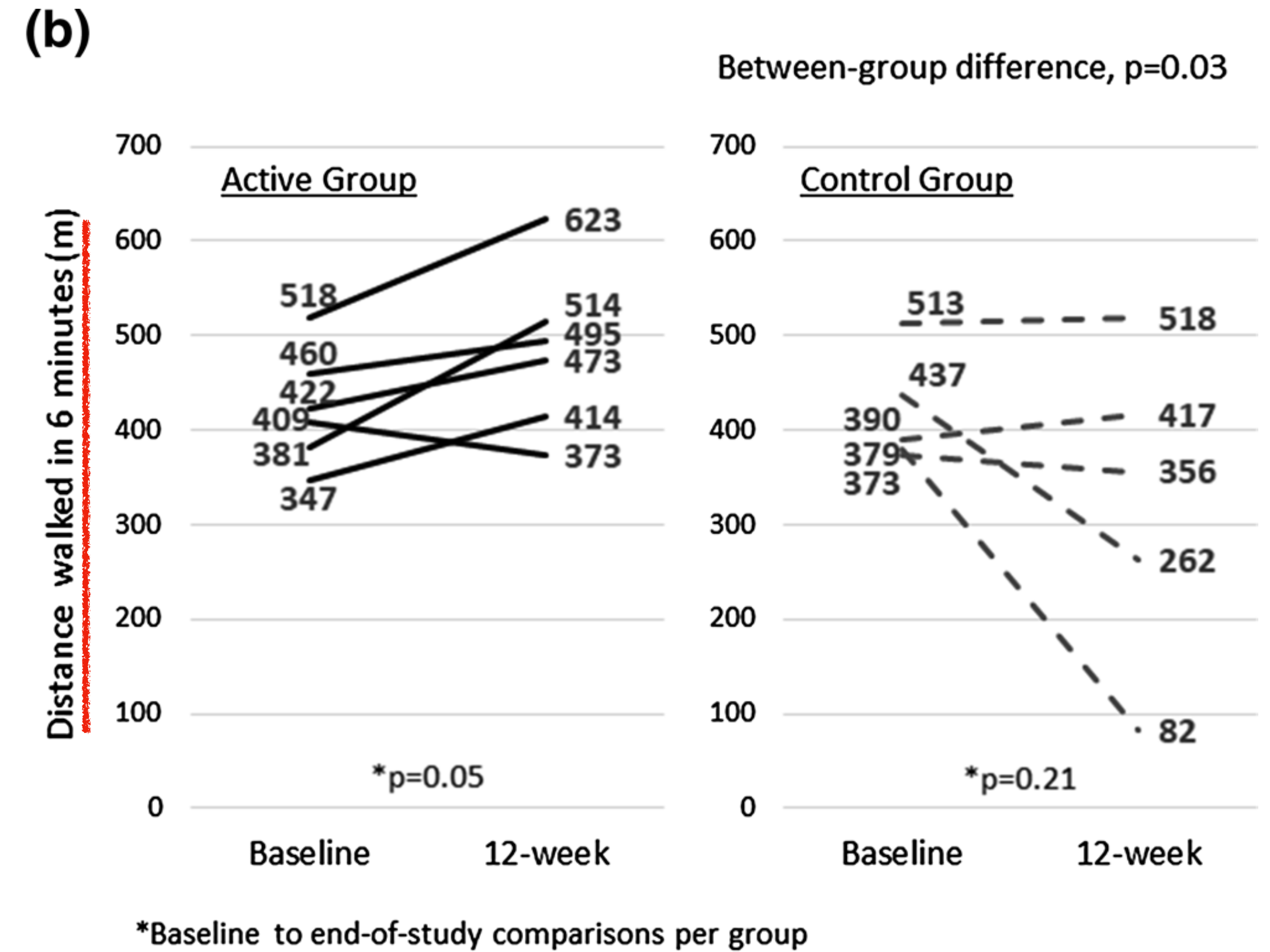
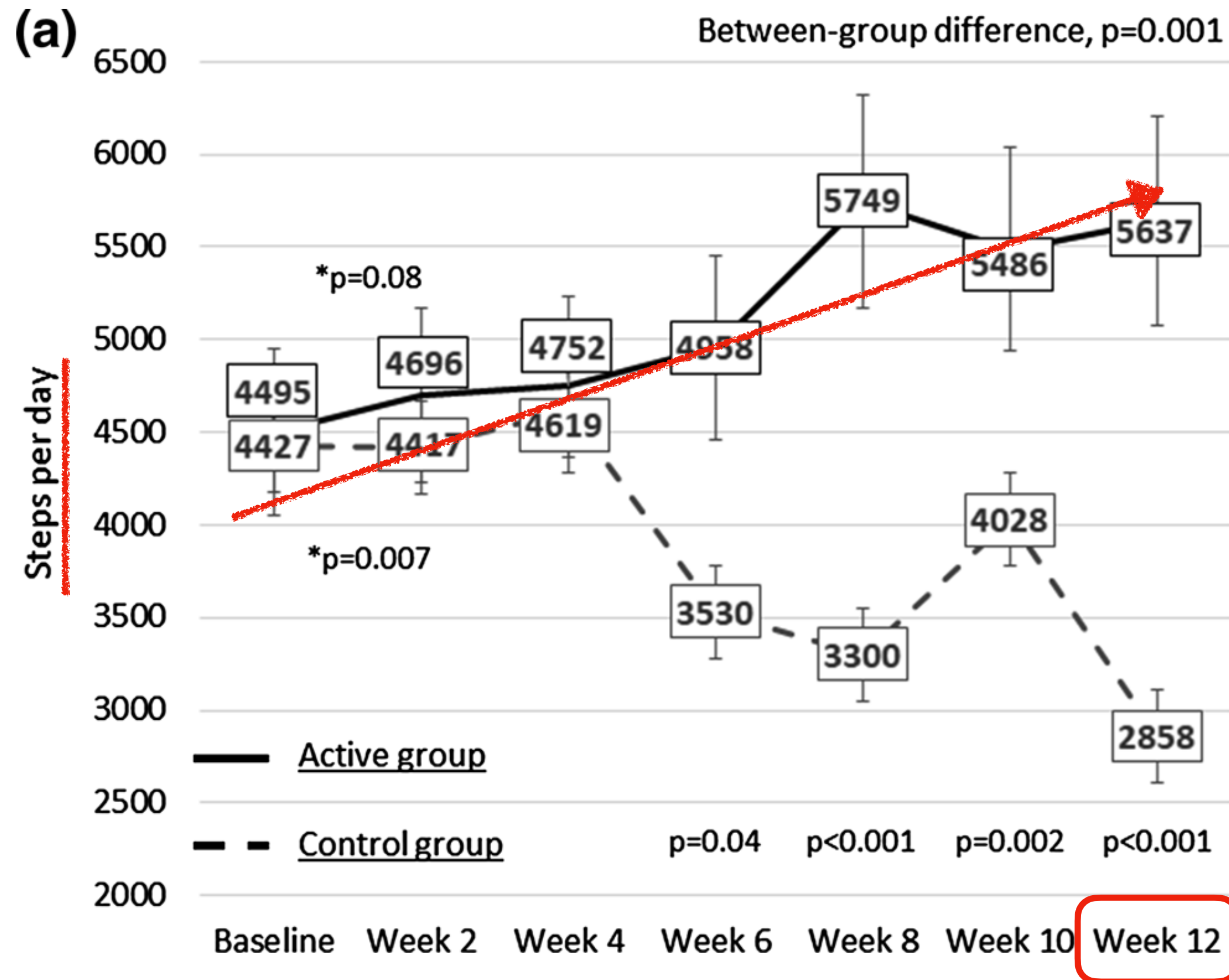
ISWT - incremental shuttle walk test
SPPBT - short physical performance battery test

ADS -average daily step

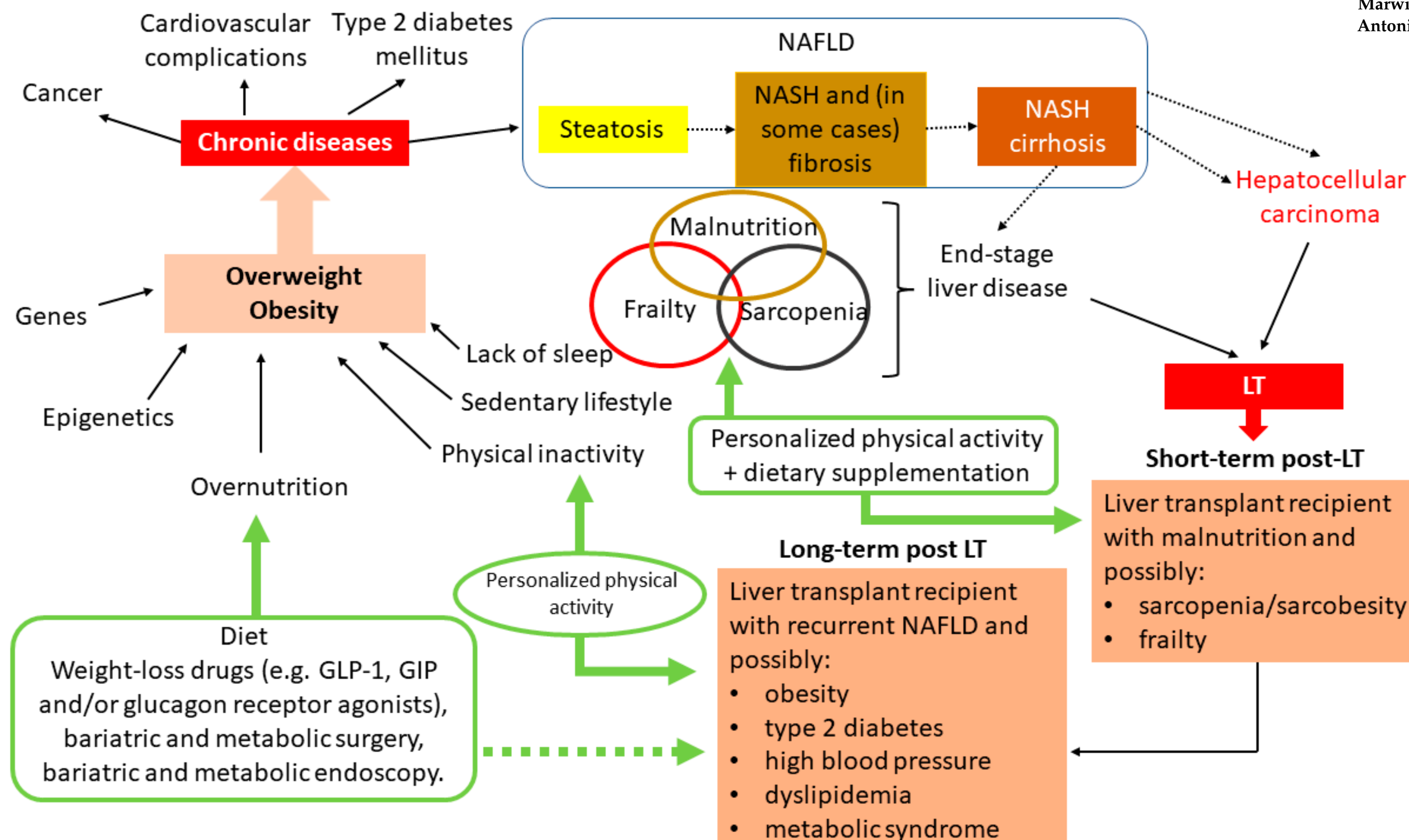
Home-Based Physical Activity and Diet Intervention to Improve Physical Function in Advanced Liver Disease: A Randomized Pilot Trial

Hui Wei Chen¹ · Arny Ferrando² · Michelle G. White³ · Richard A. Dennis^{2,4} · Jesse Xie³ · Margaret Pauly⁵ · Sanghee Park² · Thaddeus Bartter⁶ · Michael A. Dunn¹ · Astrid Ruiz-Margain⁷ · W. Ray Kim⁸ · Andres Duarte-Rojo^{1,3,5}

Digestive Diseases and Sciences (2020) 65:3350–3359
<https://doi.org/10.1007/s10620-019-06034-2>



Domácí cvičení — —> účinná metoda ke zlepšení aerobní zdatnosti u pacientů s dekompenzovanou cirhózou
 Využití **vzdáleného monitorování** způsob jak si poskytovatelé zdravotní péče mohou sledovat fyzickou aktivitu.



32% = frekvence kardiovaskulárních příhod u příjemců
10% = úmrtí po transplantaci má kardiovaskulární příčinu

Transplantace jater **eliminuje cirhózu NASH**, nenapraví základní etiologické/související faktory: nadváhu, obezitu a diabetes. Naopak velmi častý je rozvoj metabolických abnormalit a metabolického syndromu po transplantaci jater pro cirhózu související s NASH nebo jiné typy cirhózy. **Obezita** jeden rok po transplantaci jater **24–64 %** a prevalence metabolického syndromu **50–60 %**.
 Transplantace jater může **zhoršit kardiovaskulární faktory, jako je diabetes, obezita, hyperlipidemie** a zejména hypertenze (92 % příjemců)

Changes in exercise frequency and cardiovascular outcomes in older adults

Kyuwoong Kim ¹, Seulgie Choi¹, Seo Eun Hwang ², Joung Sik Son ², Jong-Koo Lee^{3,4}, Juhwan Oh⁴, and Sang Min Park^{1,2*}

Changes in Frequency of Moderate to Vigorous Physical Activity (MVPA) in Older Adults (≥60 yrs.)



Decrease in Frequency of MVPA

1-2, 3-4, and ≥5 times of MVPA/week to decreased frequency or physically inactive

Up to 27% Increased Risk of Cardiovascular Disease



Coronary Heart Disease



Stroke



Increase in Frequency of MVPA

Physically Inactive to 1-2, 3-4, and ≥5 times of MVPA/week

Up to 11% Reduced Risk of Cardiovascular Disease



Coronary Heart Disease



Stroke

Active Smoking Before Liver Transplantation in Patients with Alcohol Use Disorder: Risk Factors and Outcomes

Ana Isabel López-Lazcano ^{1,*}, Antoni Gual ¹, Jordi Colmenero ², Elsa Caballería ¹, Anna Lligoña ¹, Miquel Navasa ², Gonzalo Crespo ², Eva López ² and Hugo López-Pelayo ¹

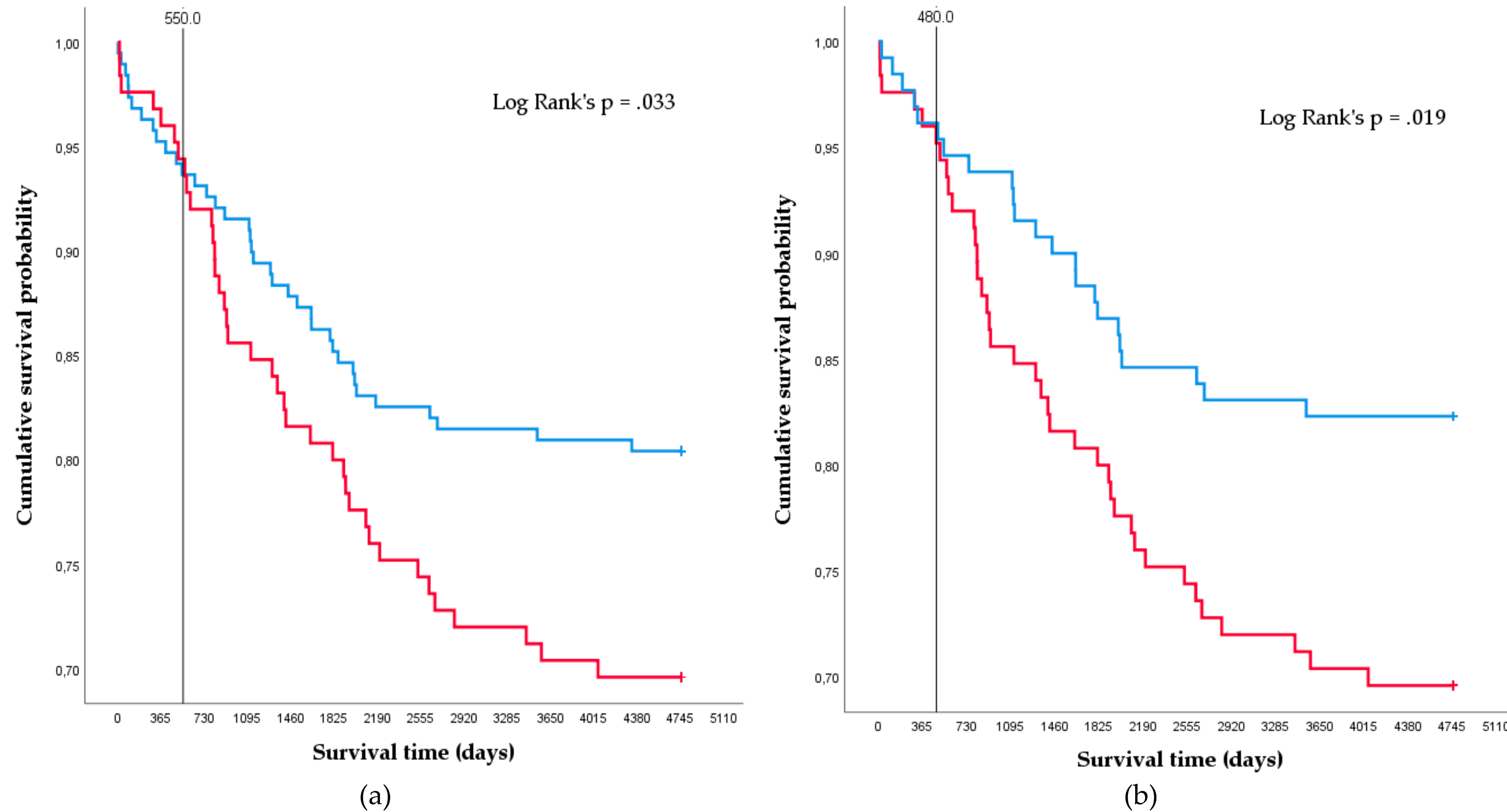


Figure 2. Impact of the smoking status before LT on patient survival. Kaplan–Meier. (a) Cumulative

Systematický přehled - vyhodnocení účinku rehabilitace fyzické kapacity a chirurgických výsledků u pacientů aktivně čekajících na WL k OLTx.



Physical Effects, Safety and Feasibility of Prehabilitation in Patients Awaiting Orthotopic Liver Transplantation, a Systematic Review

Wesley D. Jetten^{1,,†}, Rianne N. M. Hogenbirk^{2,†}, Nico L. U. Van Meeteren^{1,3†}, Frans J. C. Cuperus^{4†}, Joost M. Klaase^{2†} and Renate De Jong^{1†}*

VO₂-max a skóre MELD jsou nezávislé prognostické faktory mortalita a délka hospitalizace během pre- a potransplantačního období

- —> **bezpečné, proveditelné a potenciálně efektivní**
- —> významné zlepšení v **aerobního prahu** nebo **fyzické kapacity** při cvičení střední až vysoké intenzity
 - —> zlepšení **frailty** a **QoL** u pacientů
- —> významnou **korelaci mezi přežitím a zlepšením skóre LFI**
- —> významný medián **rozdílu 17 dnů v délka pobytu v nemocnici** mezi intervencí a kontrolou skupiny
 - —-> dodržování programu **38–90 %** (bez dozoru) a **94 %** pod dohledem



BWA

[BWA 2.0]

ID	Height	Age	Gender	Test Date / Time
Jane Doe	156.9cm	51	Female	2021.03.31. 15:44

InBody
www.inbody.com

Body Composition Analysis

	Values	Total Body Water	Soft Lean Mass	Fat Free Mass	Weight
Total Body Water (L)	27.4 (26.4 - 32.2)	27.4	34.9 (33.8 - 41.4)	37.1 (35.8 - 43.8)	59.1 (43.9 - 59.5)
Protein (kg)	7.1 (7.0 - 8.6)				
Minerals (kg)	2.64 (2.44 - 2.98)				
Body Fat Mass (kg)	22.0 (10.3 - 16.5)				

Muscle-Fat Analysis

	Under	Normal	Over
Weight (kg)	55 70 85 100 115 130 145 160 175 190 205 %		
SMM (kg)	70 80 90 100 110 120 130 140 150 160 170 %		
Body Fat Mass (kg)	40 60 80 100 160 220 280 340 400 460 520 %		

Obesity Analysis

	Under	Normal	Over
BMI (kg/m ²)	10.0 15.0 18.5 22.0 25.0 30.0 35.0 40.0 45.0 50.0 55.0		
PBF (%)	8.0 13.0 18.0 23.0 28.0 33.0 38.0 43.0 48.0 53.0 58.0		

Segmental Lean Analysis

	Under	Normal	Over	ECW Ratio
Right Arm (kg)	55 70 85 100 115 130 145 160 175 %			0.378
Left Arm (kg)	55 70 85 100 115 130 145 160 175 %			0.378
Trunk (kg)	70 80 90 100 110 120 130 140 150 %			0.398
Right Leg (kg)	70 80 90 100 110 120 130 140 150 %			0.403
Left Leg (kg)	70 80 90 100 110 120 130 140 150 %			0.404

ECW Ratio Analysis

	Under	Normal	Over
ECW Ratio	0.320 0.340 0.360 0.380 0.390 0.400 0.410 0.420 0.430 0.440 0.450		

Body Composition History

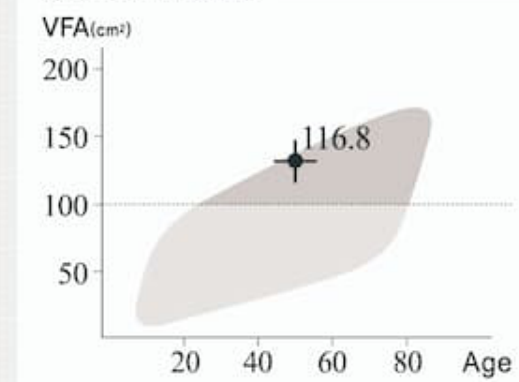
	20.07.21	20.08.27	20.09.20	20.11.23	20.12.21	21.02.19	21.03.20	21.03.31
Weight (kg)	65.3	63.9	62.4	61.8	62.3	60.9	60.5	59.1
SMM (kg)	20.1	20.0	19.7	19.7	19.8	19.7	19.8	19.5
PBF (%)	41.3	40.7	39.2	39.0	39.4	38.6	37.7	37.2
ECW Ratio	0.399	0.398	0.396	0.396	0.397	0.396	0.398	0.398

InBody Score

67 / 100 Points

* Total score that reflects the evaluation of body composition. A muscular person may score over 100 points.

Visceral Fat Area



Weight Control

Target Weight	51.7 kg
Weight Control	-7.4 kg
Fat Control	-10.1 kg
Muscle Control	+2.7 kg

Research Parameters

Intracellular Water	16.5 L	(16.3 - 19.9)
Extracellular Water	10.9 L	(10.0 - 12.2)
Basal Metabolic Rate	1171 kcal	(1255 - 1451)
Waist-Hip Ratio	0.94	(0.75 - 0.85)
Body Cell Mass	23.6 kg	(23.4 - 28.6)
SMI	5.8 kg/m ²	

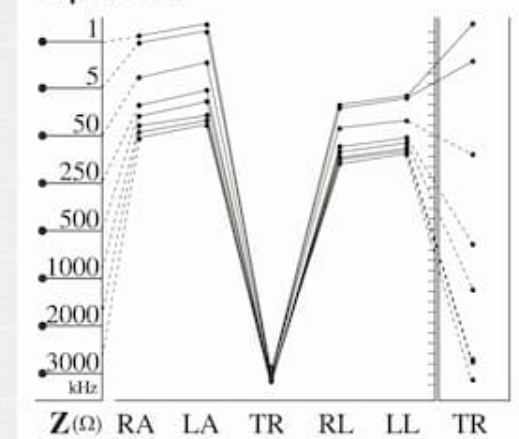
Whole Body Phase Angle

ϕ (°) 50 kHz | 4.0°

Segmental Body Phase Angle

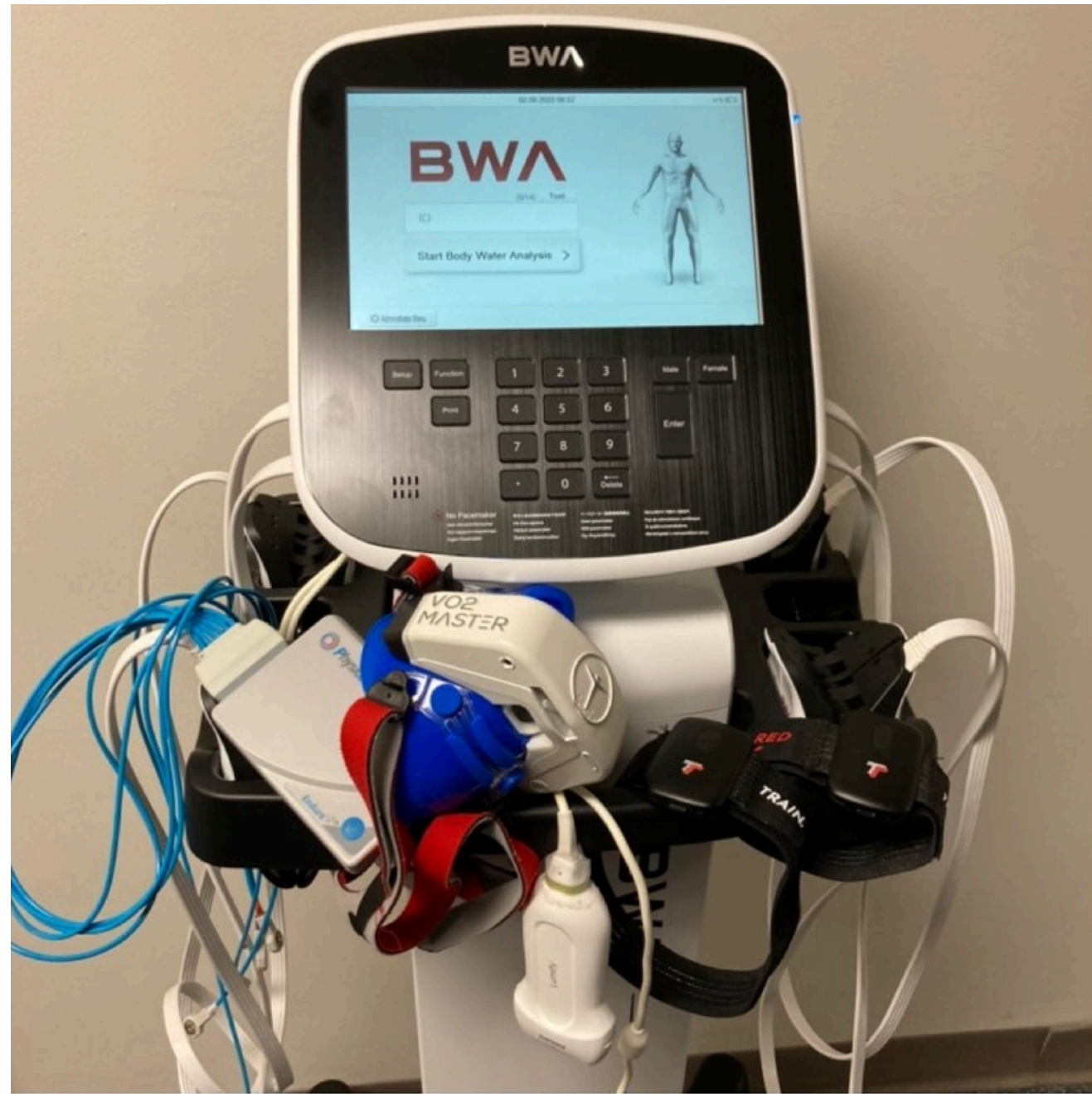
ϕ (°)	RA	LA	TR	RL	LL
5 kHz	1.7	4.7	1.7	1.6	4.5
50 kHz	4.1	5.7	4.0	3.8	4.3
250 kHz	3.8	5.6	2.9	2.9	2.9

Impedance



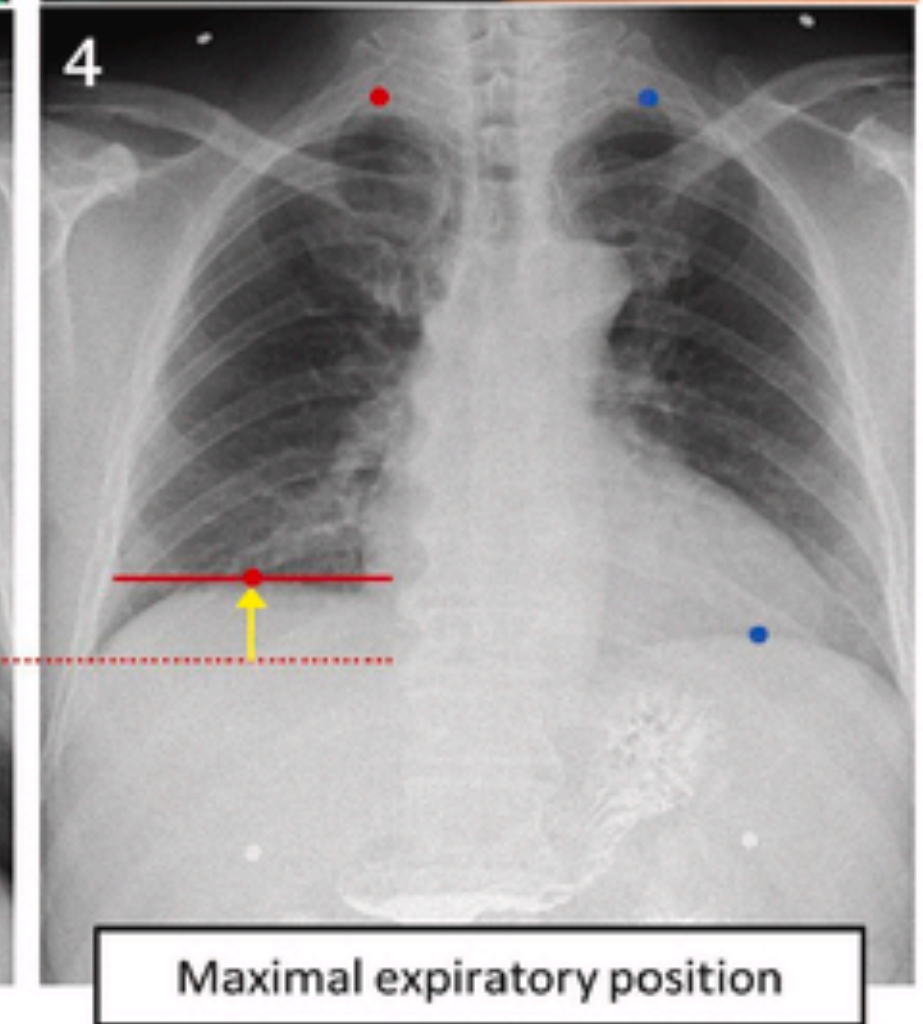
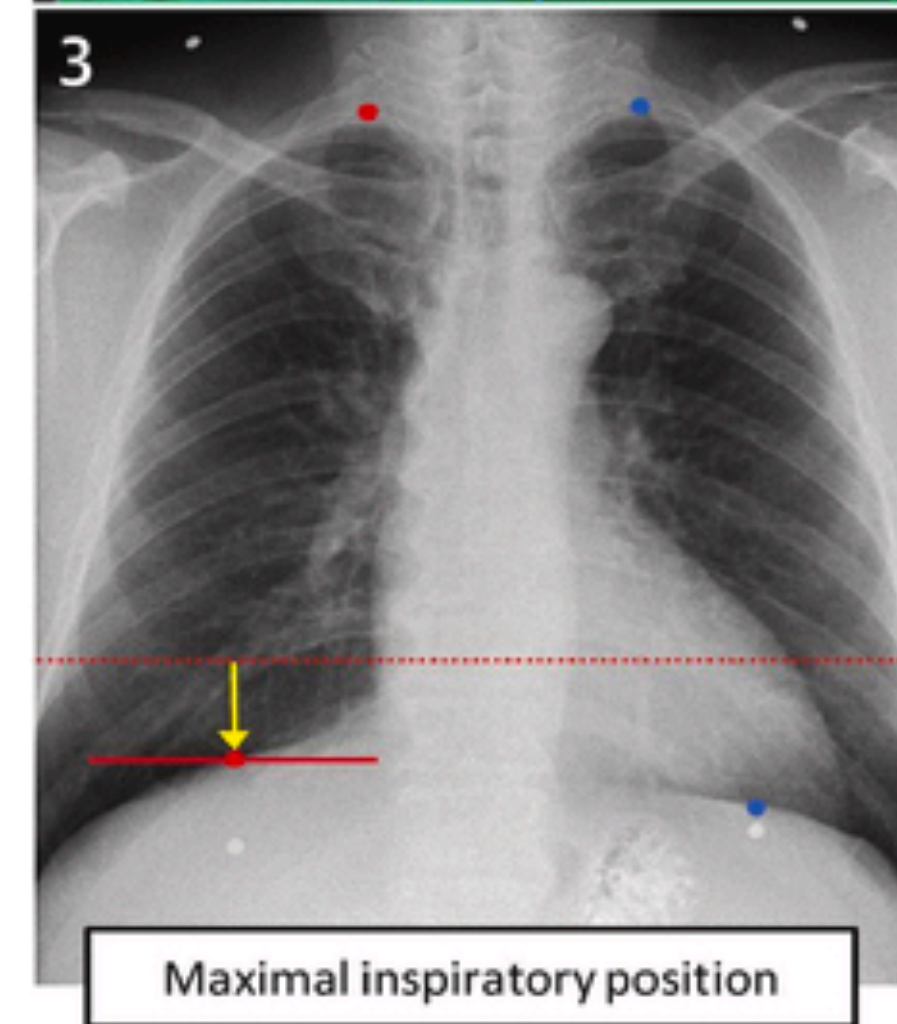
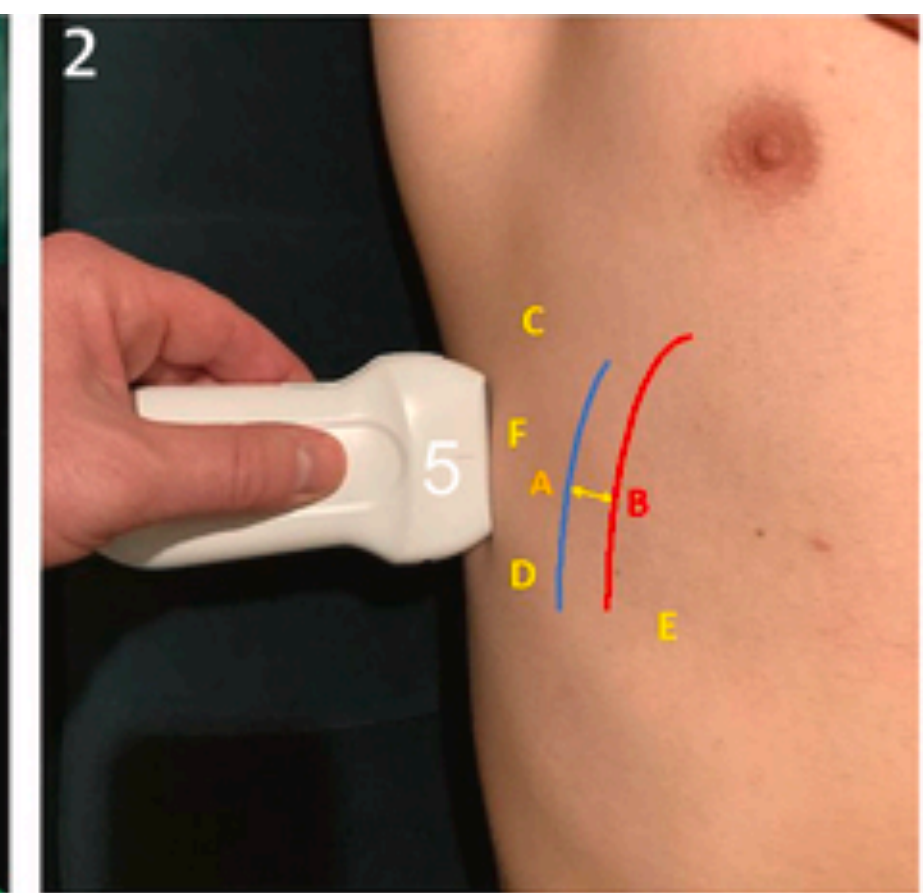
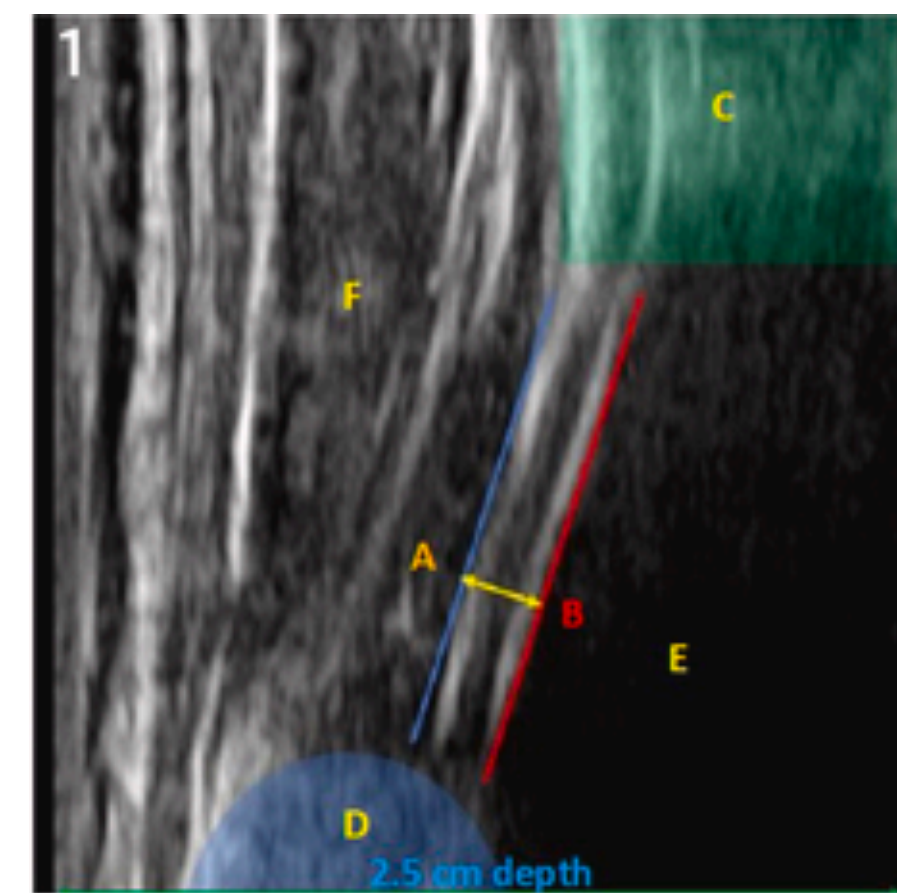
Z_i(Ω) RA LA TR RL LL TR
[Clamp Type, Lying Posture]
[000/000/000]





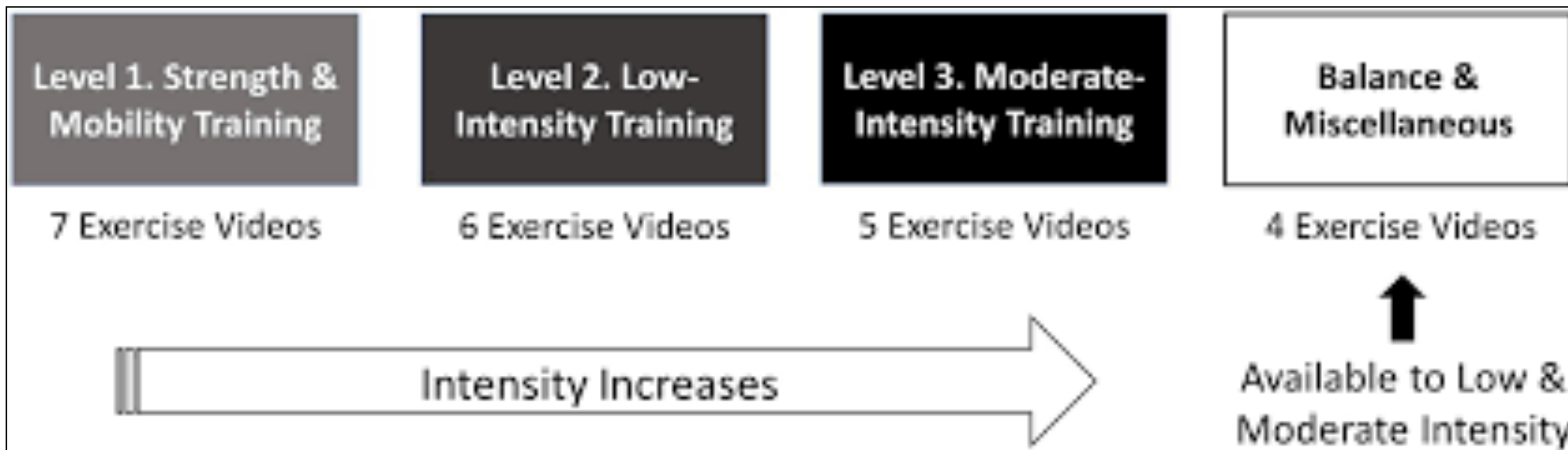
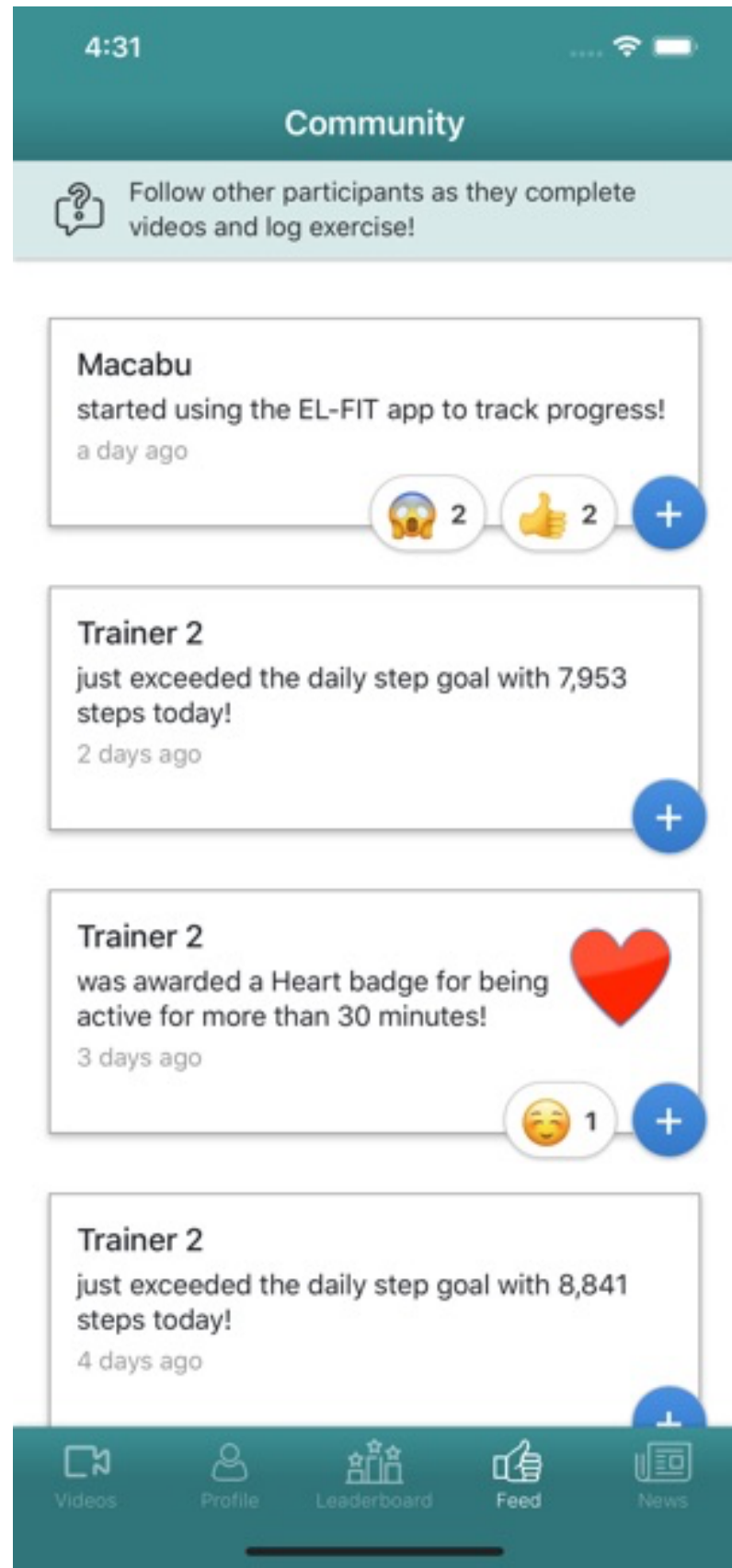
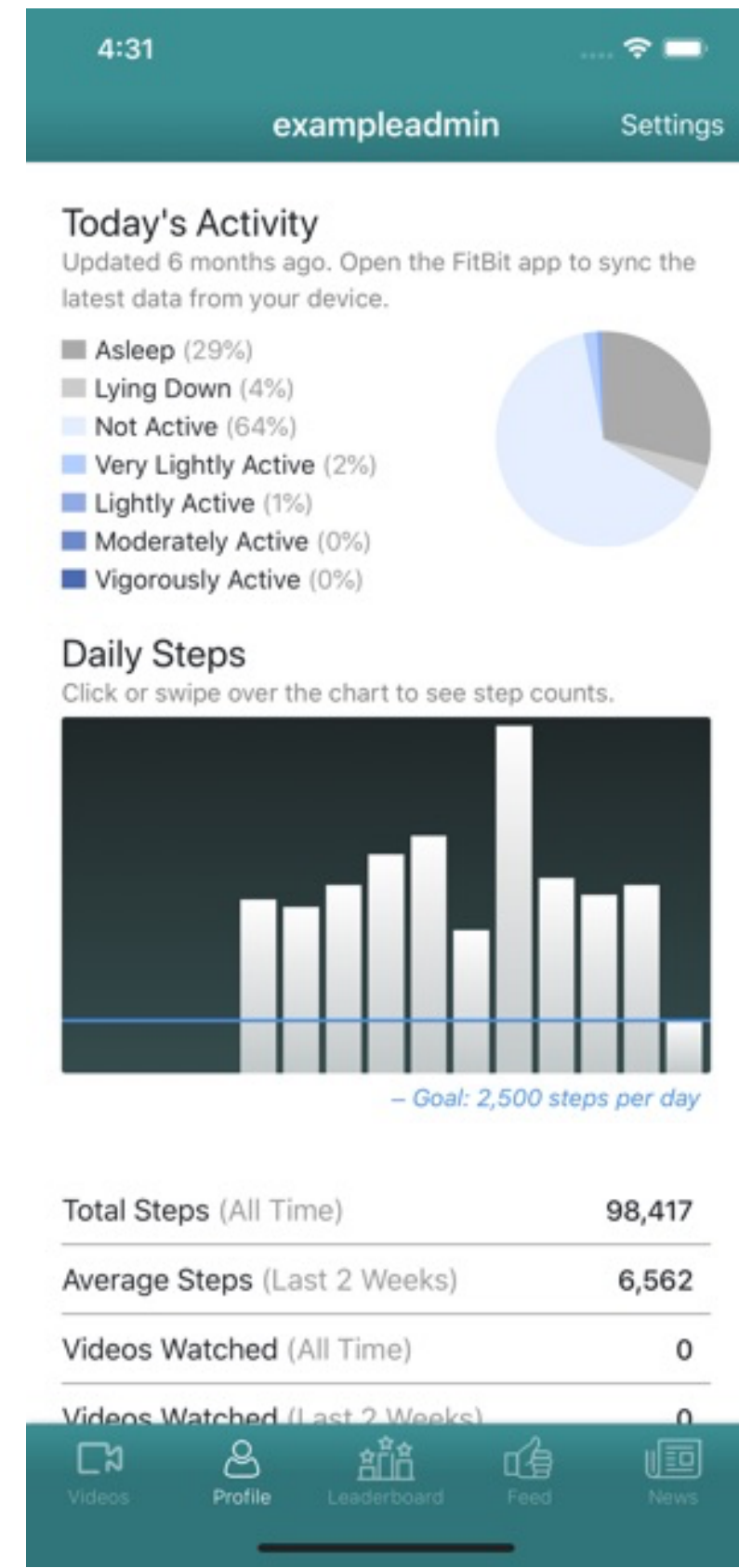
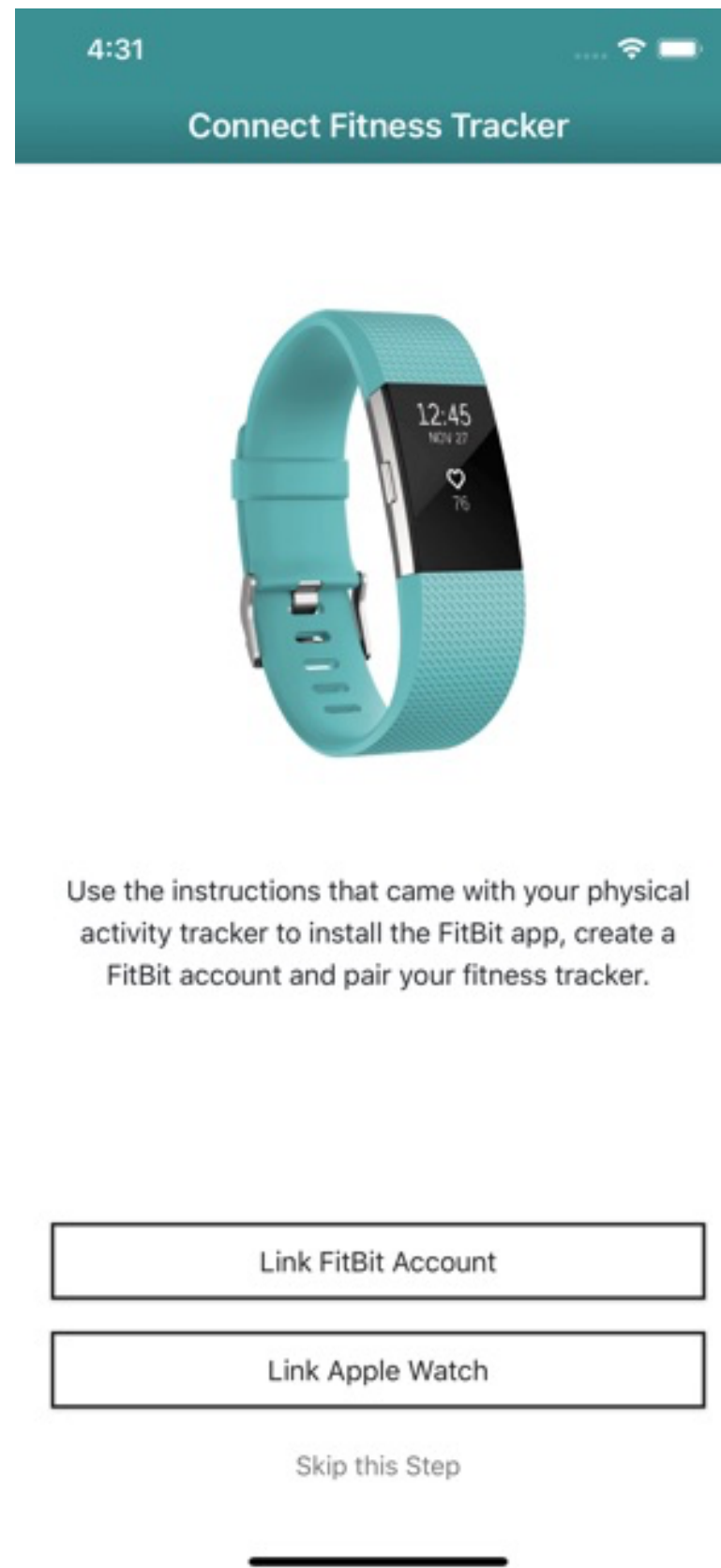
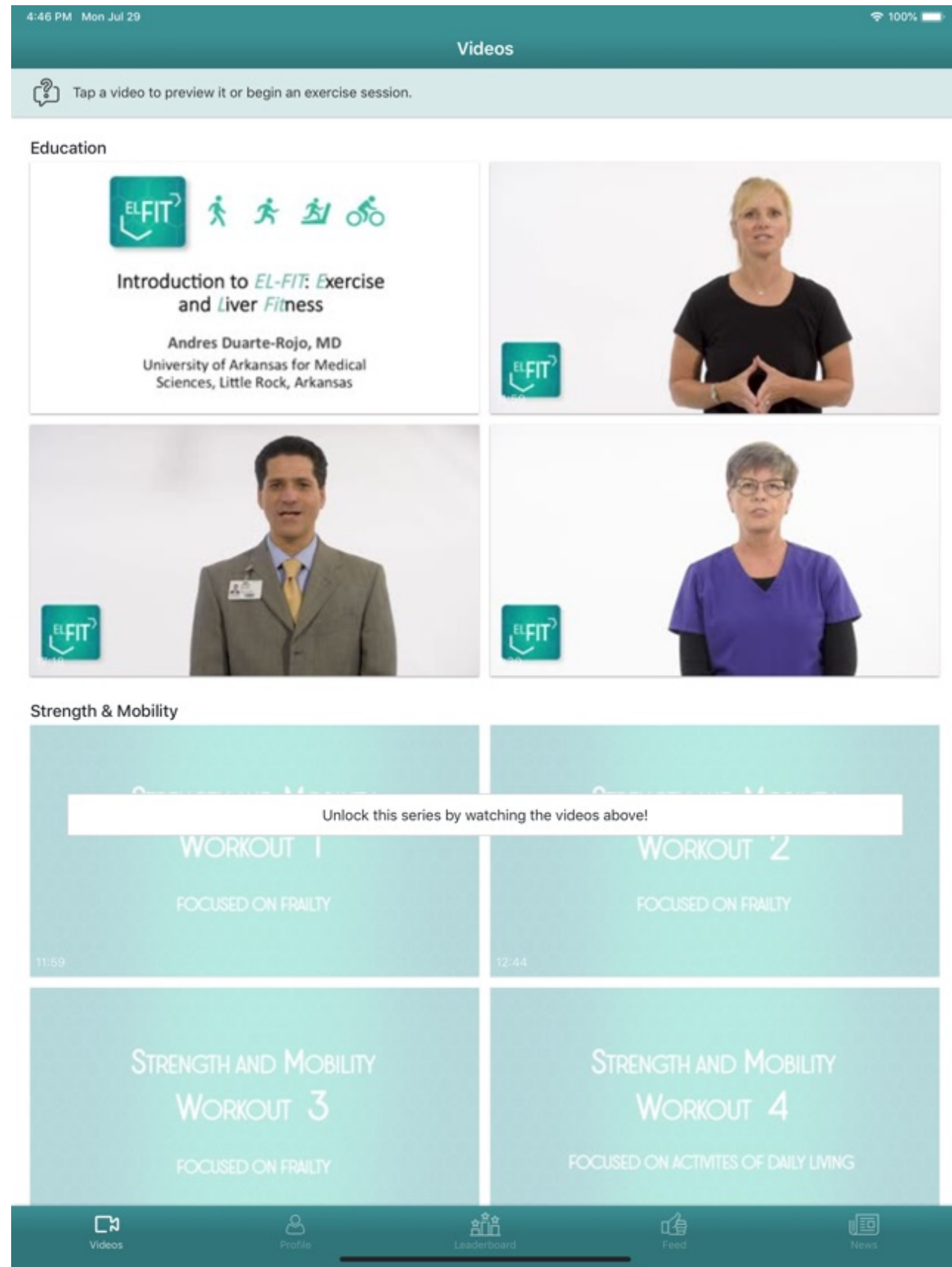
 **Duke University**
School of Medicine

0.5.17
CENTRUM SPORTOVNÍ MEDICÍNY




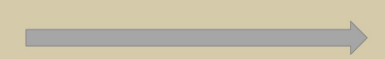
Cario-Respiratory-Fitness (CRF) - 2.0






Practical prehabilitation program

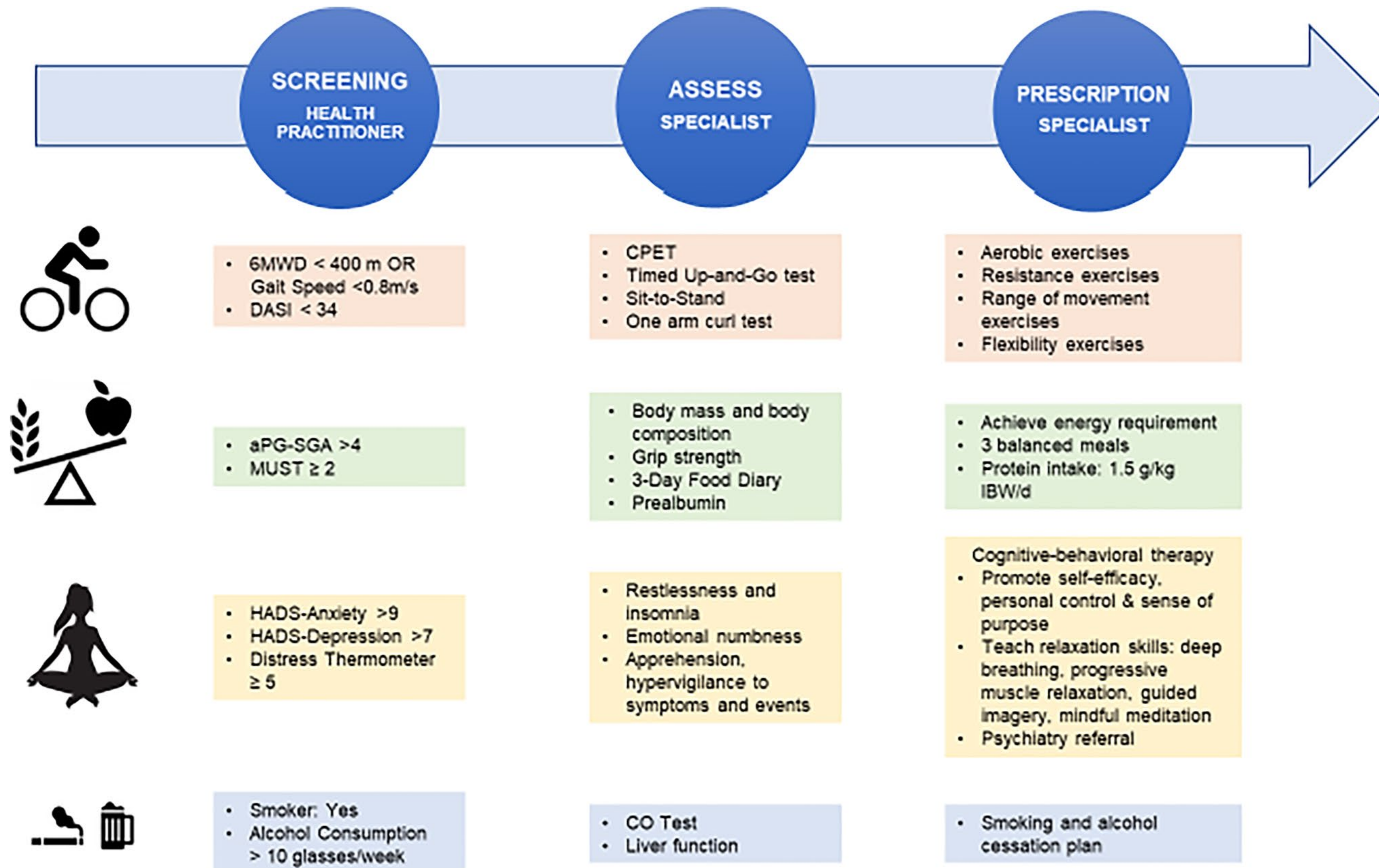
- UPMC LTx nutrition and prehabilitation guidelines
 - Standardize candidates nutritional status evaluation and monitoring
 - Home-health exercise program
 - Take advantage of 





AMERICAN ASSOCIATION FOR THE STUDY OF LIVER DISEASES
Innovation Fund
Clinical Practice SIG

- Research program (SarcoFit 2.0 Lab)
 - Sarcopenia and Fitness studies



Závěr

(doporučení, guidelines)



Malnutrition, Frailty, and Sarcopenia in Patients With Cirrhosis: 2021 Practice Guidance by the American Association for the Study of Liver Diseases

Jennifer C. Lai ^{1*}, Puneeta Tandon,^{2*} William Bernal,³ Elliot B. Tapper ⁴, Udeme Ekong ⁵, Srinivasan Dasarathy,⁶ and Elizabeth J. Carey⁷

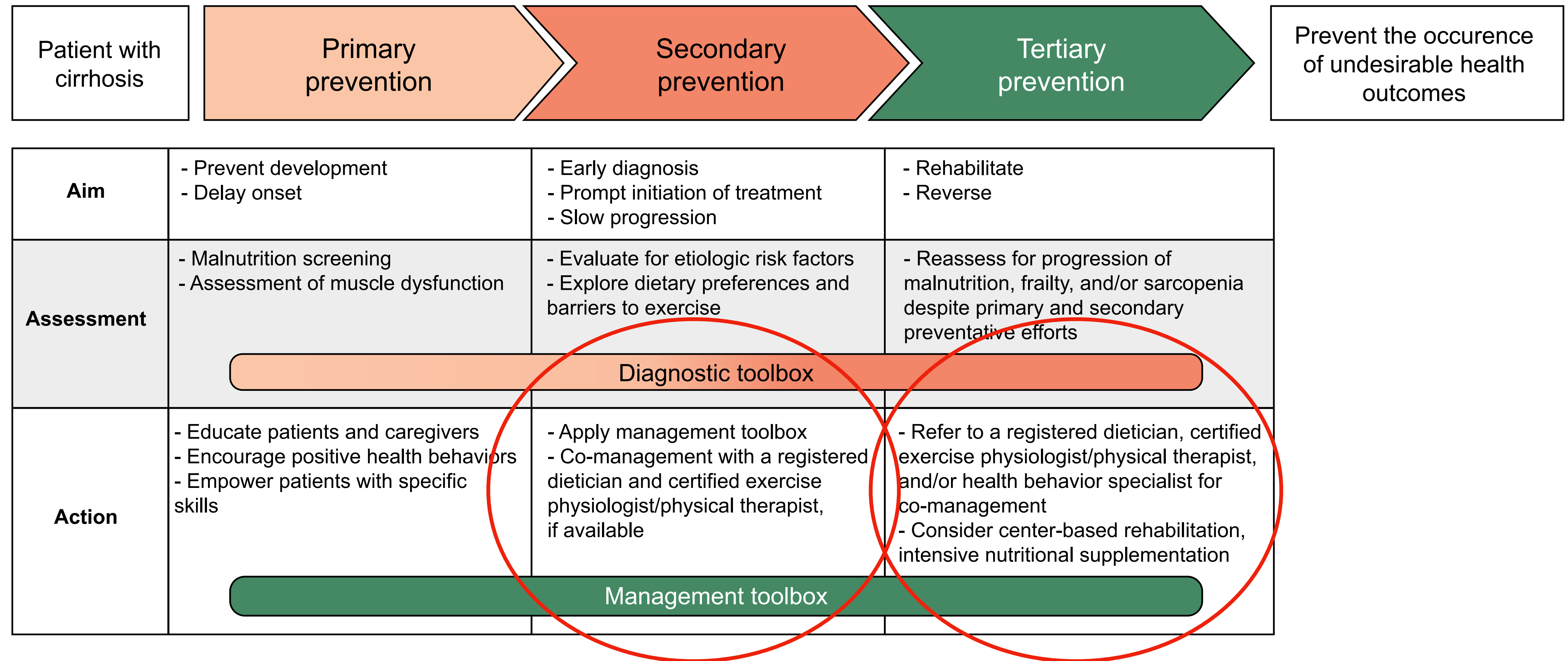
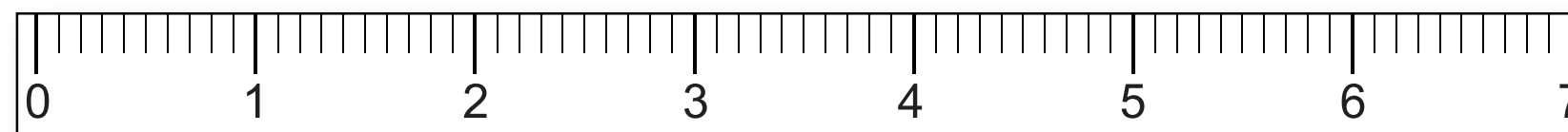
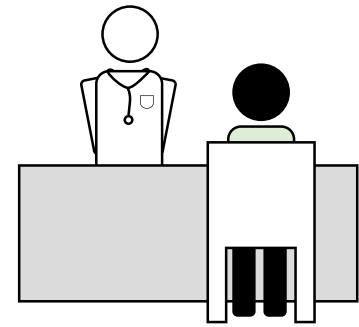
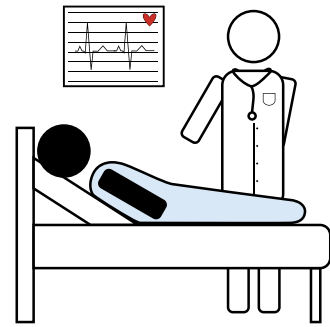
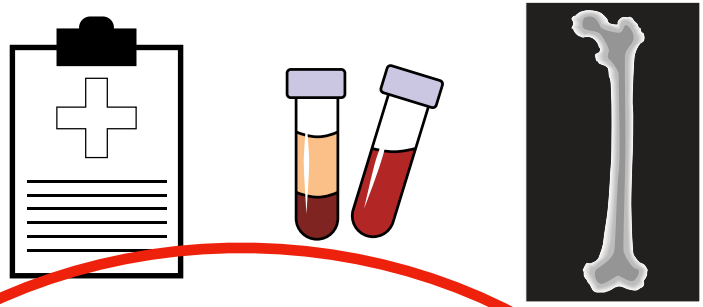


FIG. 2. The three levels of disease prevention and health promotion as applied to management of malnutrition, frailty, and sarcopenia in patients with cirrhosis.

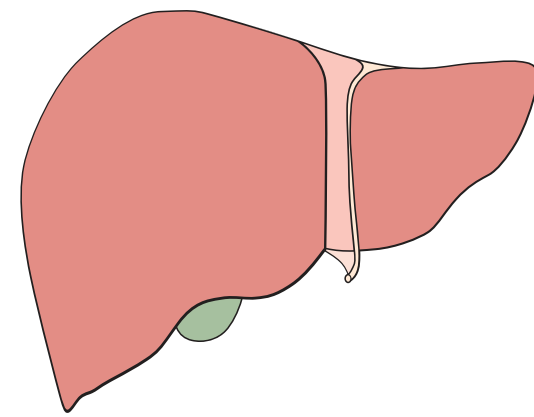


Diagnostic Toolbox

Select tools based on the clinical scenario

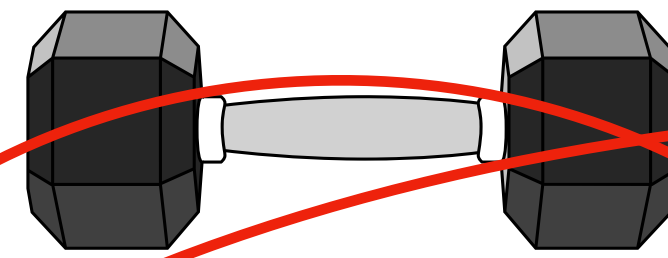
	 Clinician questions	 Physical exam findings	 Objective measures
<p>Screen for Malnutrition & Assess for frailty and/or sarcopenia</p>	<ul style="list-style-type: none">• Karnofsky Performance Scale• Clinical Frailty Scale• Activities of Daily Living• Pediatric populations<ul style="list-style-type: none">• Royal Free Hospital-Nutrition Prioritizing Tool• Lansky play performance scale• Fried-exhaustion, shrinkage, Pediatric Quality of Life Inventory	<ul style="list-style-type: none">• Muscle wasting – wasting at the temples, clavicle, shoulder, scapula/ribs, quadriceps, interosseous muscle between the thumb and forefinger• Use of a walking aid• Inability to stand up from the chair independently or getting off the exam table independently, slowness	<ul style="list-style-type: none">• CT scan L3 skeletal muscle index• Liver frailty index• Handgrip strength• 6 minute walk test• 4 meter gait speed• Triceps skin-fold thickness (pediatrics)
<p>Identify factors contributing to malnutrition, frailty, and sarcopenia</p>	<ul style="list-style-type: none">• Hunger Vital Sign (<i>abnormal if either or both are true</i>)<ul style="list-style-type: none">• Within the past 12 months, we worried whether our food would run out before we got money to buy more.• Within the past 12 months, the food we bought just didn't last and we didn't have money to get more.• Physical inactivity<ul style="list-style-type: none">• In the past week, on how many days have you done a total of 30 min or more of physical activity, which was enough to raise your breathing rate?	<ul style="list-style-type: none">• Ascites• Hepatic encephalopathy• Poor dentition• Dysgeusia	<ul style="list-style-type: none">• MELD-Na• Child Pugh score• Testosterone level (men)• Data from patient's fitness tracker (e.g., daily steps, average heart rate)

Management Toolbox



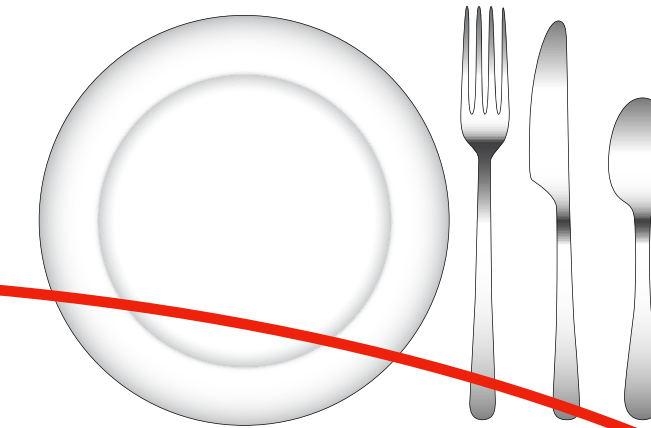
Liver specific

- Management of disease etiology
- Management of ascites
- Management of hepatic encephalopathy



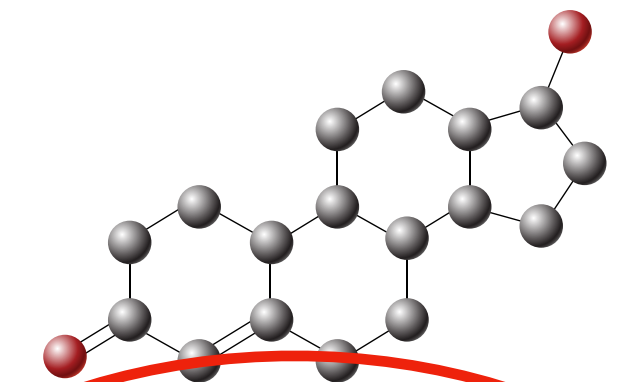
Physical activity

- **Personalized activity prescription (guided by FITT):**
 - **F**requency – Aerobic (4-7 d/week); Resistance (2-3 d/week)
 - **I**ntensity – Use the talk test (be short of breath but can still speak a full sentence); 3 sets of 10-15 repetitions at a time
 - **T**ime – Start slow and build up
 - Aerobic: 150 min per week
 - Resistance: ≥ 1 days per week
 - **T**ype – aerobic, resistance, flexibility and balance
- **Consult a certified exercise physiologist or physical therapist**



Intake/Uptake

- Calorie intake of at least 35 kcal/kg (non-obese)
- Protein intake of 1.2 to 1.5 g/kg body weight/d
- Micronutrient repletion
- Frequent, small meals and minimize fasting (e.g. late evening snack)
- Address barriers to intake (e.g. liberalize sodium restrictions as needed)
- Consult a registered dietitian



Other systems

- Testosterone replacement (men)
- Refer to health behavior specialist
- Diabetes control



AMERICAN COLLEGE
of SPORTS MEDICINE®

Otázky a výzkumné záměry:

- impakt frailty na mortalitu po Tx
- longitudinální vývoj změn frailty na outcome
- vztah mezi progresí org. selhání a frailty

Pracovní skupina pro frailty v Tx (multioborová spolupráce):

2019 → 2023

projekty, navýšení financování
implementace EBM měření, standard péče
intervence (sv.hmota, sv.funkce, aktivita, nutriční)
— — > **pre-rehabilitační programy**
ne-fyzické aspekty frailty
(kognitivní, emocionální, sociální, environmentální)
nem.doporučení
národní guidelines
výzkum



...děkuji za pozornost

petr.piza@ikem.cz