

"Integrating musculoskeletal ultrasound into rehabilitation management of geriatric patients"

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**I have no actual or potential conflict of interest in relation to
this program/presentation.**

Why MSK-US?

Non-
invasive

Bedside

Real-time

Quantitative

Repeatable



From imaging to clinical decision

Sarcopenia



„Sarcopenia = *Multisystem Disorder*
Neural System

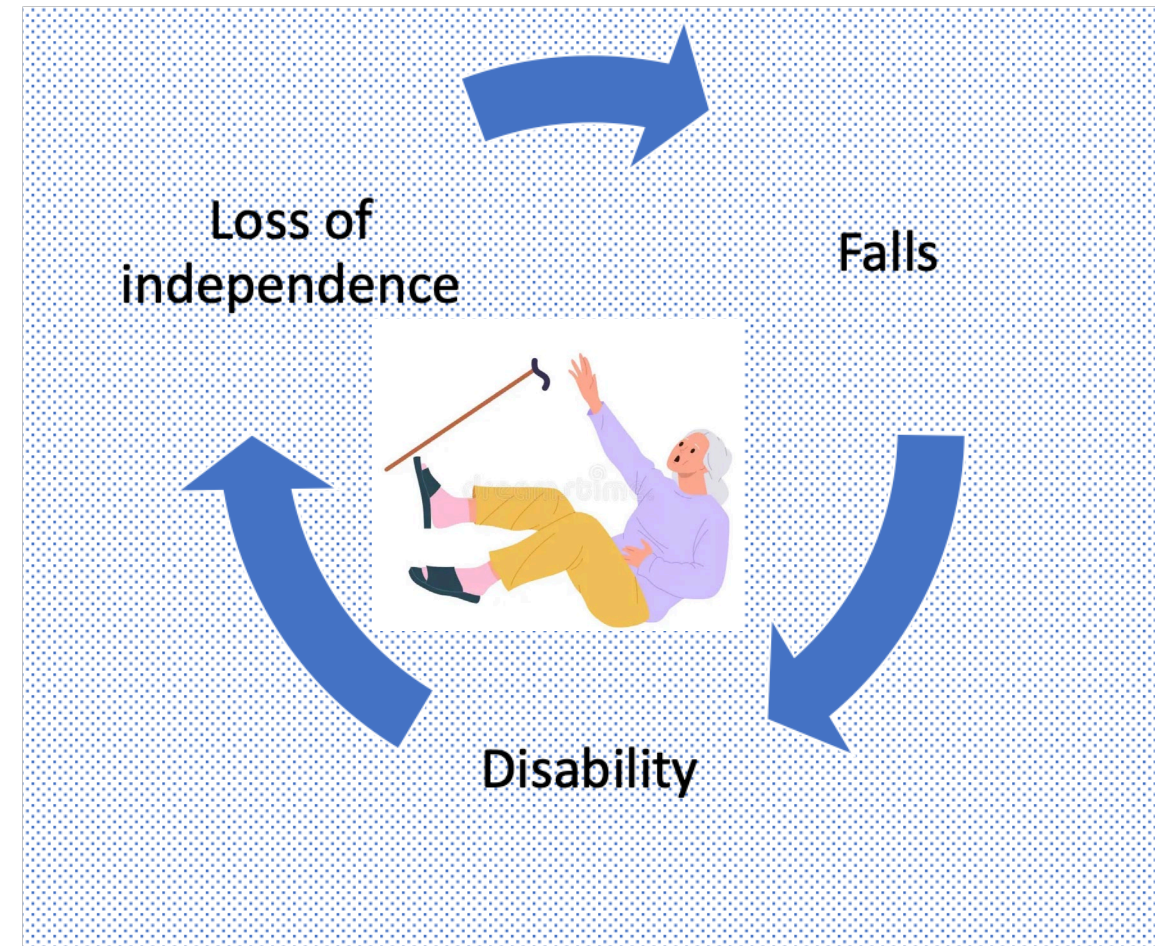


Cardiovascular Systems”



↓ muscle mass

↓ muscle strength



Materials and Methods

Elderly patients -medical rehabilitation treatment.

MSK-US:

- Rectus femoris thickness
- Cross-sectional area (CSA)



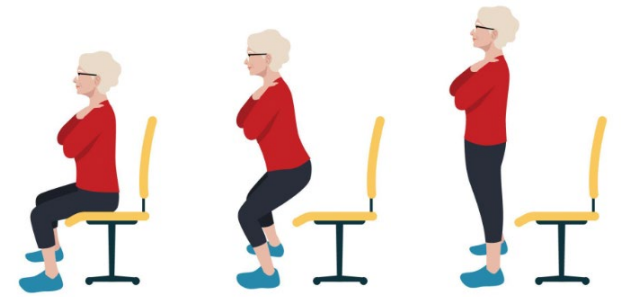
→ Dynamic monitoring (kinetotherapy program)

Combine with:

- Handgrip strength(dynamometer F<16 kg ; B<27)
- chair rise test (30s)

→ Provides:

- Structural (CSA, thickness)
- Functional (strength, performance)



<https://better5.com/30-second-sit-to-stand-test/>



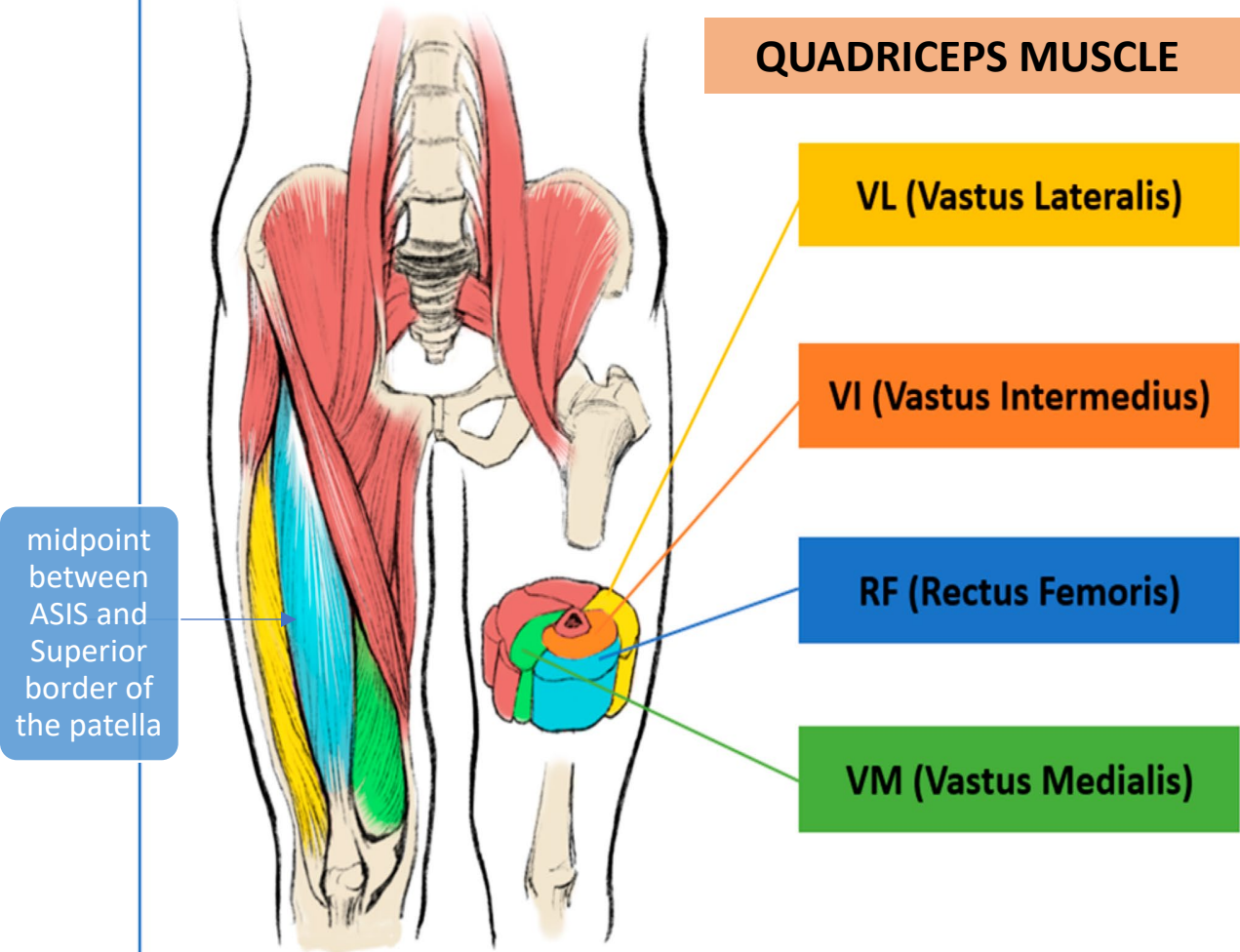
Materials and Methods

- **1. Patient Position**
- Supine (lying on back)
- Legs relaxed, extended
- Avoid muscle contraction (important for consistency)



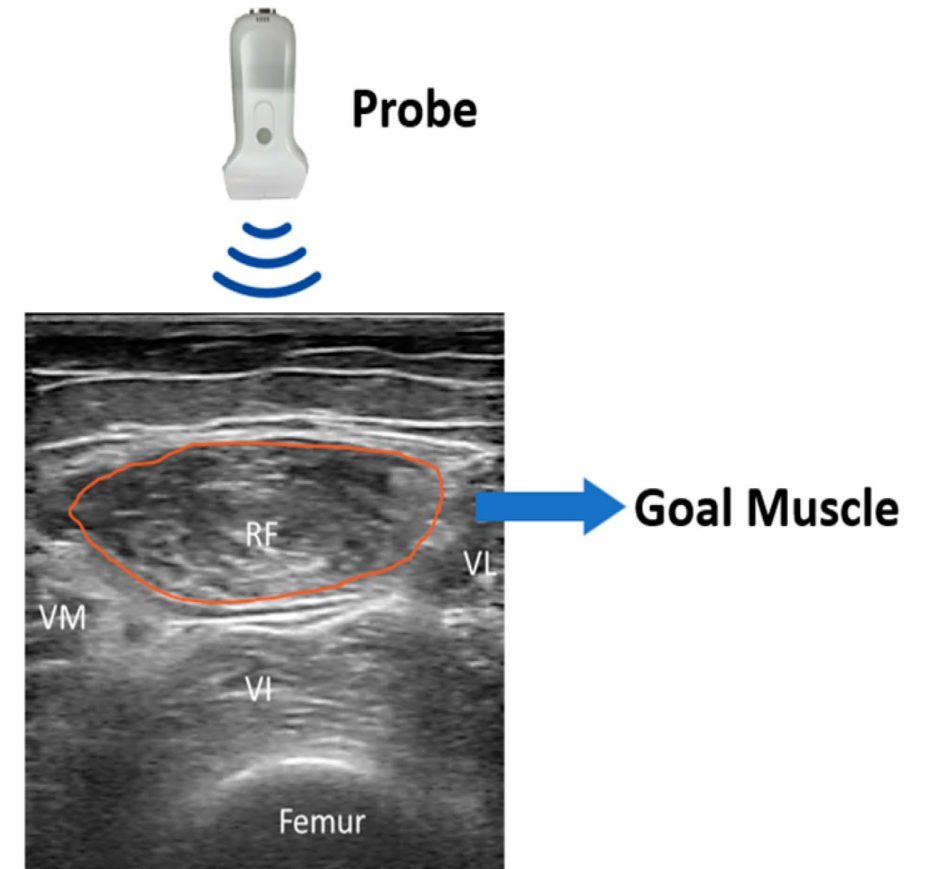
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2. Anatomical Landmark



(a) Anatomy of Rectus Femoris Muscle

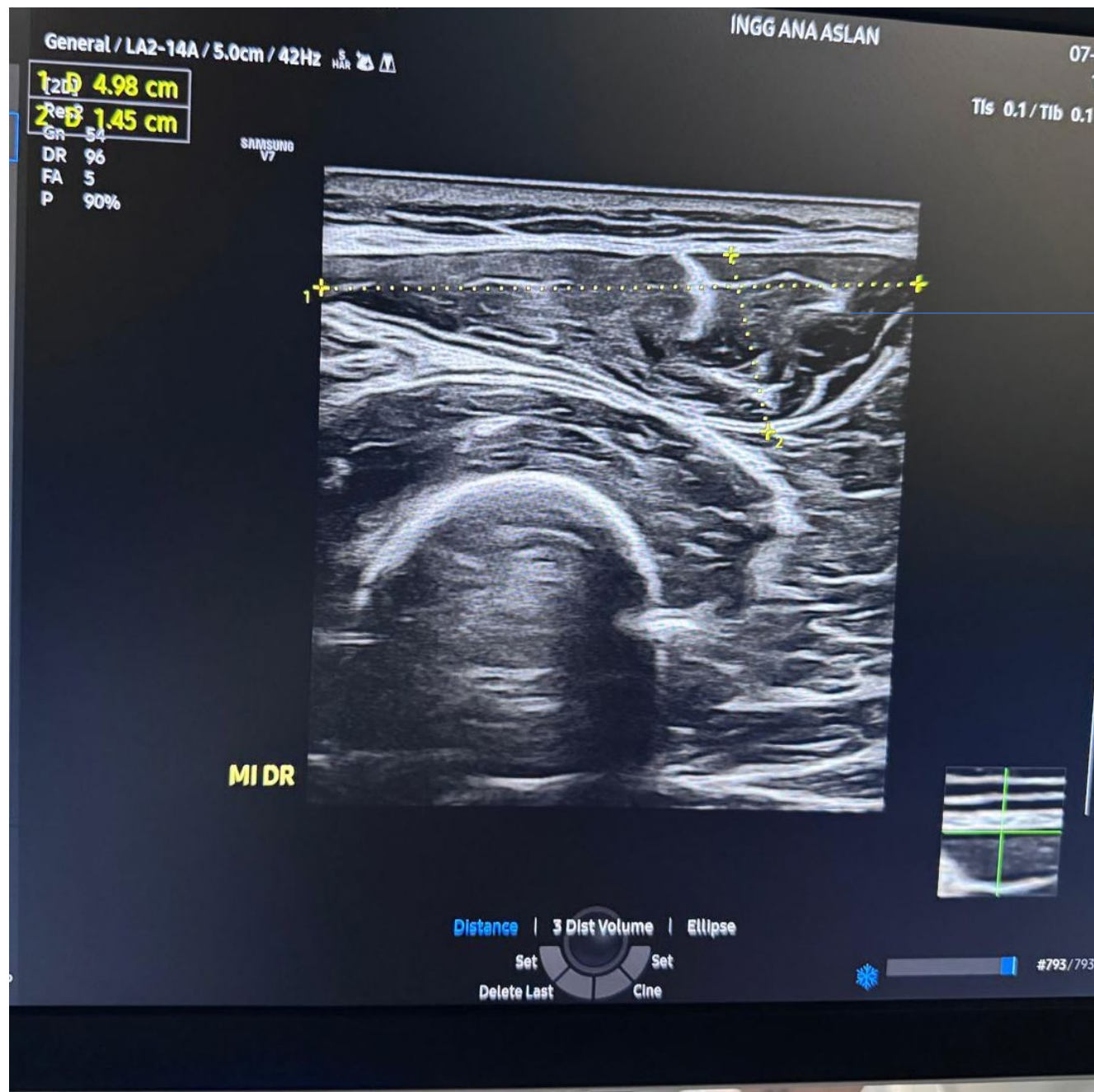
3. Probe Placement



(b) Image obtained by the transducer

- 4. Measurements
- A. Muscle Thickness
- Measure:
 - Distance between:
 - Superficial fascia
 - Deep fascia of rectus femoris
- Report in **cm or mm**





- **B. Cross-Sectional Area (CSA)**
- Trace the **inner border of the rectus femoris muscle**
- Exclude surrounding fascia and other muscles
- Use **tracing**



5. Image Quality Tips:

- Keep probe **perpendicular** to avoid anisotropy
- Take **3 measurements** → average value

US-MSK muscle measurements in the evaluation of Sarcopenia

- **Thickness of the rectus femoris muscle (MT)**

Young healthy men: ~1.5–3.0 cm

Young healthy women: ~1.2–2.5 cm

Elderly without sarcopenia: ~1.0–2.0 cm

- **Suggestive of sarcopenia:**
< 1.0 cm (especially in the elderly)
or a significant decrease compared to
adjusted normative values

Echogenicity:

↑ echogenicity → fatty infiltration → sarcopenia

- ◆ **Cross-sectional area (CSA)**

Men: ~5–10 cm²

Women: ~3–7 cm²

Values below these ranges
may suggest sarcopenia

MSK -Part of a comprehensive assessment
Correlated with:

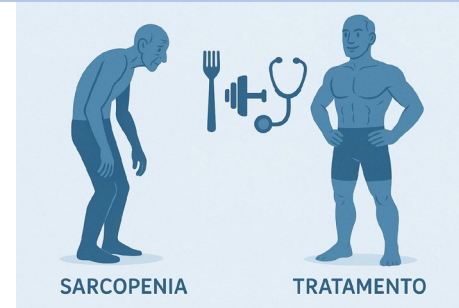
- muscle strength
- physical performance

According to the European Working Group on Sarcopenia in Older People

Role of kinetotherapy in increasing muscle mass

Main Mechanisms:

- **Progressive resistance training**
 - Stimulates **muscle hypertrophy**
 - Increases **muscle CSA** (e.g., rectus femoris)
- **Neuromuscular activation**
 - Improves **motor unit recruitment**
 - Enhances muscle contraction efficiency
- **Prevention of deconditioning**
 - Reduces **loss of muscle mass during immobilization**



Results

- Improved diagnostic accuracy

- Early detection of sarcopenia

- Correlation: Rectus femoris CSA $\leftrightarrow$ muscle strength

Personalized rehabilitation

Continuous adaptation of therapy

Conclusions

- **MSK-US**

Diagnosis → Monitoring → Adaptation → Outcome

- Reflects functional status
- Supports personalized rehab
- Useful for monitoring
- Valuable diagnostic tool
- Supports treatment decisions
- Improves outcomes

*Ultrasound transforms rehabilitation into a dynamic,
patient-centered process*

Why MSK-US and not another method (DXA, BIA, CT, RMN)?

- Because it is the only method that combines **accessibility, real-time assessment**, and the ability to be **repeated frequently without risk**, making it **ideal for dynamic monitoring in geriatric rehabilitation**.

References

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Thank you!



I THINK MY WORK HERE IS DONE.