Sarcopenia and malnutrition identify largely distinct patients and jointly predict early non-relapse mortality after allogeneic hematopoietic cell transplantation

Single-center cohort of 199 consecutive adults · Hôpital Saint-Antoine, AP-HP, Paris

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199
Consecutive adults, allo-HCT 2012–2018

26%
Sarcopenic: 51 patients, lowest PMI quartile

16%
Malnourished: 31 patients, HAS 2021 criteria

9
patients met both definitions; 126 (63%) met neither

8 → 33%
24-month NRM, 0 vs 2 risk factors

1.78
sHR for NRM per risk factor (p=0.027)

BACKGROUND

- Nutritional assessment before allogeneic transplantation (allo-HCT) relies on body mass index (BMI) and weight loss, neither is sensitive to skeletal muscle depletion.
- Reduced muscle mass is itself a phenotypic criterion of malnutrition, but its reference assessment requires muscle-strength testing, almost never performed before transplant.
- Every candidate already undergoes a staging CT, from which muscle area can be quantified at no extra cost or radiation.

Question: does psoas measurement add to conventional nutritional assessment, or simply re-identify the same patients?

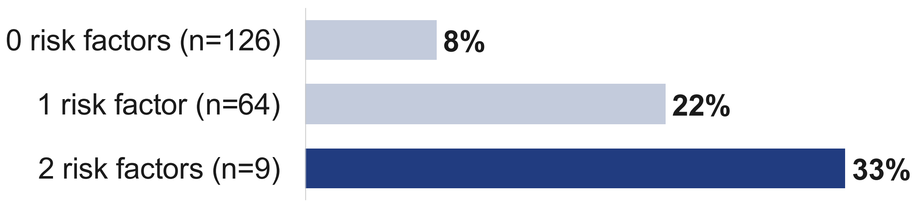
METHODS

199 adults — allo-HCT, 2012–2018 → **Pre-HCT CT** — psoas area at L3 → **Two markers** — sarcopenia · malnutrition → **Outcomes** — NRM · relapse · OS

- 199 consecutive adults transplanted at Saint-Antoine Hospital, 2012–2018.
- Total psoas area measured at L3 on the pre-transplant CT (median 25 days before, IQR 20–35) by two readers blinded to outcome, normalized to height² → psoas muscle index (PMI).
- **Sarcopenia:** lowest sex-specific PMI quartile (≤5.44 cm²/m² men, ≤3.55 women).
- **Malnutrition:** modified HAS 2021 criteria → active malignancy plus low BMI or weight loss ≥10%.
- NRM and relapse-related death analyzed as competing events (Fine-Gray); overall survival by Kaplan-Meier and Cox regression.

RESULTS

24-month non-relapse mortality by number of risk factors



sHR 1.78 per factor (1.07–2.98; p=0.027, age-adjusted); 1.60 (0.95–2.71) after HCT-CI/DRI adjustment. Median OS 122.6 / 34.7 / 27.7 months (p=0.013).

- **Cohort** Median age 56.6 years; 59% male; AML 61%; median follow-up 100.9 months; 101 deaths (38 NRM, 63 after relapse).
- **Sarcopenia** 24-month NRM 25% vs 9% (sHR 1.90, 0.98–3.68; p=0.056); relapse-related death identical (20% vs 20%).
- **Malnutrition** 24-month NRM 23% vs 12% (sHR 1.89, 0.90–4.00; p=0.095); entered jointly, neither marker added to the other.
- **Causes of NRM** sepsis 19, GvHD 13, other 6; sepsis- and GvHD-related death roughly doubled with ≥1 factor, neither significant.

KEY MESSAGE

Sarcopenia and guideline-based malnutrition identify almost non-overlapping patients. One does not substitute for the other, and psoas measurement alone is not sufficient for pre-transplant risk stratification.

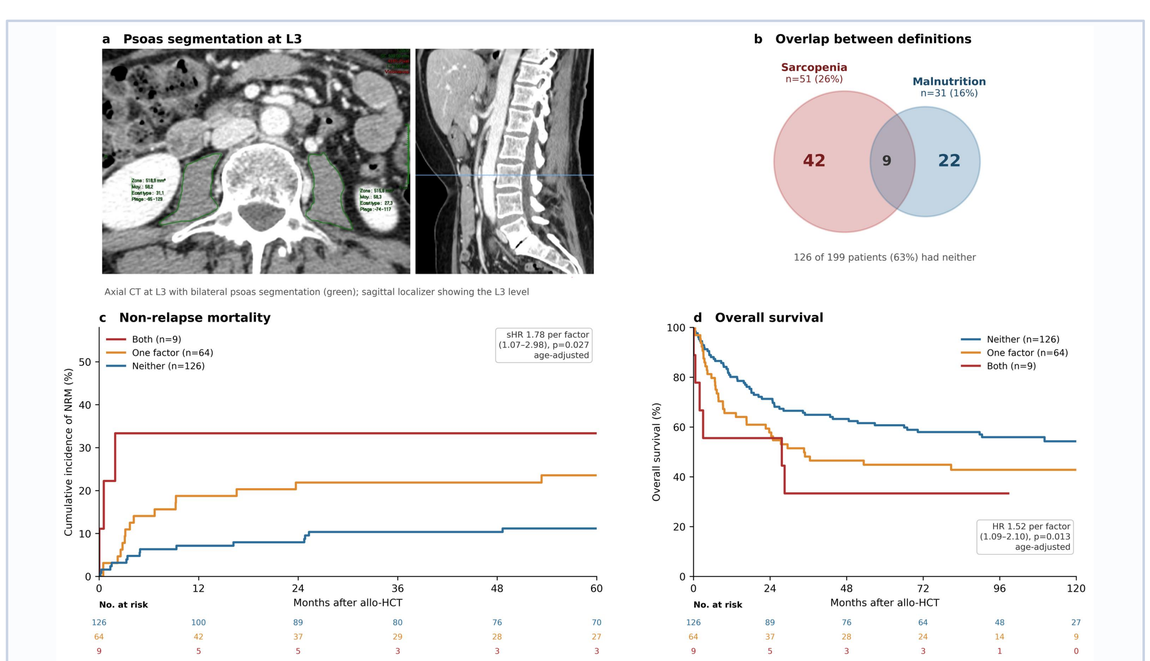


Figure 1. (a) Psoas segmentation at L3. (b) Overlap between definitions. (c) Non-relapse mortality and (d) overall survival by number of risk factors present.

CONCLUSIONS

- Pre-transplant sarcopenia and guideline-based malnutrition capture largely distinct patients: an institution using one is not implicitly capturing the other.
- Together they define a four-fold gradient of early non-relapse mortality with no corresponding increase in relapse → a toxicity-specific signal.
- Neither marker alone was independently predictive, and the gradient was not independent of age and disease risk; neither approach replaces the other or existing risk scores.
- Prospective assessment combining structured nutritional evaluation with complete L3 body composition (total muscle area and muscle attenuation) is the necessary next step.

LIMITATIONS

- Retrospective, single-center design; 38 NRM events limit the power to separate two correlated markers.
- The combined 0–2 score was constructed post hoc; the highest-risk group contains 9 patients and 3 events, so the gradient rests on the contrast between no factor and at least one.
- The sarcopenia effect size varied with the PMI threshold applied, remaining above unity throughout.
- The psoas is a convenient but weak surrogate for total muscle mass and captures nothing of muscle quality.

REFERENCES

1. Cruz-Jentoft AJ et al. Age Ageing 2019;48:16–31.
2. Haute Autorité de Santé. Diagnostic de la dénutrition. Fiche outil, 2021.
3. Ando T et al. Int J Hematol 2020;112:46–56.
4. Ussmann J et al. Bone Marrow Transplant 2026; doi:10.1038/s41409-026-03005-w.
5. Pigneur F et al. J Cachexia Sarcopenia Muscle 2023.

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