Identifying biomarkers of accelerated ageing in cancer patients from routine clinical data

NHS Guy's and St Thomas' NHS Foundation Trust

KING'S College LONDON

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Background:

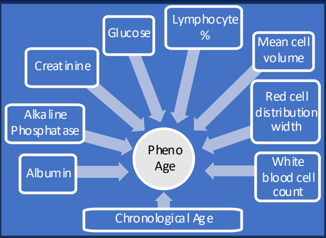
- Biomarkers of biological age are needed to stratify interventions to minimise accelerated ageing in people who have experienced cancer
- PhenoAge is a composite biomarker of ageing which can be calculate from blood test results[1]
- PhenoAgeAccel is the rate of ageing

Aims:

1. Validate use of PhenoAge and PhenoAgeAccel in a cohort of older people with cancer
2. Investigate the association between PhenoAge and functional biomarkers of ageing
3. Demonstrate the use of PhenoAgeAccel for researching accelerated aging in people with cancer

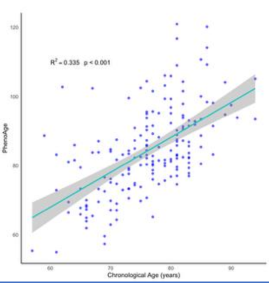
Methods:

- Extraction of anonymised data from database of patients attending the Geriatric Oncology Liaison Development clinic at Guy's hospital (August 2022-January 2025)
- PhenoAge was calculated using the "BioAge" R package[2] PhenoAgeAccel was the residual from a linear regression of PhenoAge by Chronological age



Results

173 patients
62% male
Mean age: 76.2
Mean PhenoAge: 84.3



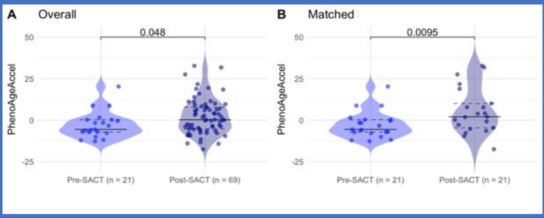
PhenoAge and PhenoAgeAccel were associated with the following:

1. One-year mortality (PhenoAge OR = 1.083, 95% CI: 1.038-1.136; PhenoAgeAccel OR = 1.096, 95% CI: 1.047-1.155).
2. Clinical Frailty Scale and Timed Up and Go (CFS: Rs=0.31, p<0.001; TUG: Rs=0.25, p<0.005).

There were no associations with chronological age.

PhenoAgeAccel, long-term conditions and systemic anti-cancer treatment (SACT)

- Diabetics had a higher PhenoAgeAccel (3.40 (9.78) vs -1.71 (10.53), p=0.002)
- In patients receiving systemic anti-cancer treatment, patients with PhenoAgeAccel calculated pre-treatment had less age acceleration than those with PhenoAgeAccel calculated post-treatment, both overall (2.18 (10.64) vs -2.87 (7.98); p=0.048) and in matched samples (n = 21, 7.76 ± 11.98 vs -2.87 ± 7.98, p<0.001).



Conclusions:

PhenoAgeAccel is a greater predictor of risk than chronological age in older people with cancer. PhenoAgeAccel is a promising biomarker to identify older people with cancer who may benefit from holistic geriatric assessment, dose reductions, or future geroprotective measures. Integration of PhenoAgeAccel within electronic healthcare records with clinician alerts to ensure patient-centred care.

References

[1] Levine, M.E., Lu, A.T., Quach, A., Chen, B.H., Assimes, T.L., Bandinelli, S., Hou, L., Baccarelli, A.A., Stewart, J.D., Li, Y., Whitsel, E.A., Wilson, J.G., Reiner, A.P., Aviv, A., Lohman, K., Liu, Y., Ferrucci, L. and Horvath, S., 2018. An epigenetic biomarker of ag [2] Kwon, D. and Belsky, D.W., 2021. A toolkit for quantification of biological age from blood chemistry and organ function test data: BioAge. Geroscience. 43, 2795-2808

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