

Introduction

- Allostatic Load (AL) is defined as a cumulative measure of stress-related state across different physiologic systems (immune, cardiovascular, and metabolic) as a response to external stressors and can be calculated based on routinely collected clinical and laboratory parameters.
- Patients in a state of allostatic overload had worse physical and mental health, such as frailty, multimorbidity and psychiatric disorders.
- We hypothesize that AL can be used to assess the holistic health of cancer patients prior to receiving treatment.

Methods

- Study design:** This cross-sectional study recruited newly diagnosed, adult cancer patients prior to receiving intravenous anti-cancer treatment at the Chao Family Comprehensive Cancer Center from 07/2021 to 12/2022 (UCI IRB #2021-6431).
- Allostatic load (AL):** A total of nine routinely collected biomarkers were utilized to calculate the AL scores as described below. A point was assigned if the biomarker value was not within the normal ranges for all biomarkers. Higher scores indicate worse physiological stress.
  - Total AL (range: 0-9):** Albumin, BMI, Creatinine, Diastolic Blood Pressure (DBP), Glucose, Heart Rate, Systolic Blood Pressure (SBP), Urea, White Blood Cell Count (WBC).
  - Immune AL (range: 0-1):** WBC.
  - Cardiovascular AL (range: 0-3):** DBP, Heart Rate, SBP.
  - Metabolic AL (range: 0-5):** Albumin, BMI, Creatinine, Glucose, Urea.
- Health assessment:** Participants completed the **PROMIS** assessment tool that measures the patients' health in two function (**cognitive** and **physical function**) and five symptom domains (**fatigue, pain, anxiety, depression, nausea & vomiting**). Higher scores represent better function and worse symptoms.
- Statistical analysis:** A spearman correlation matrix was generated to illustrate the bivariate relationships between the PROMIS symptom scores and allostatic load. All analyses were completed using R version 4.2.2.

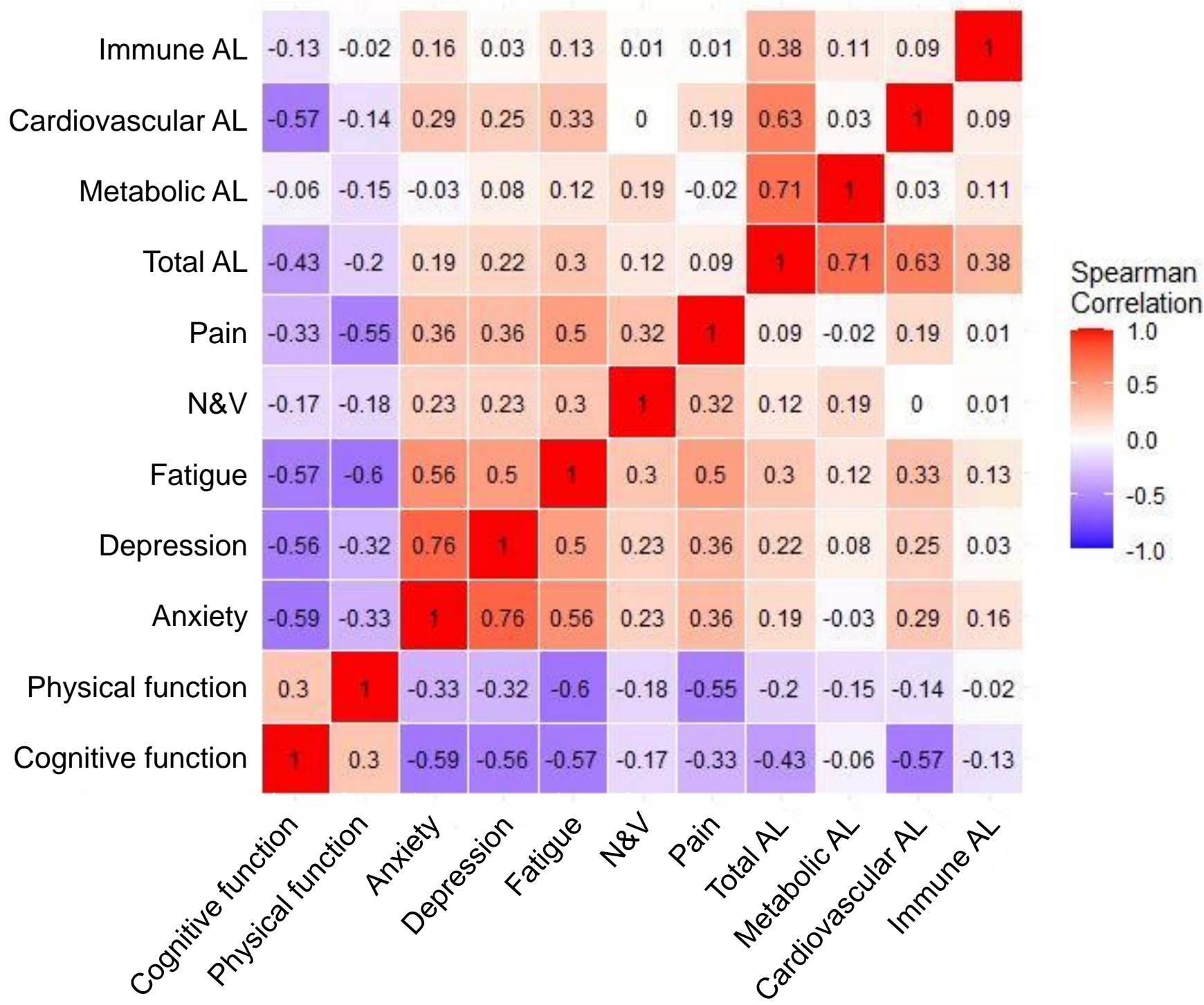
Results

- A total of 144 participants were recruited. The mean (SD) enrollment age was 60 (14.2) years and majority were females (55%). More than 90% patients had middle school and above education (Table 1).
- Spearman correlation revealed that **Total AL** achieved a statistically significant and moderate negative correlation with cognitive function ( $\rho=-0.43$ ,  $P<0.001$ ). All other **Total AL** correlations were weak but statistically significant: physical function ( $\rho=-0.20$ ,  $P=0.021$ ), fatigue ( $\rho=0.30$ ,  $P<0.001$ ), depression ( $\rho=0.22$ ,  $P=0.010$ ), and anxiety ( $\rho=0.19$ ,  $P=0.024$ ) (Figure 1).
- Among the three AL domains, **Cardiovascular AL** was found to best correlate with cognitive function ( $\rho=-0.57$ ,  $P<0.001$ ), fatigue ( $\rho=0.33$ ,  $P<0.001$ ), anxiety ( $\rho=0.29$ ,  $P<0.001$ ) and depression ( $\rho=0.25$ ,  $P<0.004$ ).

Table 1: Participant characteristics

Characteristics	(N=144)
Age at enrollment	
Mean (SD)	60 (14.2)
Median (Q1, Q3)	62 (52, 70)
Min, Max	21, 90
Biological sex, n (%)	
Male	62 (42%)
Female	78 (53%)
Race/Ethnicity, n (%)	
Non-Hispanic White	64 (43%)
Hispanic/Latino	41 (28%)
Asians/Asian Americans	32 (22%)
Others	31 (21%)
Highest Education Level, n (%)	
None/Kindergarten	3 (2%)
Primary	12 (8%)
Middle School	10 (7%)
High School	19 (13%)
High School Graduate	27 (18%)
College/Associates Degree/Technical School	18 (12%)
College Graduate	34 (23%)
Advanced Degree	17 (12%)
Employment (before cancer diagnosis), n (%)	
Unemployed	16 (11%)
Student	1 (1%)
Homemaker	5 (3%)
Retired	44 (30%)
Unable to work (disabled)	8 (5%)
Full-time employment	47 (32%)
Part-time employment/free-lance	13 (9%)
Self-employed	7 (5%)

Figure 1: Spearman Correlations ( $\rho$ )



Conclusions

- Higher physiologic stress, especially in the cardiovascular system, was associated with poorer physical and mental health among cancer patients.
- Maintaining or improving cardiovascular health could be key to better holistic health among cancer patients.
- Longitudinal findings will be reported in future.

References

- Oppegaard et al. vol. 180 (2022): 103822.doi:10.1016/j.critrevonc.2022.103822
- Zhao et al. vol. 187,2 (2021): 587-596. doi:10.1007/s10549-021-06102-021

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