Whole-Body Composition Features by Computed Tomography in Ovarian Cancer: Pilot Data on Survival Correlations

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Introduction

Epithelial ovarian cancer (EOC) is the fourth cause of cancer death in the female population in developed countries, with 19,710 estimated new cases and 13,270 estimated deaths in the United States in 2023.

Imaging examinations, including computed tomography (CT), represent a regular part of the standard management of preoperative evaluation and follow-up in many cancer patients, including EOC. CT is also considered a referral method for noninvasive assessment of muscle quantity and distribution of adipose tissue. Indeed, many dedicated software programs allow the extraction of quantitative features from a single axial CT image, usually at the level of the third lumbar vertebra (L3), including skeletal muscle area (SMA), subcutaneous adipose tissue (SAT), skeletal muscle density (SMD) and visceral adipose tissue (VAT).

Purpose: the primary objective of this study was to assess the associations of computed tomography (CT)-based whole-body composition values with overall survival (OS) and progression free survival (PFS) in epithelial ovarian cancer (EOC) patients. The secondary objective was the association of body composition with chemotherapy-related toxicity.

Methods

This retrospective study was approved by the Local Ethics Committee.

Patients: from a database of newly diagnosed EOC, referred to our institution between February 2011 and March 2020, we selected only patients with a pretreatment CT scan including both thorax and abdomen in one acquisition after injection of contrast medium.

Clinical data recorded: age; weight; height; FIGO stage; residuase disease at surgery; chemotherapy-related toxicity; and date of last contact, progression and death.

CT Data Extraction: automatic extraction of whole-body composition values was performed by dedicated software (fig.1). Sarcopenia was defined according to predefined cutoffs.

Statistical analysis: included univariate tests to investigate associations of sarcopenia and body composition with chemotoxicity. Association of body composition parameters and OS/PFS was evaluated by log-rank test and Cox proportional hazard model. Multivariate models were adjusted for FIGO stage and/or age at diagnosis.

Results

From a database of 64 patients, 30 were excluded due to a lack of chest CT; therefore, 34 patients met the inclusion and exclusion criteria (table 1).

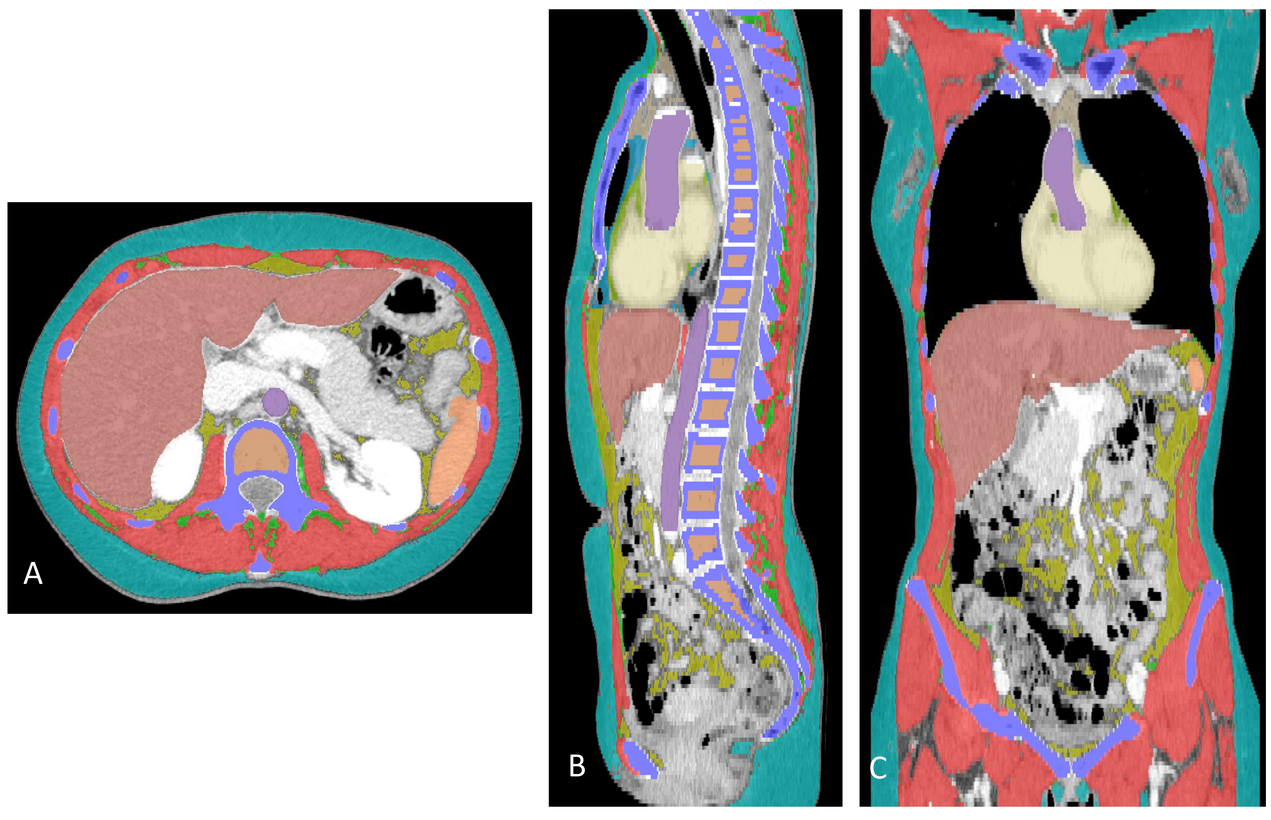

Figure 1. Colored segmentations in the axial (A), sagittal (B) and coronal (C) views. The different colors show each compartment automatically segmented, as follows: red = skeletal muscle; green = intramuscular adipose tissue; cyan = subcutaneous adipose tissue; blue (aqua) = paracardial adipose tissue; green = epicardial adipose tissue; purple = bone; bronze = trabecular bone; brick red = liver; amber = spleen; and ivory = heart.

We found significant associations of skeletal muscle volume with OS (p = 0.04) and PFS (p = 0.04); intramuscular fat volume with PFS (p = 0.03); and visceral adipose tissue, epicardial and paracardial fat with PFS (p = 0.04, 0.01 and 0.02, respectively). We found no significant associations between body composition parameters and chemotherapy-related toxicity.

Table 1. Patient characteristics (n = 34).

	N (%)
Age at diagnosis, median (IQR)	64.9 (55.4;75.4)
FIGO Stage	
IIB	1 (2.9)
IIIA	2 (5.9)
IIIC	18 (52.9)
IV	13 (38.3)
NACT	
0	21 (61.8)
1	13 (38.2)
Outcome	
R0 (no residual disease)	20 (58.8)
R1 (residual disease < 1 cm)	7 (20.6)
R2 (residual disease > 1 cm)	4 (11.8)
NA	3 (8.8)
BMI, median (IQR)	22.9 (21.7; 26.2)

IQR = interquartile range; FIGO = International Federation of Gynecology and Obstetrics; NACT = neoadjuvant chemotherapy; R = residual disease; NA = not available; BMI = body mass index.

Conclusion

In this exploratory study, we found significant associations of whole-body composition parameters with OS and PFS.

Our results, although preliminary and needing further exploration, open a window to the concrete possibility of performing direct body composition profiling, with no further need for approximate estimations.