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Loss of adipose tissue mass during chemotherapy predicts reduced survival in patients with colorectal cancer treated with palliative intent

Erin Stella Sullivan[1], Louise E. Daly[1], Éadaoin B Ní Bhuachalla[1], Samantha J. Cushen[1], Derek G. Power[2] and Aoife M Ryan[1]

[1]*School of Food & Nutritional Sciences, University College Cork, Cork, Ireland and*
[2]*Departments of Medical Oncology, Cork & Mercy University Hospitals, Cork, Ireland*

Abstract

Obesity is an established risk factor for colorectal cancer (CRC), however little is known about changes in body composition during chemotherapy and its impact on survival. The aim of this study was to examine in patients with CRC: (1) The prevalence of abnormal body composition phenotypes, (2) The impact of baseline body composition on overall survival, (3) Changes in body composition throughout treatment and its impact on overall survival.

A prospective study of adult CRC patients undergoing chemotherapy between 2012–2016 was conducted. Longitudinal changes in body composition were examined using computed tomography (CT) images at two timepoints (interval 7 months, IQR: 5–9 months) using paired t-tests. Sarcopenia and low muscle attenuation (MA) were defined using published cut-offs. Cox proportional-hazards models were used to estimate mortality hazard ratios, adjusted for known prognostic covariates – stage, age, sex, performance status & systemic inflammation.

In total, 268 patients were recruited (66% male, mean age 63 years) and 51% were undergoing chemotherapy with a palliative intent. At baseline, 4% were underweight (BMI < 20 kg/m^2), 38% had a normal BMI, and 58% were overweight/obese. Despite this, 38% had cancer cachexia, 34% were sarcopenic and 43% had low MA. Neither sarcopenia, sarcopenic obesity nor cachexia at baseline predicted survival. Over 100 days, 68% were muscle stable (± 1 kg), while 25% lost > 1 kg and 7% gained > 1 kg. Fat mass remained stable ± 1 kg in 49%, while 28% lost > 1 kg and 23% gained > 1 kg. When adjusted for known prognostic covariates, baseline BMI (20–25 kg/m^2) in those having palliative chemotherapy was independently associated with reduced survival compared to those with BMI indicating overweight (BMI 25–30 kg/m^2) [HR: 1.80 (95% CI: 1.04–3.14), $p = 0.037$]. In those undergoing chemotherapy with palliative intent, a loss of > 6.4% subcutaneous fat (Q1 SAT) over 100 days was predictive of poor survival versus those with small losses, remaining stable or gaining SAT (Q2-4), independent of changes in muscle mass [HR: 2.22 (95% CI: 1.07–4.62), p = 0.033].

Patients with CRC, particularly those treated with a palliative intent, experience significant losses in muscle and fat mass during chemotherapy. Loss of SAT mass during palliative chemotherapy is prognostic of poor survival, independent of changes in muscle mass. Baseline BMI in the overweight range confers a survival advantage. Nutritional strategies to prevent or attenuate weight loss during chemotherapy are advisable especially in the context of advanced CRC.

Conflict of Interest

There is no conflict of interest