

# Nutritional and metabolic derangements in Mediterranean cancer patients and survivors: the ECPC 2016 survey

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## Abstract

**Background** The prevalence of nutritional derangements in patients with cancer is high. This survey assessed patients' awareness of cancer-related nutritional issues and evaluated how important they perceive the impact of nutrition on cancer and treatment to be.

**Methods** A structured questionnaire was developed to determine: presence of feeding problems, perception of nutrition importance, and perception of physicians' approach to nutrition. The European Cancer Patient Coalition disseminated the questionnaire to its members in 10 countries. The Mediterranean cluster (Italy, Spain, and Greece) was analysed separately to further determine specific patterns in answers.

**Results** In total, 907 respondents completed the questionnaire (68.8% female participants; 51.7% with cancer; 48.3% cancer survivors; 59.3% diagnosed with cancer  $\leq 3$  years ago; 46.2% receiving treatment for  $< 1$  year). Feeding problems during illness/therapy were experienced by 72.5% (628/867) of all respondents (Italian: 90.0% (117/130), although up to 53.9% (467/867) reported that physicians did not check their feeding status. Overall, 69.6% (586/842) of respondents reported weight loss after cancer diagnosis (moderate to severe: 36.7%, 309/842). For Italian respondents, the percentages of overall weight loss and moderate-to-severe weight loss were 85.1% (109/128) and 70.3% (90/128), respectively. Only 35.0% (295/842) of all respondents reported having their weight measured regularly during treatment; 45.7% (385/842) believed their physician considered cancer-related weight loss unimportant. Respondents [all: 56.9% (472/830); Italian: 73.0% (92/126); Spanish: 68.9% (42/61); Greek: 79.7% (47/59)] were unaware of supplements' negative effects during therapy or the need to inform their physician about these supplements [all: 43.6% (362/830); Italian: 55.6% (70/126); Spanish: 47.5% (29/61); Greek: 49.2% (29/59)]. The term 'cachexia' was generally unknown to respondents [all: 72.9% (603/827); Italian: 64.3% (81/126); Spanish: 68.9% (42/61); Greek: 47.5% (28/59)] and most respondents [all: 92.4% (764/827); Italian: 91.3% (115/126); Spanish: 91.8% (56/61); Greek: 86.4% (51/59)] received no cachexia-related information.

**Conclusions** Patients reported differences in perspective between them and physicians on cancer-related nutritional issues and the specific nutritional approaches available for cancer treatment. Increasing physician focus on nutrition during treatment, particularly among Italian physicians, and providing information on optimizing nutrition to patients are essential factors to improving patients' quality of life.

**Keywords** Patient survey; Malnutrition; Cachexia; Loss of appetite; Weight loss

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## Introduction

Nutritional and metabolic disorders are highly prevalent among patients with advanced cancers and can lead to weight loss, reduced quality of life (QoL), and poorer treatment outcomes.<sup>1–4</sup> The extent of malnutrition is impacted by several factors, including anorexia, the reduced nutritional intake associated with the illness,<sup>5,6</sup> and cancer-related emotional issues. Examples of such emotional issues include depression, loss of interest in food, and problems with swallowing, for example, in head and neck cancers.<sup>7</sup> Furthermore, changes in the metabolism of proteins, carbohydrates, and fat in patients with cancer are a major factor in determining weight loss. Cancer cachexia (CC) is a multifactorial syndrome, characterized by reduced food intake, abnormal metabolism, and an ongoing loss of muscle mass,<sup>8</sup> thus leading to a negative protein and energy balance.<sup>8</sup> CC develops progressively from pre-cachexia to cachexia to refractory cachexia; its severity is classified on the basis of weight and energy stores loss, and decrease in body mass index.<sup>8</sup>

To prevent CC development, patients with cancer require regular assessment of their nutritional status, advice on practical methods to achieve adequate nutrition, and interventions that enhance nutrition.<sup>9,10</sup> Consequently, adequate nutrition, adherence to anticancer therapy, and thereby its effectiveness may be improved, in addition to preventing muscle mass depletion and enhancing physical status, strength, and QoL. However, with cancer treatment as the main focus, nutrition is often neglected by physicians, and patients and their families are often left unsupported.<sup>2,11</sup> The lack of nutritional studies during past medical training can often lead to underappreciation by physicians of nutrition's impact on treatment outcomes and prognosis in patients with cancer.<sup>12</sup> Similarly, patients are also unaware that their nutritional status can condition their therapeutic response,<sup>13</sup> illness remission, and overall survival. From our experience, patients are often interested in being better informed but may be uncomfortable asking for guidance and support.

The objectives of this survey, made possible by a collaboration between the European Cancer Patient Coalition (ECPC), Sapienza University of Rome (Department of Clinical Medicine), and Healthware International, were to (i) assess patients' awareness of nutrition's importance during cancer therapy; (ii) determine from patients' answers whether nutritional problems during and after oncologic therapy are perceived as important by the physician and, if so, how important; and (iii) utilize any relevant information obtained from patients' responses to the questionnaire to develop practical guidance on how to improve daily nutrition, especially during therapy. The present manuscript focuses on data obtained from the Mediterranean population.

## Material and methods

### *Survey design and inclusion criteria*

The survey was developed with the joint effort of international experts in clinical nutrition and metabolism, and communication experts. The questionnaire was structured on the basis of available scientific evidence and the most recent European Society for Medical Oncology guidelines on nutrition and cancer.<sup>14</sup> All patients with cancer and cancer survivors were eligible to participate, except for patients diagnosed with brain and breast cancers.

The questionnaire was subdivided into specific areas of interest: (i) patient profile (sex, age, disease status, cancer type, illness duration from first diagnosis, and treatment duration from first diagnosis); (ii) nutritional profile (presence of feeding problems, perception of nutrition importance, and role of food supplements); (iii) physicians' approach to nutrition (investigation of nutritional problems, referral to a nutritionist, relevance of body weight changes, and advice for improving nutrition); (iv) patient knowledge profile (appetite loss as a consequence of therapy; importance of maintaining body weight and physical activity; the impact of vitamins on therapy; information about cachexia; and effects of appetite loss on personal, family, and social life). Patients with breast cancer were excluded from the survey to eliminate the potential bias possibly introduced by their different nutritional-metabolic pattern (e.g. an increase in body weight after surgery and the start of hormonal therapy) and to maintain a good numerical balance between all cancer types in the sample.

The questionnaire was originally circulated to 14 ECPC affiliates; four countries (Cyprus, UK, Croatia, and the Netherlands) either failed to respond or declined to participate. Ten other countries (Italy, Czech Republic, Greece, Spain, Romania, Poland, Bulgaria, Slovenia, Denmark, and Finland) participated in the survey. The SurveyMonkey online platform, standardized and homogenized across all countries, was used to share the questionnaire with the ECPC affiliates. The affiliates used various methods to submit the questions to their national audiences, including personal interviews during treatments; Facebook protected pages, paper, and online mailing; WhatsApp, and phone calls. More specifically, for the countries in which patient associations already had a consolidated digital strategy with multiple touchpoints (e.g. newsletter and Facebook page) and provided local law regulations allowed to do so, invitations to survey participation were distributed by means of those channels. In countries where this type of favourable organizational and regulatory structure was not in place and/or patients were shy to share their condition, more personal methods like phone calls and direct after-visit contact were used. These methods were used considering the national audience preference and local privacy regulations.

## Statistical analyses

The data were analysed using IBM SPSS Statistics software, version 19. Frequencies were described, and the results were reported using descriptive statistics accounting for lack of response. Mediterranean countries (Italy, Spain, and Greece) were clustered on the basis of geographic, cultural, and socio-economic factors (e.g. presence of a public healthcare system, strong family/caretaker influence on patients' lives, and uneasy general economic conditions). Clustering of these countries in the Mediterranean group is also sustained by previously used classifications,<sup>15,16</sup> such as Portugal, Italy, Greece, and Spain, which describe a certain disadvantageous economic status, reflected in population well-being, including health,<sup>16</sup> as well as comparable situations concerning the public healthcare system.<sup>17</sup> A separate analysis of the answers provided by these respondents was also performed.

## Results

### Patient demographics and baseline characteristics

Overall, 907 patients with cancer and cancer survivors completed the survey; 68.8% were female. The highest percentage of respondents (29.7%) were aged 56–65 years (Table 1). The percentages of patients with cancer and cancer survivors were similar in the overall population (51.7% and 48.3%) and in two of the three Mediterranean cluster countries (Italy: 53.5% and 46.5%; Spain: 52.3% and 47.7%). The most prevalent cancer types were hematologic and chest/thoracic cancers in the overall population (22.1% each) and in Spain (hematologic, 81.5%). This differed in Italy, where 70.4% of respondents had gastric cancer, and in Greece, where 23.0% had genitourinary cancers (Table 1). Considering the duration of illness from first diagnosis, the majority of respondents (59.3%) were diagnosed with cancer less than 3 years ago. The treatment duration from first diagnosis ranged from less than 1 year (46.2%), 1–3 years (23.8%), and 3–5 years (10.9%) to more than 5 years (19.1%) (Table 1).

### Patients' nutritional and knowledge profile

The majority of respondents [overall: 72.5% (628/867), Figure 1A; Mediterranean cluster: 58.6% (37/63)–90% (117/130), Table S1] experienced feeding problems during their illness and/or therapy. These were moderate to severe in 39.7% (344/867) of overall respondents and ranged between 25.3% (Spain: 16/63) and 70% (Italy: 91/130) in the Mediterranean cluster. While virtually all respondents acknowledged the importance of adequate nutrition during therapy [overall:

**Table 1.** Baseline characteristics and demographics of survey respondents<sup>a</sup>

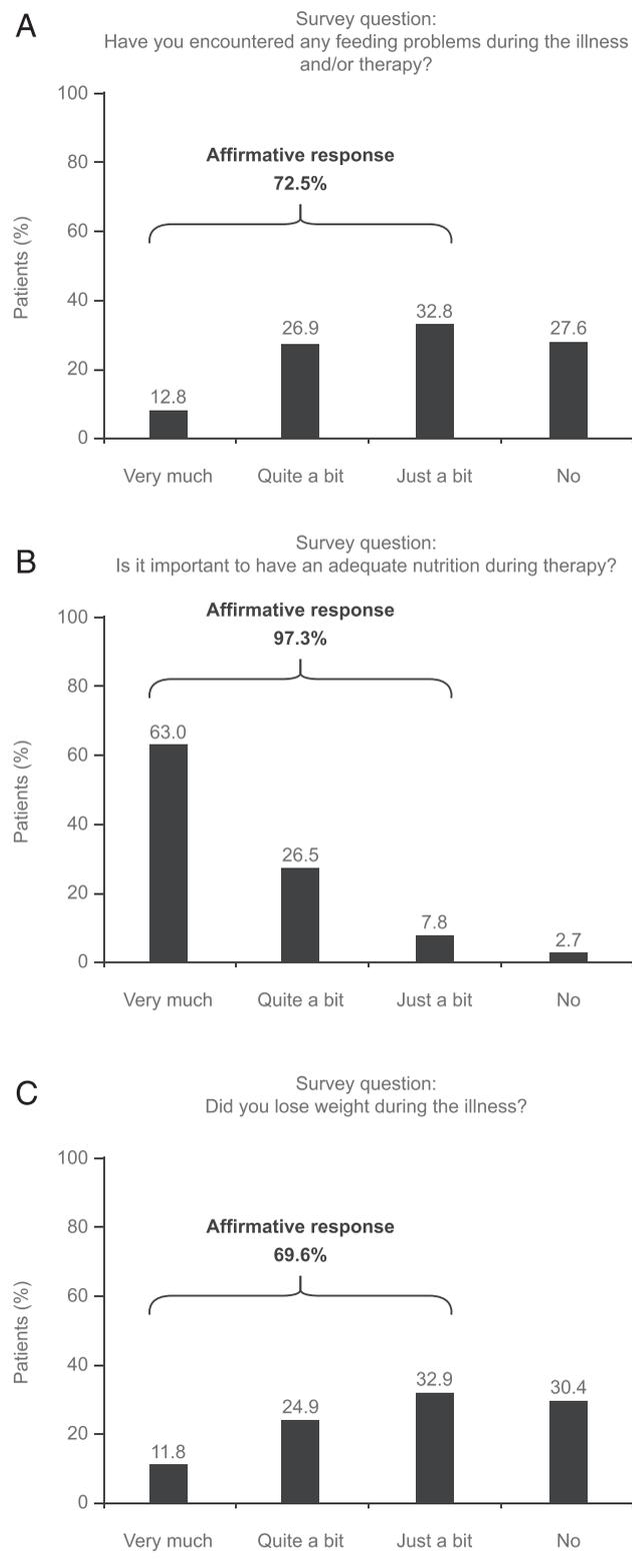
Characteristic	Mediterranean cluster			Total population (N = 907)
	Italy (n = 142)	Spain (n = 65)	Greece (n = 61)	
Sex, n/N valid (%)				
Male	61 (43.0)	24 (36.9)	26 (42.6)	283/907 (31.2)
Female	81 (57.0)	41 (63.1)	35 (57.4)	624/907 (68.8)
Age, years, n (%)				
18–29	3 (2.1)	4 (6.2)	2 (3.3)	44 (4.9)
30–45	19 (13.4)	15 (23.1)	20 (32.8)	183 (20.2)
46–55	42 (29.6)	15 (23.1)	21 (34.4)	224 (24.7)
56–65	53 (37.3)	17 (26.2)	11 (18.0)	269 (29.7)
65+	25 (17.6)	14 (21.5)	7 (11.5)	187 (20.6)
Disease status, n (%)				
Survivors	66 (46.5)	31 (47.7)	43 (70.5)	438 (48.3)
Patients	76 (53.5)	34 (52.3)	18 (29.5)	469 (51.7)
Type of cancer				
Hematologic	5 (3.5)	53 (81.5)	5 (8.2)	200 (22.1)
Chest/Thoracic	3 (2.1)	2 (3.1)	9 (14.8)	200 (22.1)
Genitourinary	12 (8.5)	1 (1.5)	14 (23.0)	173 (19.1)
Gastric	100 (70.4)	3 (4.6)	10 (16.4)	136 (15.0)
Head and neck	2 (1.4)	1 (1.5)	6 (9.8)	45 (5.0)
Liver/kidney/pancreatic	6 (4.2)	1 (1.5)	4 (6.6)	36 (4.0)
Lung	5 (3.5)	2 (3.1)	6 (9.8)	36 (4.0)
Bone	1 (0.7)	0 (0.0)	2 (3.3)	36 (4.0)
Skin	7 (4.9)	1 (1.5)	2 (3.3)	27 (3.0)
Other	1 (0.7)	1 (1.5)	3 (4.9)	18 (2.0)
Illness duration from the first diagnosis, years, n (%)				
<1 year	74 (52.1)	23 (35.4)	20 (32.8)	327 (36.1)
1–3 years	35 (24.6)	14 (21.5)	16 (26.2)	210 (23.2)
3–5 years	14 (9.9)	8 (12.3)	10 (16.4)	117 (12.9)
>5 years	19 (13.4)	20 (30.8)	15 (24.6)	253 (27.9)
Treatment duration from the first diagnosis, years, n (%)				
<1 year	95 (66.9)	28 (43.1)	32 (52.5)	419 (46.2)
1–3 years	29 (20.4)	16 (24.6)	15 (24.6)	216 (23.8)
3–5 years	9 (6.3)	10 (15.4)	4 (6.6)	99 (10.9)
>5 years	9 (6.3)	11 (16.9)	10 (16.4)	173 (19.1)

<sup>a</sup>The calculated percentages were rounded to display values with one decimal place.

97.3% (844/867), Figure 1B; Mediterranean cluster: 96.6% (Greece: 58/60)–98.4% (Italy: 128/130); Spain: 62/63, Table S1], up to more than a third [overall: 37.3% (323/867); Mediterranean cluster: 20.8% (Italy: 27/130)–40.0% (Greece: 24/60)] were not informed about different options of artificially improving nutrition (e.g. food supplements and enteral/parenteral nutrition) (Table 2 and Table S1).

Most respondents believed that their appetite loss was a consequence of their illness/therapy [overall: 82.5% (730/885); Mediterranean cluster: 78.0% (Greece: 46/59)–90.6% (Italy: 116/128)], and thought that avoiding weight loss during therapy was important [overall: 86.3% (727/842); Mediterranean cluster: 81.4% (Greece: 48/59)–98.4% (Italy: 126/128)] (Table 2 and Table S1). Weight loss during illness was reported in 69.6% (586/842) of overall respondents and in 62.7% (Greece: 37/59)–85.1% (Italy: 109/128) of respondents from the Mediterranean cluster (Table 2 and Table S1). In 36.7% (309/842) of overall respondents, the weight

**Figure 1** Percentages of patients (A) encountering feeding problems during their illness and/or therapy, (B) aware of the importance of nutrition during therapy, and (C) experiencing weight loss during their illness. The percentages depicted in the graphs have been rounded up to one decimal place.



loss was moderate to severe (*Figure 1C*); similar percentages were recorded for Greece (39.0%, 23/59) and Spain (34.5%, 21/61). In Italy, 70.3% (90/128) of respondents reported moderate-to-severe weight loss.

Approximately half of respondents [overall: 53.7% (449/836); Greece: 55.9% (33/59); Italy: 56.3% (72/128); Spain: 45.9% (28/61)] believed that weight loss could worsen the adverse effects of therapy (*Table 2* and *Table S1*). The importance of maintaining physical activity during cancer treatment was acknowledged by 82.4% (689/836) of overall respondents, although only 53.8% (450/836) reported that their physicians had advised them accordingly (*Table 2*). Similarly, 72.9% (43/59) and 78.7% (48/61) of respondents from Greece and Spain, respectively, were aware of the importance of physical activity during therapy (*Table S1*). This percentage was lower for Italian respondents (68.0%, 87/128).

Additionally, 56.9% of respondents did not realize the potential negative effect of vitamin/antioxidant supplements taken during therapy, and 43.6% were unaware that they should inform their physician about it. In the Mediterranean cluster, 68.9% (Spain: 19/61)–79.7% (Greece: 12/59) of respondents were unaware of the potential negative effect of vitamin/antioxidant supplements, and approximately half [47.5% (Spain: 32/61)–55.6% (Italy: 70/126)] were unaware that they should inform their physicians about it (*Table 2* and *Table S1*).

The causal link between the tumour and a persistent appetite or weight loss was recognized by 69.4% (574/827) of respondents; the situation differed in the Mediterranean cluster per country [Greece: 71.2% (42/59); Italy: 44.4% (56/126); Spain: 54.1% (33/61)]. Only 27.1% (224/827) of overall respondents had ever heard of the word ‘cachexia’; in the Mediterranean cluster, this percentage ranged from 31.1% (Spain: 19/61) to 52.5% (Greece: 31/59). Overall, 92.4% (764/827) had not received any information about cachexia from their healthcare providers. This was similar for the Mediterranean cluster [86.4% (Greece: 51/59)–91.8% (Spain: 56/61)] (*Table 2* and *Table S1*).

Overall, 60.4% (487/805) of respondents acknowledged that the topic of food was worrisome for them/their family (*Figure 2A*), and 41.8% (297/710) felt that they had been ‘forced to eat’ by their family/caregiver (*Figure 2B*). In the Mediterranean cluster, these percentages ranged from 71.2% (Greece: 37/52)–87.1% (Italy: 108/124) to 48.1% (Greece: 25/52)–66.9% (Italy: 83/124), respectively.

Overall, 65.9% (531/805) of respondents felt that their mood was influenced by appetite loss (*Figure 2C*), and 58.6% (472/805) felt that their eating habits had an impact on their social interactions (*Figure 2D*). These percentages ranged per country in the Mediterranean cluster [59.4% (Spain: 35/59)–85.5% (Italy: 106/124) and 54.3% (Spain: 32/59)–83.1% (Italy: 103/124), respectively] (*Table S1*).

**Table 2.** Questions related to participants' nutritional and knowledge profile and to physicians' approach to nutrition

	Yes, n/N (%)
<b>Questions related to participants' nutritional and knowledge profile</b>	
Have you encountered any feeding problems during the illness and/or therapy?	628/867 (72.5)
Is it important to have adequate nutrition during therapies?	844/867 (97.3)
Did you know that if you are not following a sufficient nutrition regimen, it is possible to use food supplements or artificial nutrition, as for example enteral or parenteral nutrition?	544/867 (62.7)
Do you think that loss or reduction of appetite are a consequence of your illness and/or a collateral effect of therapy?	730/885 (82.5)
Do you think it is important not to lose weight during oncologic therapy?	727/842 (86.3)
Did you lose weight during the illness?	586/842 (69.6)
Did you know that losing weight can worsen the adverse effects of therapy?	449/836 (53.7)
Did you know that it is important to maintain a certain level of physical activity during therapy?	689/836 (82.4)
Did you know that taking vitamins or antioxidants can have a negative effect on your therapy?	358/830 (43.1)
Did you know that if you take any vitamins or antioxidants you need to inform your therapist?	468/830 (56.4)
Did you know that persistent lack or loss of appetite or weight loss can be caused by the tumour?	574/827 (69.4)
Have you ever heard about 'cachexia'?	224/827 (27.1)
Is the topic of 'food' worrisome for yourself and your family?	487/805 (60.4)
Do you feel that you have been 'forced to eat' by your family or caregiver?	297/710 (41.8)
Did loss of or reduced appetite influence your mood?	531/805 (65.9)
Did problems related to eating habits influence your daily life and social interactions with others?	472/805 (58.6)
<b>Questions related to physicians' approach to nutrition</b>	
Did your physician ask whether you had any feeding problems during therapies?	400/867 (46.1)
If your previous answer was YES, did the physician/oncologist refer you to either a nutritionist or a dietitian?	140/602 (23.3)
Does your physician/oncologist check your weight during your visits?	531/842 (63.0)
Does your physician give importance to cancer-related weight loss?	457/842 (54.3)
Did your physician/oncologist give you advice to improve your appetite and to allow for adequate nutrition?	310/830 (37.3)
Did your physician recommend a certain level of physical activity even if you feel tired?	450/836 (53.8)
Did your physician/oncologist give to you or your relatives any information about cachexia?	63/827 (7.6)

n, number of respondents answering 'Yes'; N, number of respondents providing an answer to the question.

### Physicians' approach to nutrition

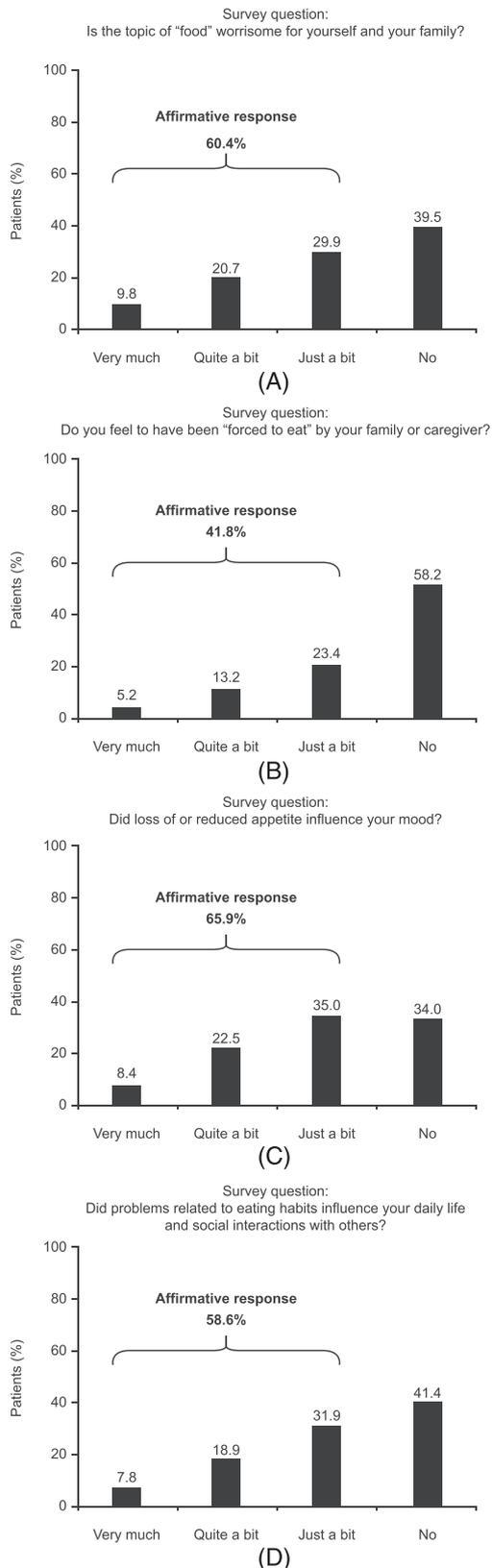
Overall, 53.9% (467/867) of respondents reported that their physician did not check their feeding status during therapy, and only 35.0% (295/842) reported having their weight checked regularly (during all visits) during treatment (Figure 3). For the Mediterranean cluster, 36.9% (Italy: 48/130)–45.0% (Greece: 27/60) of respondents reported their physicians not checking their feeding status during therapy, and only 22.0% (Greece: 13/59)–45.9% (Spain: 28/61) reported having their weight checked regularly. Of the overall respondents who were asked about their feeding problems, 76.7% (462/602) had not been referred to a nutrition specialist. In fact, 45.7% (385/842) of respondents reported that their physician considered cancer-related weight loss unimportant (Table 2), and 62.7% (520/830) of respondents reported not receiving any advice to improve appetite and allow for adequate nutrition (Table 2). In the Mediterranean cluster, 57.7% (Italy: 60/104)–83.3% (Spain: 35/42) were not referred to a nutrition specialist, 35.6% (Greece: 21/59)–47.5% (Spain: 29/61) reported that physicians considered cancer-related weight loss unimportant, and 54.2% (Greece: 32/59)–71.4% (Italy: 90/126) reported not receiving advice for improving appetite and nutrition (Table S1).

### Discussion

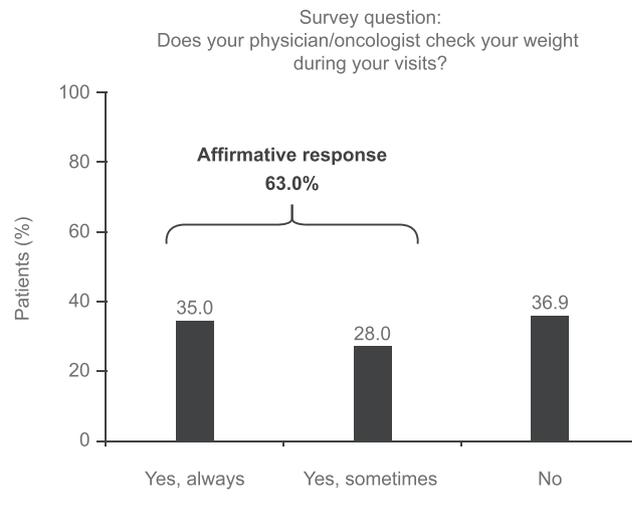
The results of this survey indicate that patients and physicians have significantly different perspectives on the nutritional aspects of cancer and its therapy. Nearly all respondents recognized the importance of adequate nutrition during therapy, and while the majority of respondents had experienced feeding problems during cancer therapy, more than 50% reported that their physician had not asked them about feeding issues. Of those whose physicians had asked, only a quarter of overall respondents had been referred to a nutritionist or dietitian.

Most respondents believed that their appetite loss was due to their illness and/or therapy, and the majority recognized the importance of maintaining weight. However, the majority of respondents did report losing weight during illness and therapy. A high proportion of respondents had not previously heard about 'cachexia' (especially in Italy and Spain) and were therefore unaware of the risk of developing this serious consequence. They were also mostly unaware of the potential negative impact of supplements during treatment. The majority of respondents reported that 'food' is a worrisome topic and that changes in eating habits influenced their mood and caused problems with daily life and social interactions (especially for Italian respondents). These results

**Figure 2** Responders' reports of the (A–D) effects of feeding problems on their personal, family, and social life.



**Figure 3** Responders' reports of the percentage of physicians/oncologists performing weight loss measurements during therapy. The percentages depicted in the graphs have been rounded up to one decimal place.



reaffirm that appetite loss and feeding problems have a negative effect on the patients' QoL.

The responses relating to physicians' approach to nutrition are quite surprising, with only a third performing regular measurements of a patient's weight (22.0–45.9% in the Mediterranean cluster) and just over 50% considering that cancer-related weight loss is important. It is worthwhile mentioning that physicians might still consider cancer-related weight loss important; however, they might have other reasons for not highlighting it towards the patient, namely, their lack of options for effective interventions or the worry about discussing cachexia, particularly refractory cachexia, and thus lead to undue stress among patients. An additional informative result is that more than 85% of respondents had not been given any information about management of malnutrition and cachexia. In terms of physical activity, while over 65% of respondents recognized the need to keep physically active, only half of physicians had recommended a certain level of physical activity (46.1–68.9% in the Mediterranean cluster). In the Italian population, a lower percentage of respondents (68.0%) acknowledged the need for physical activity, a result that might be explained by the difference between countries in physician recommendations concerning physical activity (Greece: 62.7%; Italy: 46.1%; Spain: 68.9%). Overall, some differences have been observed in the Mediterranean cluster concerning incorporation of nutrition and the corresponding information in the management and treatment of patients with cancer. For example, differences were noted in the level of unawareness of nutritional supplements' negative impact during cancer therapy or the lack of patients' understanding of the necessity to inform their doctors about them. An explanation for such differences between Italy or Spain and Greece might be the various availability levels of clear

informative tools. Additionally, there is a clear difference between the Mediterranean cluster countries in the percentage of respondents who were familiar with the term of 'cachexia', even though similar percentages of patients in all three countries had received no cachexia-related information from their physicians. This difference can be due to the lack of sufficient alternative means of information for the patients in countries such as Italy and Spain.

It is generally accepted that malnutrition and CC influence the effectiveness of anticancer therapies, as well as impacting patients' QoL.<sup>3,18–20</sup> Several studies across different cancer types have found associations between weight loss/malnutrition and poorer treatment outcomes.<sup>21–24</sup> Nevertheless, because the clinical focus is mainly on treating the cancer, patients' nutritional status is often neglected, and CC is underrecognized.<sup>25</sup> However, for effective treatment, early detection of nutritional and metabolic derangements leading to CC is critical.<sup>6,9,26–29</sup>

While the strength of this survey is the number of respondents recruited in 10 different European countries, the limitations are the subjective nature of the responses and, for the Mediterranean cluster, the differences in sample size and in the prevalence of cancer type among respondents. Indeed, while the number of respondents from Italy was 142, both Spain and Greece had less than half of the number of respondents completing the survey as compared to Italy (Spain: 65; Greece: 61). This limits the interpretation of results, especially the physicians' perspective on nutritional status, as it only allows quantification of responses from a limited number of respondents who were motivated to complete the survey. The heterogeneity of cancer types and their treatment status represent another limitation of the study, as the status of cancer patients who participated in the survey might be significantly influenced by these factors. Nevertheless, the data clearly indicate that many physicians are not assessing patients' nutritional issues and failing to provide patients with information and guidance. These results support a recent report of three global surveys conducted among healthcare professionals that demonstrated a lack of awareness of CC and its management.<sup>4</sup> One conclusion drawn from that report was the need for effective guidelines and educational initiatives to ensure physicians are aware of nutrition's impact on patients' treatment and QoL. Recently, the European School of Oncology Task Force proposed a multimodal approach to tackle this issue.<sup>3</sup> This multimodal approach highlights three supportive care issues that should be taken into consideration by the oncologists: ensuring sufficient energy and protein intake, maintaining physical activity to maintain muscle mass, and reducing systemic inflammation, if this is present in the patient. Novel therapeutic agents for management of CC, currently in Phases II–III of clinical trials, will hopefully contribute to improvement of both patient-centred and oncology outcomes. Additionally, the 'parallel pathway', a novel nutritional and metabolic approach, may

prevent/delay CC onset by ensuring early, appropriate, and continuous nutritional and metabolic support to cancer patients.<sup>29</sup> This pathway aims to take into consideration the nutritional issues of the patient from the beginning of the natural history of the disease and all throughout its development, at the same time that monitoring disease progression occurs. This implies nutritional screening and assessment in parallel with disease staging, elaboration of a nutritional plan in parallel with a therapeutic plan, incorporation of a first-level nutritional intervention in parallel with administration of first-line therapy, and follow-up and periodic nutritional evaluations. Lastly, an additional relevant factor to take into consideration are the psychological effects of the disease on the patient's emotional well-being. As stated previously, patients with cancer and anorexia–cachexia often suffer from depression and, consequently, a loss of interest in food.<sup>7</sup> In view of this, a psychological follow-up of these patients would most likely contribute to enhancing patient awareness about the importance of nutrition, as well as help the patient's family and caregivers in the daily management of food-related issues. In addition to ensuring that physicians increase their focus on nutrition during cancer treatment, using specialist nutritionist support where necessary, it is essential that patients are provided with relevant and useful information to manage their own nutrition. Physicians have an obligation to empower individual patients and patient associations by producing relevant information on the nutritional needs of patients with cancer. To optimize the effectiveness of such material, it is imperative that patients work in close collaboration with medical oncologists and other healthcare professionals.

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preparation, review, or approval of the manuscript, or the decision to submit the manuscript for publication.

## Ethics and Informed Consent Statement

The manuscript does not contain clinical studies or patient data.

## Declaration of Interest Statements

M.M., A.M., K.C., and I.M.V. declare no conflict of interest.

F.S. is employed by Healthware International as a strategy director and, in this role, acted as a consultant for AstraZeneca, Bayer, Boston Scientific, Helsinn, Merck, MSD, Novartis, Roche, and Sanofi. F.S. has declared no conflicts of

interest that might have interfered with conducting the present study and with the interpretation of the results.

F.D.L. is a volunteer cancer patient advocate and the president of the European Cancer Patient Coalition. The European Cancer Patient Coalition has received support to carry its Action Plan from AbbVie, Amgen, AstraZeneca, Baxter, BMS, Boehringer-Ingelheim, Celgene, Eli Lilly & Co, Gilead, Helsinn, Ipsen, Johnson & Johnson, Merck, MSD, Novartis, Pfizer, and Roche.

## Online supplementary material

Additional supporting information may be found online in the Supporting Information section at the end of the article.

**Table S1.** Questions related to participants' nutritional and knowledge profile and to physicians' approach to nutrition, for the Mediterranean subgroup of respondents.

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