Purpose of Review  
Breast cancer (BC) is the most common cancer diagnosed in women in the West World. Coping with cancer is cause of extreme stress for patients and their family. The purpose of this review is to evaluate possible approaches to follow to control those situations that can impact on quality of life (QoL) and compliance to treatments.

Recent Findings  
Anxiety, distress, depression, and posttraumatic stress disorder are the most frequent psychological disorders in BC patients. Cognitive disorders and sexual dysfunction can also be important in affecting QoL both in younger and older patients. Younger and older patients show different characteristics of these disorders and different strategies of managing them.

Summary  
Several psychotherapeutic and supportive approaches have proven effective in managing psychological disorders in BC patients. Every BC patient should be supported with these techniques during her entire oncological history, in order to increase QoL and compliance to treatments.

Keywords  
Breast cancer · Elderly · Personalized medicine · Distress · Depression · Quality of life

Introduction  
Breast cancer is the most common noncutaneous malignancy diagnosed in women in the West World with one in eight women developing breast cancer (BC) in her lifetime [1]. Localized disease accounts for 61% of all BC diagnosed in the USA, and the 5-year survival rate for this population approaches 98% [2]. In Italy, BC represents 22% of neoplasms diagnosed in elderly women [3].

Facing BC represents huge stress for the patient that has to deal with new and challenging issues and choices. Accepting diagnosis, undergoing treatments, understanding prognosis, handling possible side effects, managing a possible relapse, facing an uncertain future, are all stages of a stressful process that can cause psychological instability and can lead to depression or other mood disorders.

A large proportion of BC patients experience multiple concurrent psychological symptoms during their cancer care trajectory, such as distress, anxiety, depression, cognitive impairment, and body image/sexual dysfunction [4].

Distress, Anxiety, and Depression  
Anxiety is one of the most common psychological symptoms in BC patients, with rates ranging from 10 to 30% [5]. The patient can experience anxiety symptoms because of the anticipation of negative outcomes [6], and the uncertainty about the future; anxiety can spring from the concern over recurrence and the worry of treatment side effects both during and after treatments [7, 8]. Recent findings suggest that anxiety is even more prevalent than depression [9], in contrast to what has been presented in the past [10].

Distress is a broad construct, covering a wide continuum of emotions related to symptoms of depression, anxiety, and adjustment disorder [11]. Even though prognostic prospects are
relatively good, a BC diagnosis is threatening and confronts women with numerous additional stressors, such as treatment and its side effects [12]. BC patients’ distress levels may rise at different stages throughout the disease trajectory [13]. For example, some patients experience clinical distress at the time of diagnosis, yet during the active phases of treatment, BC patients report higher distress when compared to prostate cancer patients, expressing concerns about fatigue, family and friends, weight, fears, worries, and pain [14]. Other BC patients are mostly affected after treatment due to the discontinuation of regular contacts with medical specialists and/or to treatment-induced side effects [13]. Among the sociodemographic factors, younger age, living with a partner and children or only with children, and having a paid job, predict a greater endurance of clinical distress. From an oncological point of view, having a mastectomy, chemotherapy or radiation, and chemotherapy compared to radiation therapy alone, were strong clinical predictors of durable distress [13]. In addition, having received psychosocial services before the BC diagnosis, and having two or more comorbid conditions are also strong predictors of long-lasting distress.

Among patients with all types of cancer, the prevalence of depression among those with BC is the third highest after the BC diagnosis, and having two or more comorbid conditions [13]. In addition, having received psychosocial services before the BC diagnosis, and having two or more comorbid conditions are also strong predictors of long-lasting distress.

Elderly BC Patients and Psychological Profile

In elderly BC patients, several factors may add psychological burden, such as a decreased reserve and social supports, clinical bias toward undertreatment and a particular sensitivity to effective medical communication [17]. Elderly women may be less disposed to see a psychiatrist or psychologist, or to seek medical help for any breast symptom. Instead, they report more concerns about disfigurement and financial consequences related to health care, resulting in a delay in cancer treatment of up to three months [18]. Regarding other psychological characteristics that could influence mood and distress in BC patients, the only paper exploring resilience in BC survivors did not report an influence of age on this construct [19]. On the other hand, a recent paper exploring coping styles among young and old cancer patients [20•] showed that older individuals have a resignation strategy. This results in higher levels of anxiety and depression, scarce cognitive strategies, a conviction of low control on events, low compliance, and an attitude of renunciation. This study does not support the previous data demonstrating older BC survivors had lower distress that younger BC patients [21]. Compared to younger BC survivors, older survivors are often diagnosed at a life stage frequently without multiple responsibilities as primary caregivers to their spouses or partners, children, and parents, and are often retired from work. Intuitively, older BC patients are less threatened by death because they cope better with major medical crises [21]. Moreover, comparing to younger patients, older patients have less fear of recurrence. Timing of onset and duration of symptoms are different too: younger survivors demonstrate an increase of fear during the first 1.5 years after surgery, while in older survivors, levels of fear are stable for the first 6 months after which it declined [22]. Although the data on distress, anxiety, and depression are not homogeneous, several factors, including age, education, social support, and treatment characteristics, appear to have an effect on patients after BC diagnosis. Particular attention should be paid to anxiety/depression in elderly BC patients because of the demonstration of specific periods of time and associated risk factors which can influence mood in older patients (Tables 1 and 2) [17].

One of the challenges in facing these issues in elderly patients is the phenomenon that the number of studies on the effectiveness of psychooncological interventions for patients with breast and other cancers decrease with increasing age and are extremely limited among patients older than 60 years [23]. Possible interventions for elderly patients to reduce psychosocial problems are supportive psychotherapy, mindfulness-based stress reduction protocol, and cognitive behavioral therapy. The specific intervention described for geriatric cancer patients are coping and communication support for older cancer patients (CCS) and CARE intervention—cancer and aging: reflections of elders [24]. Also, web-based intervention

| Table 1 | Periods of increased vulnerability for elderly patients with cancer |
| --- | --- |
| Finding a suspicious physical symptom | During work-up |
| Transition in treatments | Treatment decision: should I treat the cancer or not (at my age?) |
| Awaiting treatment | Conclusion of treatment |
| Stopping ineffective treatments and other medical decision | Advanced cancer |
| Discharge from hospital | Recurrence |
| Stresses of survivorship | End of life |

© Springer
Intrusive symptoms are the most prevalent, with a rate of 3 to 22% among long-term cancer survivors shows rates of lifetime cancer-related PTSD that range from 3 to 22% [26]. Evidence examining PTSD symptomatology among long-term cancer survivors shows rates of lifetime cancer-related PTSD that range from 3 to 22% [26].

Cancer and Posttraumatic Stress Disorder

For some patients, their cancer experience is decisively traumatic, with psychological consequences that might result in posttraumatic stress disorder (PTSD) [26]. PTSD is a mental disorder occurring after exposure to life-threatening episodes (criterion A) and is characterized by intense reliving of the traumatic event through intrusive memories and nightmares (criterion B); avoidance of reminders of the event (criterion C); negative alterations in cognitions and mood (criterion D); hypervigilance toward potential threats in the environment (criterion E); and in some cases, persistent or recurrent depersonalization symptoms [27]. Cancer patients often describe constant concerns, nightmares about the neoplastic disease or the treatment, and worries of recurrence and about the future. Intrusive symptoms are the most prevalent, with a rate of 11–45% [26]. Evidence examining PTSD symptomatology among long-term cancer survivors shows rates of lifetime cancer-related PTSD that range from 3 to 22% [26].

Eye movement desensitization and reprocessing (EMDR) therapy is an eight-phase psychotherapeutic comprehensive approach that has been extensively researched and proven effective for the treatment of trauma [28]. According to the World Health Organization (2013), trauma-focused cognitive behavioral therapy and EMDR therapy are the only psychotherapies recommended for children, adolescents, and adults with PTSD. Two recent papers describe the efficacy of EMDR in cancer patients: Jarero et al. [29] performed a randomized clinical trial (RCT) investigating the eye movement desensitization and reprocessing Integrative Group Treatment Protocol (IGTP) adapted for ongoing traumatic stress (EMDR-IGTP-OTS) in women with cancer. Data analysis showed that the EMDR-IGTP-OTS was effective in significantly reducing symptoms of PTSD, anxiety, and depression, which was maintained at the 90-day follow-up. The standard EMDR Integrative Group Treatment Protocol for early intervention provides individual EMDR therapy in a group setting. The protocol provides EMDR’s eight phases in a group therapy model with an art therapy format (e.g., drawings, symbols). It uses the Butterfly Hug (BH) method as a self-administered bilateral stimulation to process traumatic material. During the session, the patient draws a picture or symbol representing the traumatic events and then focuses on it for an average of 3 min while performing the BH method. This process is repeated four times in the session, with the patient usually reporting substantial decreases in the subjective disturbance at the session end.

Carletto et al. [26] performed a quasiexperimental study comparing the neurobiological correlates of two different therapeutic interventions (EMDR versus treatment as usual—TAU) for treating cancer-related PTSD in women with BC. Participants received 10 EMDR sessions over a period that varied between 2 and 3 months. EMDR was administered in accordance with Shapiro’s protocol for traumatic events [28], and it specifically followed the EMDR specific protocol for oncological patients [30]. The TAU group received four sessions of supportive therapy, one every other week for 2 months. This consisted of standard treatment to support patients in coping with the psychological symptoms related to BC. Participants were assessed using EEG at two separate time points: at baseline (T0) and after the last session of EMDR or TAU treatment (T1). EMDR was found to be superior to TAU in reducing the proportion of patients who were classified as having a PTSD clinical diagnosis. EMDR resulted in a clinically significant improvement, achieving scores below the clinical threshold in intrusive, avoidant, and hyperarousal symptoms. Furthermore, EMDR was found to be effective in reducing depressive symptoms. Neither EMDR nor TAU was effective in reducing anxiety symptoms.

Cognitive Impairment

Many BC survivors report changes in memory and overall cognition during or after chemotherapy or hormone therapies [31], often referred to as ‘Chemo brain’. Chemo brain (CB) (or chemotherapy-induced cognitive impairment CICI) includes impairment of a patient’s memory, learning, concentration, reasoning, executive function, attention, and visuospatial skills during and after the discontinuation of chemotherapy [31]. These symptoms have significant negative implications on activities of daily life, including driving, paying bills, and reading dense or ‘technical’ material [32]. Although CB is

---

**Table 2** Risk factors for developing anxiety and depression in elderly patients with cancer

| Risk Factor                      |
|---------------------------------|
| Pain                            |
| Fatigue                         |
| Poor physical condition         |
| Comorbid medical conditions     |
| Need for assistance with activities of daily living |
| Functional disability           |
| Poor eyesight                   |
| Sensory losses                  |
| Cognitive decline               |
| Lack of perceived control       |
| Other life stressors or losses  |
| Loneliness                      |
| Fatalistic feelings             |
| Inadequacy of emotional support |
Body Image and Sexual Dysfunctions

Body image (BI) is conceptualized as a multifaceted construct, defined as “the mental representation of one’s body, thoughts, and feelings about one’s physical appearance, attractiveness, and competence, as well as one’s perceived state of overall health wholeness, functioning, and sexuality” [42]. A diagnosis of BC is likely to further exacerbate the women’s propensity to focus on body image-related evaluation and investment [43]. Losing a breast is inherently linked to a woman’s identity, sexuality and sense of self, with approximately one-third of BC survivors expressing distress directly related to disrupted body image after successful cancer treatment, particularly among younger women [44]. Although BI disturbances usually improve over time, the subgroup of BC survivors continues to experience BI-related concerns despite breast conservation or reconstruction techniques [42].

Body image has been validated to be associated with women’s sexuality [45]. Amongst BC patients, 73.4% have sexual dysfunctions, suggesting that women with BC constitute a high-risk group [46]. This may be due to BC-specific treatment experiences, such as BI changes after breast surgery, hormone treatments, changes in hormone levels after ovariectomy, and the physiological and psychological effects of chemoradiotherapy. Attention should be paid to changes in sexual function affecting women with BC [46]. Natural menopause, drugs, or surgical castration can all contribute to reduced estrogen levels in women with BC, and these reduced levels can induce or aggravate sexual dysfunction ultimately leading to a reduction in sexual desire, reduced sexual arousal, lack of vaginal lubrication, pain during intercourse, difficulty achieving orgasm, and genital hypoesthesia [46]. Women’s intrapsychic experience of changes to sexuality includes a fear of loss of fertility, negative body image, feelings of sexual unattractiveness, loss of femininity, as well as alterations to a sense of sexual self; the impact of such changes can last for many years after successful treatment and can be associated with serious physical and emotional side effects [47]. Even if sexuality is mostly investigated in young patients, it is important to show that approximately 53% of adults between the ages of 65 to 74 are sexually active [48]. Sexuality is one of the first elements of everyday life influenced by cancer and unlike other side effects that tend to improve over time, survivors’ untreated sexual problems typically persist or worsen [49]. The causes of sexual dysfunction in elderly patients are related to physical changes (alopecia, hormone imbalances, pain), psychological factors (adopting the “patient role”—asexual—, altered body image, fear of death, rejection by partner), and social factors (communication difficulties regarding sexuality) [48]. Some factors can be exacerbated in the older patient, such as difficulty of speaking about sex, fear of death, or reassignment of priorities. The treatment of sexual dysfunction in the older patient includes estrogen supplements, vaginal lubricants, change in antidepressants (SSRIs can delay orgasm), dilators in conjunction with Kegel exercises, a referral to
a sexual therapist, and couple-based interventions [48]. Esplen [42] conducted an RCT to assess the efficacy of an 8-week group for women after BC treatment. The manual-based intervention combined two steps: expressive guided-imagery exercises integrated within a model of group-therapy principles. This intervention facilitates exploration of identity, the development of new self-schemas, and personal growth. The intervention also included an educational component on the social and cultural factors affecting women’s self-esteem and BI. Patients in the intervention group showed significantly less concern/distress about body appearance, decreased body stigma, and a lower level of BC-related concerns, compared with women in the control group. BC-related QoL was also better in the intervention group compared with the control group at the 1-year follow-up. There was no statistically significant difference in sexual functioning, indicating that more studies are needed to improve sexual health in BC patients. A review on BI in cancer [50] presented and patient-doctor communication found that BI difficulties were found across patients with diverse cancers, and were most prevalent in the immediate post-operative and treatment period. Age, body mass index, and specific cancer treatments have been identified as potential risk factors for body image disturbance in cancer patients. In addition, specific interventions were described (Table 3). The authors also proposed practical strategies for the oncologic health care team when addressing BI concerns, which is referred to as The Three C’s (common, concerns, consequences) [51]. This strategy encourages patients to discuss their BI concerns, thereby allowing the health care team to identify emotional difficulties and to develop a solution. At the beginning of a clinical encounter, providers should remind patients that BI difficulties are very common to normalize their concerns and reduce shame, embarrassment, and stigma. Then, providers, should ask about specific concerns which may include impending treatment effects or recent or prolonged changes to the appearance and/or functioning. This step is accomplished with open-ended questions that elicit patient narrative. Finally, therapists ask patients about consequences of their BI difficulties on daily functioning, with particular attention to social, emotional, and occupational problems. Regarding BI, a recent study [52] investigated the effects of a brief beauty care intervention on self-reported symptoms of depression, QoL, BI, and self-esteem in 39 female BC patients with appearance-related treatment side effects. The intervention consisted of a single-session group makeup workshop with an incorporated portrait and upper-body photo shooting. Photos were also professionally edited and sent to the patients. While groups did not differ regarding any measure at the pretreatment baseline assessment, patients in the intervention group reported fewer symptoms of depression, higher QoL, and higher self-esteem compared with baseline. Follow-up at 8 weeks indicated moderate stability of these improvements, in contrast to previous research, indicating beneficial short-term and mid-term effects of beauty care on psychological outcomes in patients with early BC.

**Conclusion**

Elderly and young BC patients have similar psychological problems related to trauma of diagnosis, side effects of therapies with the consequent change of body image and sexual behavior, fear of recurrence, and end of life. Many psychotherapeutic and supportive approaches have proven effective in various patient groups. In order to ensure a successful psychological approach in elderly patients, the most effective interventions include:

- Psychotherapy with a soft body mediation approach;
- Meditative and reconciliation interventions with one’s own spiritual well-being and needs;
- Soft cognitive rehabilitation interventions not too demanding for patients;
- Interventions for the elaboration of the group trauma with EMDR.

**Funding** Open access funding provided by Università Cattolica del Sacro Cuore within the CRUI-CARE Agreement.

**Compliance with Ethical Standards**

**Human and Animal Rights and Informed Consent** This article does not contain any studies with human or animal subjects performed by any of the authors.
Conflict of Interest  The authors declare no conflict of interest.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit http://creativecommons.org/licenses/by/4.0/.

References

Papers of particular interest, published recently, have been highlighted as:

- Of importance
- Of major importance

1. Desantis C, Ma J, Bryan L, et al. Breast cancer statistics, 2013. CA Cancer J Clin. 2014;64:52–62. https://doi.org/10.3322/caac.21203.
2. SEER. Cancer Statistics Factsheets: breast cancer. Bethesda: National Cancer Institute; 2013.
3. REGISTRO TUMORI ITALIA
4. Guimond AJ, Ivers H, Savard J. Clusters of psychological symptoms in breast cancer: is there a common psychological mechanism? Cancer Nurs. 2019;43:343–53. https://doi.org/10.1097/NCC.0000000000000705.
5. Ng CG, Mohamed S, Kaur K, Sulaiman AH, Zainal NZ, Taib NA, et al. Perceived distress and its association with depression and anxiety in breast cancer patients. PLoS One. 2017;12:e0172975. https://doi.org/10.1371/journal.pone.0172975.
6. Barlow DH. Unraveling the mysteries of anxiety and its disorders from the perspective of emotion theory. American Psychologist. 2000;55:1247–63. https://doi.org/10.1037//0003-066x.55.11.1247.
7. Montgomery GH, David D, Goldfarb AB, Silverstein JH, Weltz CR, Birk JS, et al. Sources of anticipatory distress among breast surgery patients. J Behav Med. 2003;26:153–64. https://doi.org/10.1023/a:1023034706298.
8. Walker LG, Heys SD, Walker MB, Ogston K, Miller ID, Hutcheson AW, et al. Psychological factors can predict the primary chemotherapy in patients with locally advanced breast cancer. Eur J Cancer. 1999;35:1783–8. https://doi.org/10.1016/s0959-8049(99)00169-0.
9. Saboonchi F, Petersson LM, Wennman-Larsen A, Alexanderson K, BrÉannstrÈom R, Vaez M. Changes in caseness of anxiety and depression in breast cancer patients during the first year following surgery: Patterns of transience and severity of the distress response. Eur J Oncol Nurs. 2014;18:598–604. https://doi.org/10.1016/j.ejon.2014.06.007.
10. Shapiro SL, Lopez AM, Schwartz GE, Bootzin R, Figueredo AJ, Braden CJ, et al. Quality of life and breast cancer: relationship to psychosocial variables. J Clin Psychol. 2001;57:501–19. https://doi.org/10.1002/jclp.1026.
11. Bisdstrup PE, Christensen J, Mertz BG, Rottmann N, Dalton SO, Johansen C. Trajectories of distress, anxiety, and depression among women with breast cancer: Looking beyond the mean. Acta Oncol. 2015;5:789–96. https://doi.org/10.3109/0284186X.2014.1002571.
12. Henselmans I, Helgeson VS, Seltman H, de Vries J, Sanderman R, Ranchor AV. Identification and prediction of distress trajectories in the first year after a breast cancer diagnosis. Health Psychol. 2010;29:160–8. https://doi.org/10.1037/a0017806.
13. Lo-Fo-Wong DN, de Haes HC, Aaronson NK, et al. Predictors of enduring clinical distress in women with breast cancer. Breast Cancer Res Treat. 2016;158:563–72. https://doi.org/10.1007/s10549-016-3896-7.
14. Stapleton SJ, Valero TD, Astroth K, Woodhouse S. Distress during radiation therapy: assessment among patients with breast or prostate cancer. Clin J Oncol Nurs. 2017;21:93–8. https://doi.org/10.1188/17.CJON.93-98.
15. Golden-Kreutz DM, Andersen BL. Depressive symptoms after breast cancer surgery: relationships with global, cancer-related, and life event stress. Psycho-Oncology. 2004;13:211–20. https://doi.org/10.1002/pon.736.
16. Boing L, Pereira GS, Araújo CDCR, et al. Factors associated with depression symptoms in women after breast cancer. Rev Saude Publica. 2019;53:30. https://doi.org/10.11606/s1518-8787.2019053000786.
17. Doolittle MN and Massie MJ “Psychosocial issues specific to breast cancer” in Geriatric Psycho-oncology: a quick reference on the psychosocial dimensions of cancer symptom management. Holland JC, Weiss Wiesel T, Nelson CJ, Roth AJ, Alici Y. 820149 Oxford University press.
18. Burgess CC, Potts HW, Hamed H, et al. Why do older women delay presentation with breast cancer symptoms? Psycho-Oncology. 2006;15:962–8. https://doi.org/10.1002/poj.1030.
19. Padilla-Ruiz M, Ruiz-Román C, Pérez-Ruiz E, Rueda A, Redondo M, Rivas-Ruiz F. Clinical and sociodemographic factors that may influence the resilience of women surviving breast cancer: cross-sectional study. Support Care Cancer. 2019;27:1279–86. https://doi.org/10.1007/s00520-018-4612-4.
20. Hernandez R, Calderon C, Carmona-Bayonas A, et al. Differences in coping strategies among young adults and the elderly with cancer. Psychogeriatrics. 2019;19:426–34. https://doi.org/10.1111/psgy.12420 This observational study describes how young and older patients have different strategies for coping with cancer.
21. Kornblith AB, Powell M, Regan MM, Bennett S, Krasner C, Moy B, et al. Long-term psychosocial adjustment of older vs younger survivors of breast and endometrial cancer. Psycho-Oncology. 2007;16:895–903. https://doi.org/10.1002/poj.1146.
22. Starreveld DEJ, Markovitz SE, van Breukelen G, Peters ML. The course of fear of cancer recurrence: different patterns by age in breast cancer survivors. Psycho-Oncology. 2018;27:295–301. https://doi.org/10.1002/poj.4505.
23. van Ei I, Hagedoom M, Slaets J, Smits C. Patient navigation and activation interventions for elderly patients with cancer: a systematic review. Eur J Cancer Care. 2017;26:e12621. https://doi.org/10.1111/1365-2354.12621.
24. Baidner L, Wess Wiesel T, and JC Holland “Psychosocial interventions for older cancer patients” in Geriatric Psycho-oncology: a quick reference on the psychosocial dimensions of cancer symptom management. Holland JC, Weiss Wiesel T, Nelson CJ, Roth AJ, Alici Y. (2014) Oxford University press.
25. Villani D, Cognetta C, Repetto C, Serino S, Toniolo D, Scanzi F, et al. Promoting emotional well-being in older breast cancer survivors of breast and endometrial cancer. Psycho-Oncology. 2006;15:962–8. https://doi.org/10.1002/poj.1146.
26. Carletto S, Porcaro C, Settanta C, et al. Neurobiological features and response to eye movement desensitization and reprocessing treatment of posttraumatic stress disorder in patients with breast cancer. Eur J Psychotraumatol. 2019;10:1600832. https://doi.org/10.1080/20080198.2019.1600832 This trial demonstrates the efficacy of Eye Movement Desensitization and Reprocessing
therapy in treating posttraumatic stress disorder in breast cancer patients.

27. American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 5th ed. Arlington: Author; 2013.

28. Shapiro F. Eye movement desensitization and reprocessing (EMDR) therapy: basic principles, protocols, and procedures. 3rd ed. New York: Guilford Press; 2018.

29. Jarero IN, Givaudan M, Osorio A. Articles randomized controlled trial on the provision of the EMDR integrative group treatment protocol adapted for ongoing traumatic stress to female patients with cancer-related posttraumatic stress disorder symptoms. J EMDR Pract Res. 2018;12:94–104. https://doi.org/10.1891/1933-3196.12.3.94.

30. Faretta E, Borsato T. EMDR therapy protocol for oncological patients. J EMDR Pract Res. 2016;10:162–75. https://doi.org/10.1891/1933-3196.10.3.162.

31. Seliktar N, Polek C, Brooks A, Hardie T. Cognition in breast cancer survivors: hormones versus depression. Psycho-Oncology. 2015;24:402–7. https://doi.org/10.1002/pon.3602.

32. Boykoff N, Moieni M, Subramanian SK. Confronting chemobrain: an in-depth look at survivors’ reports of impact on work, social networks, and health care response. J Cancer Surviv. 2009;3:223–32. https://doi.org/10.1007/s11766-009-0098-x.

33. Deprez S, Amant F, Smeets A, Peeters R, Leemans A, van Hecke W, et al. Longitudinal assessment of chemotherapy induced structural changes in cerebral white matter and its correlation with impaired cognitive functioning. J Clin Oncol. 2012;30:274–81. https://doi.org/10.1200/JCO.2011.36.8571.

34. Porter KE. ‘Chemo Brain’—is cancer survivorship related to later-life cognition? Findings from the health and retirement study. J Aging Health. 2013;25:960–81. https://doi.org/10.1177/0898264313498417.

35. Janelins MC, Heckler CE, Peppone LJ, et al. Cognitive complaints in survivors of breast cancer after chemotherapy compared with age-matched controls: an analysis from a nationwide, multicenter, prospective longitudinal study. J Clin Oncol. 2017;35:506–14. https://doi.org/10.1200/JCO.2016.68.5826 This nationwide observational study compared cognitive function of patients with breast cancer with age-matched noncancer controls through the administration of the Functional Assessment of Cancer Therapy-Cognitive Function (FACT-Cog) questionnaire. Patients reported a significant increase in anxiety and depression, and a decrease in cognitive reserve both from prechemotherapy to postchemotherapy as well as from prechemotherapy to 6-month follow-up.

36. Mohile S, Dale W, Hurria A. Geriatric oncology research to improve clinical care. Nat Rev Clin Oncol. 2012;9:571–8. https://doi.org/10.1038/nrclon.2012.125.

37. Mandelblatt JS, Jacobsen PB, Ahles T. Cognitive effects of cancer systemic therapy: implications for the care of older patients and survivors. J Clin Oncol. 2014;32:2617–26. https://doi.org/10.1200/JCO.2014.55.1259.

38. Andretti C, Root JC, Alici Y, and Ahles TA “Cognitive disorders and delirium” in Geriatric Psycho-oncology: a quick reference on the psychosocial dimensions of cancer symptom management. Holland JC, Weiss Wiesel T, Nelson CJ, Roth AJ, Alici Y. (2014) Oxford University press.

39. van Ah D, Carpenter JS, Saykin A, et al. Advanced cognitive training for breast cancer survivors: a randomized controlled trial. Breast Cancer Res Treat. 2012;135:799–809. https://doi.org/10.1007/s10549-012-2210-6.

40. Kesler S, Hadi Hosseini SM, Heckler C, Janelins M, Palesh O, Mustian K, et al. Cognitive training for improving executive function in chemotherapy-treated breast cancer survivors. Clin Breast Cancer. 2013;13:299–306. https://doi.org/10.1016/j.clbc.2013.02.004.

41. Vergani L, Marton G, Pizzoli SFM, Monzani D, Mazzocco K, Pravettoni G. Training cognitive functions using mobile apps in breast cancer patients: systematic review. J M Heal Heaht. 2019;7(3):e10855. https://doi.org/10.2196/10855 This systematic review gives an overview of the state-of-the-art mobile apps aimed at training cognitive functions in breast cancer patients.

42. Esplin MJ, Wong J, Warner E, Toner B. Restoring body image after cancer (ReBIC): results of a randomized controlled trial. J Clin Oncol. 2018;36:749–56. https://doi.org/10.1200/JCO.2017.74.8244.

43. Przedziecki A, Alcorso J, Sherman KA. My Changed Body: Background, development and acceptability of a self-compassion based writing activity for female survivors of breast cancer. Patient Educ Couns. 2016;99:870–4. https://doi.org/10.1016/j.pec.2015.12.011.

44. Fobair P, Stewart S, Chang S, D’Onofrio C, Banks P, Bloom J. Body image and sexual problems in young women with breast cancer. Psycho-Oncology. 2006;15:579–94. https://doi.org/10.1002/pon.991.

45. Fang SY, Lin YC, Chen TC, Lin CY. Impact of marital coping on the relationship between body image and sexuality among breast cancer survivors. Support Care Cancer. 2015;23:2551–9. https://doi.org/10.1007/s00520-015-2612-1.

46. Jing L, Zhang C, Li W, Jin F, Wang A. Incidence and severity of sexual dysfunction among women with breast cancer: a meta-analysis based on female sexual function index. Support Care Cancer. 2019;27:1171–80. https://doi.org/10.1007/s00520-019-04667-7.

47. Vaziri S, Lotfi Kashani F. Sexuality after breast cancer: need for guideline. Iran J Cancer Prev. 2012;5:10–5.

48. Hughes MK, Lacy S, and Nelson CJ. “Sexual dysfunction” in Geriatric Psycho-oncology: a quick reference on the psychosocial dimensions of cancer symptom management. Holland JC, Weiss Wiesel T, Nelson CJ, Roth AJ, Alici Y. (2014) Oxford University press.

49. Bober SL, Michaud AL, Recklitis CJ. Finding sexual health aids after cancer: are cancer centers supporting survivors’ needs? J Cancer Surviv. 2019;13:224–30. https://doi.org/10.1007/s11764-019-00744-2.

50. Fingeret MC, Teo I, Epner DE. Managing body image to improve quality of life cognition? Findings from the health and retirement study. J Aging Health. 2013;25:960–81. https://doi.org/10.1177/0898264313498417.

51. Bober SL, Michaud AL, Recklitis CJ. Finding sexual health aids after cancer: are cancer centers supporting survivors’ needs? J Cancer Surviv. 2019;13:224–30. https://doi.org/10.1007/s11764-019-00744-2.

52. Richard A, Harbeck N, Wuermstein R, Wilhelm FH. Recover your smile: effects of a beauty care intervention on depressive symptoms, quality of life, and self-esteem in patients with early breast cancer. Psycho-Oncology. 2019;28:401–7. https://doi.org/10.1002/pon.4957 This trial investigates the effects of a brief beauty care intervention on self-reported symptoms of depression, quality of life, body image, and self-esteem in breast cancer patients. Patients in the intervention group reported less symptoms of depression, higher QoL, and higher self-esteem compared with controls, with these effects remaining stable at 8 weeks follow-up.