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Nutritional profile in breast cancer survivors

Perfil nutricional em sobreviventes de câncer de mama

Perfil nutricional en sobrevivientes de cáncer de mama

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ABSTRACT

Objective: To analyze the nutritional profile of female breast cancer survivors by evaluating anthropometric indicators and body composition parameters. **Methods:** This is a cross-sectional study that aimed to characterize the nutritional profile of 30 female survivors followed at an oncology institution in Northeast Brazil. Sociodemographic and clinical data were collected, and body mass index and body composition were assessed by bioelectrical impedance, with calculation of the Fat-Free Mass Index and the Fat Mass Index. **Results**: The participants were mostly between 50 and 59 years old, with a high prevalence of overweight and obesity. A high percentage of body fat and muscle mass deficit were observed in all participants, and excess adiposity in most. **Conclusions:** It is concluded that there is a predominance of adiposity associated with muscle reduction, reinforcing the importance of continuous nutritional monitoring.

Keywords: *Breast cancer; Cancer survivors; Nutritional status; Body composition; Bioelectrical impedance.*

RESUMO

Objetivo: Analisar o perfil nutricional de mulheres sobreviventes de câncer de mama, avaliando indicadores antropométricos e parâmetros de composição corporal. **Método:** Trata-se de estudo transversal que objetivou caracterizar o perfil nutricional de 30 mulheres sobreviventes, acompanhadas em uma instituição oncológica no Nordeste do Brasil. Coletou-se dados sociodemográficos e clínicos, avaliando-se o índice de massa corporal e a composição corporal por bioimpedância elétrica, com cálculo do Índice de Massa Livre de Gordura e do Índice de Massa de Gordura. **Resultados:** As participantes encontravam-se, majoritariamente, na faixa etária entre 50 e 59 anos, com alta prevalência de sobrepeso e obesidade. Observou-se elevado

percentual de gordura corporal, déficit de massa muscular em todas as avaliadas e excesso de adiposidade na maioria. **Conclusão:** Conclui-se que há predominância de adiposidade associada à redução muscular, reforçando a importância do acompanhamento nutricional contínuo.

Descritores: *Câncer de mama; Sobreviventes de câncer; Estado nutricional; Composição corporal; Bioimpedância elétrica.*

RESUMEN

Objetivo: Analizar el perfil nutricional de mujeres supervivientes de cáncer de mama mediante la evaluación de indicadores antropométricos y parámetros de composición corporal. **Método:** Se trata de un estudio transversal cuyo objetivo fue caracterizar el perfil nutricional de 30 mujeres sobrevivientes atendidas en una institución oncológica del noreste de Brasil. Se recopilaron datos sociodemográficos y clínicos, y se evaluaron el índice de masa corporal y la composición corporal mediante bioimpedancia eléctrica, con cálculo del índice de masa libre de grasa y del índice de masa grasa. **Resultados**: Las participantes eran mayoritariamente entre 50 y 59 años, con alta prevalencia de sobrepeso y obesidad. Se observó elevado porcentaje de grasa corporal y déficit de masa muscular en todas. **Conclusión:** Se concluye que predomina la adiposidad asociada a reducción muscular, reforzando el seguimiento nutricional continuo.

Descriptores: *Cáncer de mama; Supervivientes de cáncer; Estado nutricional; Composición corporal; Impedancia bioeléctrica.*

INTRODUCTION

Breast cancer is one of the most prevalent malignant neoplasms among women worldwide, representing an important challenge for public health systems[1]. In recent decades, advances in early diagnosis and therapeutic strategies have contributed to a significant increase in survival rates, contributing to increasing life expectancy after cancer treatment. This scenario has driven growing scientific interest to the health conditions of survivors, especially with regard to factors that may influence physical well-being and the risk of chronic diseases in the post-treatment period.

Studies show that women undergoing chemotherapy, radiotherapy or hormonal therapies can present important metabolic changes, including increased adipose tissue and reduced muscle mass. Among the aspects frequently observed after breast cancer treatment, changes in nutritional status and body composition stand out, with a prevalence of obesity and overweight[2].

Studies show that cancer and its treatments can lead to excess body fat, decreased lean mass, cardiotoxicity and other side effects[3]. These bodily changes can occur as a result of multiple factors, such as hormonal changes, reduced physical activity, changes in dietary patterns, and adverse effects associated with antineoplastic therapies, and a better understanding of dietary patterns can improve cancer-related outcomes for survivors of the disease[4].

The assessment of nutritional status traditionally uses the Body Mass Index (BMI) as the main anthropometric indicator. However, BMI has significant limitations, such as the inability to differentiate between muscle mass and fat, in addition to not considering the distribution of body fat, factors that can lead to inaccurate diagnoses[5]. In this context, methods that allow for a more detailed assessment of body composition become particularly relevant.

Bioelectrical impedance is widely used in clinical research because it allows estimates of fat mass, fat-free mass, and body fat distribution in a fast and non-invasive manner[5], helping to identify changes in muscle mass and adipose tissue, providing more accurate information about the body profile of the individuals evaluated.

This evaluation becomes particularly relevant in people who have already experienced a cancer diagnosis, as they commonly present bodily changes during treatment, which are related to metabolic changes induced by the tumor and also by the treatment itself[6]. Thus, the use of bioimpedance contributes to the early identification of excess adiposity or reduction of muscle mass, helping to direct nutritional interventions and rehabilitation strategies aimed at promoting health and improving metabolic conditions.

The characterization of the nutritional profile of breast cancer survivors is essential to guide care strategies and interventions aimed at health promotion. Early identification of changes in body composition can contribute to the prevention of chronic diseases and to the improvement of the nutritional status of these people[2]. In this context, the present study aimed to analyze the

nutritional profile of women survivors of breast cancer, evaluating anthropometric indicators and body composition parameters.

METHODS

This is a cross-sectional study conducted with women survivors of breast cancer. The sample consisted of 30 participants aged between 40 and 69 years, who had completed cancer treatment and had not had recurrence or a new diagnosis of cancer for at least five years, selected through convenience sampling, considering the ease of access and availability to participate in the research[7].

The research was carried out in the municipality of Mossoró/RN and the face-to-face meetings for nutritional assessment of the participants took place at the headquarters of Unit I of the Mossoroense League for Studies and Fight against Cancer, located at Rua Isaura Rosado, nº 129, Abolição III neighborhood, in the municipality of Mossoró/RN, located 282 km from the state capital, Natal.

As an inclusion criterion, individuals aged 18 years or older with a previous diagnosis of cancer for at least 5 years, with no signs of disease progression or the emergence of new tumors, were considered eligible.

Participants who did not have the mental and physical capacity to participate in interviews and perform physical activity without supervision were excluded from the study, as well as participants who had physical limitations to practice unsupervised exercises.

To recruit the participants, the research team initially reviewed medical records to select patients who met the inclusion criteria (age over 18 years, previous cancer diagnosis for at least 5 years, no signs of disease progression or new tumors).

After identifying the potential participants, an invitation letter to participate in the study was delivered. The invitation letter contained information about the research, detailing its objectives, benefits and risks, information that there would be no monetary costs for the participants, duration of the study, information about the voluntariness of participation in the study, as well as clarification about the total and unrestricted exclusive decision of the participant to continue or give up participating in the research at any stage.

All recruitment stages were only initiated after approval by the Ethics Committee of the State University of Rio Grande do Norte and consent by the Mossoroense League for Studies and Fight against Cancer.

Anthropometric evaluation included measurement of body weight and height, using a calibrated anthropometric scale. From these measurements, the body mass index (BMI) was calculated, obtained by the ratio between weight in kilograms and height in meters squared.

Body composition was assessed by means of bioelectrical impedance, using an OMRON HBF-514 Whole Body Body Control Scale, allowing estimating body fat percentage, lean mass, visceral fat, basal energy expenditure and metabolic age. From this information, two additional indicators of body composition were calculated: Fat-Free Mass Index (LMMI) and Fat Mass Index

(GMI). These indices were used to identify muscle mass deficit and excess adiposity.

30 people participated in the research. However, two of them did not perform the bioimpedance stage, as they were unable to attend at the scheduled time. The 28 patients who underwent bioimpedance were weighed in the morning shift in the postprandial period. Quantitative variables were described as mean, standard deviation, median, and minimum and maximum values. Categorical variables were presented as absolute and percentage frequencies.

This research was submitted to the Research Ethics Committee of the State University of Rio Grande do Norte, to which the Medical Course of the Federal Rural University of the Semiarid Region is linked for research purposes, in order to comply with all the requirements set forth in Resolution No. 466, of December 12, 2012, of the National Health Council/MS, respecting the legal and ethical precepts regarding research with human beings. The research was approved by the CEP-UERN, through opinion No. 7,463,920 of March 25, 2025.

For data collection, participants were invited to sign a free and informed consent form in two copies. One copy was with the participant and the other with the researchers.

The delivery and signing of the term to the participants took place at the headquarters of the Mossoroense League for Studies and Fight against Cancer, located at Rua Isaura Rosado, nº 129, in the Abolição III neighborhood, in the municipality of Mossoró/RN. The signing took place in an appropriate room, where the researchers were able to clarify all the doubts of the participants and ensure confidentiality.

The data were organized in a database in a statistical program and analyzed using descriptive and inferential statistical techniques. The collected data were organized and tabulated in an electronic database. Adequate statistical analysis was performed in accordance with the objectives of the research. The results were interpreted respecting the principles of research ethics, ensuring the anonymity of the participants.

RESULTS

Sociodemographic characteristics

The sociodemographic characterization of the participants showed a predominance of women in the age group of 50 to 59 years, representing half of the sample evaluated (50%), followed by the group of 40 to 49 years (30%) and 60 to 69 years (20%). Regarding the occupational situation, an equivalent distribution was observed between participants with paid work and those without paid activity, both corresponding to 50% of the sample (Chart 1).

Regarding the level of education, there was a higher frequency of women with complete secondary education (50%), followed by elementary education (27%) and higher education (23%). These data indicate that the population

studied is composed mostly of women with intermediate educational level and similar distribution in terms of insertion in the labor market.

The analysis of self-perception of health showed that most participants evaluated their health condition positively. It was observed that 70% of the women rated their health as good, while 27% considered it excellent or very good. Only 3% of participants reported a negative perception, rating their health as poor or very poor.

With regard to self-reported comorbidities, there was a higher frequency of dyslipidemia, present in 23% of the participants, followed by diabetes mellitus (13%). Arterial hypertension and the presence of gastritis or reflux were reported by 7% of the women. The presence of these clinical conditions suggests the occurrence of metabolic and gastrointestinal alterations in part of the sample, highlighting the importance of continuous clinical and nutritional follow-up in breast cancer survivors, with the aim of preventing or controlling risk factors associated with the development of chronic diseases.

Chart 1 - Description of the sample of women breast cancer survivors selected for the study (n=30).

Variable	n	%
Age		
40-49	9	30
50-59	15	50
60-69	6	20
Paid Work		
Yes	15	50
No	15	50
Education		
Elementary School	8	27
High School	15	50
Higher Education or more	7	23
Self-Perception of Health		
Excellent/Very Good	8	27
Good	21	70
Bad/Very Bad	1	3
Comorbidities		
Hypertension	2	7
Diabetes	4	13
Dyslipidemia	7	23
Gastritis/Reflux	2	7

Source: Survey data.

Nutritional status

The evaluation of the nutritional status of the participants, according to the BMI classification, revealed a high prevalence of overweight in the sample studied. It was observed that 43% of the women were overweight, while 39% were classified as class I obesity and 4% as class II obesity (Chart 2).

Chart 2 - Classification of nutritional status according to Body Mass Index.

Classification	n	%
Suitable weight	4	14
Overweight	12	43
Obesity grade I	11	39
Obesity grade II	1	4

Source: Survey data.

Body composition indicators

The analysis of body composition parameters showed that the participants had a mean weight of 71.8 ± 11.4 kg, with a median of 72.5 kg and a range between 52.6 and 95.9 kg. The mean body mass index was 29.0 ± 3.7 kg/m², a value compatible with the classification of overweight. Regarding body composition, the average percentage of body fat was 43.2 ± 6.6%, indicating high adiposity among the participants, while lean mass had an average of 23.2 ± 2.5%. Visceral fat had an average of 9.5 ± 2.0 (Chart 3).

As for metabolic indicators, the mean basal energy expenditure was 1393.8 ± 137.4 kcal, while the mean metabolic age was 60.9 ± 9.4 years, values that show metabolic characteristics compatible with the age group of the sample studied.

Weight and height measurements were measured on an anthropometric scale. To classify the nutritional status of the patients, the Body Mass Index (BMI= weight (Kg)/height (m)2 was used.

Chart 3 - Characterization of body composition by bioimpedance (n=28).

Variable	Average ± SD	Median (min-max)
Weight (Kg)	71.8 ± 11.4	72,5 (52,6-95,9)
BMI (Kg/m2)	29.0 ± 3.7	29,0 (21,5-35,2)
Fat mass (%)	43.2 ± 6.6	43,8 (24,3–53,1)
Lean Mass (%)	23.2 ± 2.5	22,8 (18,1–28,1)
Visceral fat (%)	9.5 ± 2.0	9,0 (5–13)
Basal energy expenditure (kcal)	1393.8 ± 137.4	1396 (1139–1670)
Metabolic age (years)	60.9 ± 9.4	61,5 (38–75)

SD: standard deviation. **Source:** Survey data.

Body composition indices

To classify body composition, bioimpedance data, the Fat-Free Mass Index (MLMI = lean mass weight (Kg)/ height (m)2) and the Fat Mass Index (GRMI = fat mass weight (Kg)/height (m)2) were used. These were evaluated according to the cutoff points suggested by Kyle et al., which classify body composition as muscle mass deficit (women IMLG ≤ 15.0 kg/m2) and excess adiposity (women IMG ≥ 11.8 kg/m2)[7] (Chart 4).

The evaluation of body composition indices showed a high prevalence of alterations related to muscle mass and fat accumulation among the participants. Muscle mass deficit was observed in 100% of the sample.

Regarding adiposity, it was found that 61% of the participants had excess body fat, while 39% had values within normal limits. These results indicate that, in addition to the excess weight identified in part of the sample, there is also significant impairment of body composition, characterized by a reduction in muscle mass associated, in most cases, with increased adiposity.

Chart 4 - Evaluation of muscle mass and adiposity (Fat-Free Mass Index (LMMI) and Fat Mass Index (GHMI)).

Variable	n	%
Fat-Free Mass Index (IMLG)		
Muscle mass deficit (IMLG ≤ 15.0 Kg/m2)	28	100
No muscle mass deficit (IMLG > 15.0 Kg/m2)	0	0
Fat Mass Index (IMG)		
Excess adiposity (IMG ≥ 11.8 Kg/m2)	17	61
No excess adiposity (IMG < 11.8 Kg/m2)	11	39

Source: Survey data.

DISCUSSION

The results of this study show important changes in the nutritional profile of women survivors of breast cancer evaluated in the research, characterized mainly by the high prevalence of excess weight and significant reduction in muscle mass.

These findings are in line with studies that show that theside effects of chemotherapy treatment can contribute to the prevalence of obesity and overweight, as it influences the eating habits of patients undergoing treatment, affecting nutritional status, and the occurrence of weight gain and obesity is common in women who underwent treatment for breast cancer[8].

Furthermore, other studies show that patients undergoing cancer treatment are also at higher risk for developing sarcopenia, especially when undergoing neoadjuvant chemotherapy[9].

In addition to the excess weight identified by BMI, the analysis of body composition revealed a high percentage of adiposity among the participants. The accumulation of adipose tissue, especially in the visceral region, has been associated with a higher risk of developing cardiometabolic diseases, including insulin resistance, dyslipidemias, and hypertension, as well as recurrences and the development of cancers[9].

Another relevant finding of this study was the presence of lean mass deficit in all participants. Reduction in lean body mass in cancer survivors may be associated with different pathophysiological mechanisms, as a result of an underlying disease, which may induce various physiological changes, including inflammation, loss of appetite or anorexia, low levels of testosterone and other anabolic hormones, and anemia[9].

However, it is important to emphasize that, although the present study identified muscle mass deficit in 100% of the participants evaluated, this finding should be interpreted with caution, considering important methodological limitations inherent to the research design and the method used to assess body composition.

In addition, it is important to highlight that bioelectrical impedance, despite being widely used due to its practicality, low cost, and non-invasive nature, is sensitive to factors such as hydration status, previous food consumption, physical activity, menstrual cycle, and use of medications, variables that can interfere with the estimation of lean mass[10].

The simultaneous presence of high body adiposity and reduced muscle mass represent a pattern of body composition associated with a higher risk of physical frailty, impairment of functional capacity, and increased vulnerability to the development of chronic diseases. Thus, the importance of systematic monitoring of body composition as part of the clinical and nutritional follow-up of the cancer survivor population is reinforced[11].

The assessment of body composition, by means of bioelectrical impedance, proved to be particularly useful in the identification of alterations related to adiposity and muscle mass, being a complementary strategy to BMI, which provides only a general estimate of body weight in relation to height. Bioimpedance allows estimating the distribution of different body compartments, providing more detailed information on fat and fat-free mass[11].

In the present study, more than half of the participants had excess adiposity according to the fat mass index. This result highlights the importance of using more specific indicators for the nutritional assessment of cancer survivors.

From a clinical point of view, unfavorable changes in body composition can have important implications for long-term health. Excess body fat has been linked to a higher risk of breast cancer recurrence and increased mortality in

some epidemiological studies. At the same time, some studies suggest that the practice of muscle-strengthening exercises has been associated with a lower risk of mortality[12].

In this context, the implementation of strategies aimed at promoting healthy lifestyle habits becomes essential in the follow-up of cancer survivors. Interventions that include structured physical activity programs, especially resistance exercises, can favor the maintenance of muscle mass and contribute to improvements in body composition, improving the quality of life of this population[13,14].

At the same time, adequate nutritional monitoring plays an important role in managing body weight and reducing the risk of metabolic alterations in cancer survivors, as adequate nutrition has been recommended for surviving patients and pointed out as a modifiable aspect, in order to prevent disease recurrence15.

The investigation of the nutritional profile and body composition of cancer survivors is of great relevance in the context of cancer care, as it provides important support for the planning of nutritional interventions and rehabilitation strategies aimed at improving body composition, preventing metabolic complications, and promoting better health conditions in cancer survivors[13,15].

Among the limitations of the present study, the cross-sectional design stands out, which does not allow the establishment of causal relationships between the factors analyzed. In addition, the relatively small sample size may limit the generalizability of the results. However, the findings presented contribute to broaden knowledge about the nutritional profile and body composition of breast cancer survivors, providing relevant information on possible metabolic alterations in this population.

Thus, the results reinforce the importance of future investigations with larger samples and longitudinal designs, in order to deepen the understanding of these changes and support more effective clinical and nutritional follow-up strategies.

CONCLUSION

The women who survived breast cancer evaluated in this study had a high prevalence of excess weight associated with a significant reduction in muscle mass. The analysis of body composition revealed a profile characterized by an increase in body adiposity concomitant with a decrease in lean mass, evidencing changes that may have a negative impact on the metabolic and functional status of these patients in the post-treatment period. However, considering the cross-sectional design of the study, it is not possible to establish causal relationships between the variables evaluated.

These findings reinforce the importance of comprehensive nutritional assessment in the follow-up of breast cancer survivors, since traditional indicators, such as body mass index, may not adequately reflect changes in different body compartments. In this context, methods for assessing body composition, such as bioelectrical impedance, become relevant tools for a more

accurate identification of alterations related to fat accumulation and reduction of muscle mass.

The identification of these alterations can help to direct care strategies aimed at health promotion and clinical and nutritional follow-up of this population. However, the findings of this study should be interpreted with caution, since they represent descriptive data restricted to the sample evaluated, selected by convenience, which limits the generalization of the results.

Thus, the need to integrate nutritional monitoring with long-term care strategies for breast cancer survivors is highlighted, including actions that favor the maintenance of muscle mass and the control of body adiposity. In addition, further studies with larger samples and longitudinal designs are needed to deepen the understanding of changes in body composition and their possible impacts on the health and quality of life of this population.

REFERENCES

1. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, et al. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2021;71(3):209-249. doi:10.3322/caac.21660.

2. Jemal A, Soerjomataram I, Adams C. The Cancer Atlas. 3rd ed. Atlanta: American Cancer Society; 2020.

3. McHugh A, O'Connell E, Gurd B, et al. Mediterranean-style dietary interventions in adults with cancer: a systematic review of the methodological approaches, feasibility, and preliminary efficacy. Euro J of Clin Nutr. 2024; 78:463–476.

4. Curtis AR, Livingstone KM, Daly RM, Brayner B, Abbott G, Kiss N. Dietary patterns, malnutrition, muscle loss and sarcopenia in cancer survivors: findings from the UK Biobank. J Cancer Surviv. 2024 Dec;18(6):1889-1902. DOI: 10.1007/s11764-023-01428-8. Epub 2023 Jul 20. PMID: 37468793; PMCID: PMC11502595.

5. Epaminondas CMS, Carmo GM, Silva KM, Ferreira KD, Paulin RF. IMC: novos paradigmas na avaliação da obesidade e seus impactos clínicos. BACIMED Rev Bras Ciênc Méd. 2024. Disponível em: https://revistas.icesp.br/index.php/BACIMED/article/view/6449.

6. Elias GM, Barreto AB, Martucci RB, Souza NC. Determinantes da perda de peso e da redução da força muscular em pacientes com câncer do trato gastrointestinal submetidos à quimioterapia. Rev Bras Cancerol. 2025;71(1).

7. Gil AC. Métodos e técnicas de pesquisa social. 6ª ed. São Paulo: Atlas; 2008.

8. Alves PC, Carioca AAF, Sabry MOD, Pinheiro LGP, Oliveira AJN, Tavares NHC, et al. Análise vetorial de bioimpedância elétrica: comparação entre sobreviventes de câncer de mama e mulheres saudáveis. Nutr Clin Diet Hosp. 2017;37(2):50-55.

9. Wang C, Wang H, Zhang Y, et al. Cancer cachexia: molecular mechanisms and treatment strategies. J Hematol Oncol. 2023;16(1):117. DOI:10.1186/s13045-023-01454-0.

10. Su Y, Wu Y, Li C, Sun T, Li Y, Wang Z. Sarcopenia among treated cancer patients before and after neoadjuvant chemotherapy: a systematic review and meta-analysis of high-quality studies. Clin Transl Oncol. 2024 Aug;26(8):1844-1855. doi:

10.1007/s12094-024-03421-8. Epub 2024 Mar 12. PMID: 38467895.

11. Quantitative and Qualitative Radiological Assessment of Sarcopenia and Cachexia in Cancer Patients: A Systematic Review." Jour Person Med. 2024;14(3):243.

12. Roberto M, Barchiesi G, Resuli B, Verrico M, Speranza I, Cristofani L, et al. Sarcopenia in breast cancer patients: a systematic review and meta-analysis. Cancers (Basel). 2024;16(3):596. doi:10.3390/cancers16030596.

13. Morishita S, Kaida K, Tanaka T, Itani Y, Ikegame K, Okada M, et al. Prevalence of sarcopenia before stem cell transplantation. Supp Care Cancer. 2012;20(12):3161-3168.

14. Frio CC, Pretto ADB, Gonzalez MC, Pastor CA. Influência da composição corporal na qualidade de vida em pacientes com câncer. Rev Bras Cancerol. 2015;61(4):351-357.

15. Sales JN, Barbosa MC, Bezerra IN, Verde SMML. Consumo de alimentos ultraprocessados por mulheres sobreviventes do câncer de mama. Rev Bras Cancerol. 2020;66(3):e-141092. DOI:10.32635/2176-9745.RBC.2020v66n3.1092.

16. Agussalim NQ, Ahmad M, Prihantono P, Usman AN, Rafiah S, Agustin DI. Physical activity and quality of life in breast cancer survivors. Breast Dis. 2024;43:161-171. doi:10.3233/BD-249005.

17. Alves ALS, Castro CBL. Benefícios da atividade física no tratamento do câncer. Cad ESP. 2022;16(4).

18. Carneiro GS, Mendes LAPPF, Lopes DC, Deus LRS, Rodrigues KBR, Coutinho IVL, et al. Nutrição, exercício físico e profilaxia do câncer. Res Soc Dev. 2022;11(8):e29311830960. doi:10.33448/rsd-v11i8.30960.

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Conflict of Interest

The authors declare no conflicts of interest.

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