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Eduarda da Silva Limberger Castilhos

RELAÇÃO ENTRE O CONSUMO DE SUPLEMENTOS ESPORTIVOS E BIOMARCADORES RENAIS, HEPÁTICOS, DE GENOTOXICIDADE E DE ESTRESSE OXIDATIVO EM PRATICANTES DE ACADEMIA: uma análise correlacional e comparativa

Santa Cruz do Sul
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Dissertação apresentada ao Programa de Pós-Graduação em Promoção da Saúde – Mestrado e Doutorado, Área de Concentração em Promoção da Saúde, Linha de Pesquisa em Biodinâmica Humana. Universidade de Santa Cruz do Sul – UNISC, como requisito parcial para obtenção do título de Mestre em Promoção da Saúde.

Orientadora: Drª Silvia Isabel Rech Franke
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RESUMO

Introdução: O aumento da prática de exercícios físicos tem impulsionado o consumo de suplementos esportivos, especialmente em ambientes de academia, estimulando o crescimento da indústria e a diversificação dos produtos disponíveis. A ingestão simultânea de múltiplos suplementos levanta preocupações quanto à segurança metabólica, com possíveis impactos em biomarcadores hepáticos, renais e de genotoxicidade e estresse oxidativo. **Objetivo geral:** Investigar a relação entre o consumo de suplementos alimentares e biomarcadores renais, hepáticos, de genotoxicidade e de estresse oxidativo em praticantes de academia, por meio de análises correlacionais e comparativas. **Manuscrito 1:** Foram avaliados 355 indivíduos praticantes de atividades físicas em 14 academias, dos quais 59,4% relataram o uso de suplementos nutricionais. O consumo concomitante de dois suplementos esportivos foi a prática mais frequente entre os usuários (26,5%). A análise estatística revelou correlações significativas, embora de baixa magnitude, entre o número de suplementos utilizados e os níveis séricos de creatinina (Spearman r=0,198;p<0,001), ureia (Spearman r=0,107;p=0,047), ALT (Spearman r = 0,193;p < 0,001) e ALP (Spearman r = 0,123;p = 0,023). No entanto, após ajuste para potenciais variáveis de confusão, apenas a associação entre o número de suplementos e os níveis de ALT permaneceu estatisticamente significativa (r=0,148; p=0,006), indicando uma possível influência hepática relacionada à prática de multi-suplementação. Além disso, não foram observadas diferenças significativas (p>0,05) entre os grupos quanto aos marcadores de genotoxicidade (índice e frequência de danos no DNA, micronúcleos e brotos nucleares) ou aos biomarcadores de estresse oxidativo (TBARS e TEAC), sugerindo que, nas condições avaliadas, o uso de suplementos não promoveu alterações detectáveis nesses parâmetros. **Manuscrito 2:** Neste estudo, praticantes de atividades físicas em academias foram classificados em três grupos conforme o padrão de consumo de suplementos nutricionais: não uso (n=160), uso isolado (n=84) e uso de multi-suplementos (n=111). A análise comparativa entre os grupos revelou diferenças estatisticamente significativas nos biomarcadores renais e hepáticos, com níveis mais elevados de creatinina, ALT e ALP observados entre os participantes que faziam uso concomitante de múltiplos suplementos (Kruskal-Wallis: creatinina, p=0,001 e ALT, p=0,002). Contudo, após o ajuste para variáveis de confusão, como idade, sexo, índice de massa corporal e nível de atividade física, essas associações perderam significância estatística (p>0,05), indicando que os efeitos inicialmente observados podem estar relacionados a outros fatores, principalmnte relacionados ao sexo e idade. Além disso, não foram detectadas diferenças significativas (p>0,05) entre os grupos em relação aos marcadores de genotoxicidade (frequência de danos no DNA, micronúcleos e brotos nucleares) e aos biomarcadores de estresse oxidativo (TBARS e TEAC), sugerindo que, nas condições avaliadas, o padrão de suplementação não promoveu alterações mensuráveis nesses parâmetros**.** **Considerações finais**: Os resultados evidenciam que o uso de múltiplos suplementos podem levar a alterações discretas em biomarcadores renais e hepáticos, mas essas mudanças são moduladas principalmente por fatores individuais como idade e sexo. Além disso, não foram observados impactos significativos em marcadores de genotoxicidade ou estresse oxidativo, indicando segurança do consumo concomitante em indivíduos saudáveis. Esses achados reforçam a importância do acompanhamento profissional e da avaliação individualizada na prescrição de suplementos, contribuindo para práticas de suplementação mais seguras e baseadas em evidências.

Palavras chaves: Praticantes de academia; Suplementos esportivos; Biomarcadores renais e hepáticos; Genotoxicidade; Estresse oxidativo

ABSTRACT

Introduction: The increase in physical exercise practice has driven the consumption of sports supplements, especially in gym environments, stimulating the growth of the industry and the diversification of available products. The simultaneous intake of multiple supplements raises concerns regarding metabolic safety, with possible impacts on hepatic, renal, genotoxicity, and oxidative stress biomarkers. **General objective:** To investigate the relationship between dietary supplement consumption and renal, hepatic, genotoxicity, and oxidative stress biomarkers in gym-goers through correlational and comparative analyses.
Manuscript 1: A total of 355 individuals engaged in physical activities at gyms were evaluated, of whom 59.4% reported the use of nutritional supplements. The concurrent consumption of two products was the most frequent practice among users (26.5%). Statistical analysis revealed significant, although low-magnitude, correlations between the number of supplements used and serum levels of creatinine (Spearman $r = 0.198$; $p < 0.001$), urea (Spearman $r = 0.107$; $p = 0.047$), ALT (Spearman $r = 0.193$; $p < 0.001$), and ALP (Spearman $r = 0.123$; $p = 0.023$). However, after adjustment for potential confounding variables, only the association between the number of supplements and ALT levels remained statistically significant ($r = 0.148$; $p = 0.006$), indicating a possible hepatic influence related to multi-supplementation practices. Furthermore, no significant differences ($p > 0.05$) were observed between groups regarding genotoxicity markers (Visual score and frequency, micronuclei, and nuclear buds) or oxidative stress bio
Manuscript 2: In this study, gym-goers were classified into three groups according to their pattern of dietary supplement consumption: non-use ($n = 160$), single-supplement use ($n = 84$), and multi-supplement use ($n = 111$). Comparative analysis between the groups revealed statistically significant differences in renal and hepatic biomarkers, with higher levels of creatinine, ALT, and ALP observed among participants who concomitantly used multiple supplements (Kruskal-Wallis: creatinine, $p = 0.001$; ALT, $p = 0.002$). However, after adjusting for confounding variables such as age, sex, body mass index, and physical activity level, these associations lost statistical significance ($p > 0.05$), indicating that the initially observed effects may be related to other factors, mainly sex and age. Moreover, no significant differences ($p > 0.05$) were detected between groups regarding genotoxicity markers (frequency of DNA damage, micronuclei, and nuclear buds) or oxidative stress biomarkers (TBARS and TEAC), suggesting that. **Final considerations**: The results demonstrate that the use of multiple supplements may lead to subtle alterations in renal and hepatic biomarkers, but these changes are mainly modulated by individual factors such as age and sex. Additionally, no significant effects were observed on genotoxicity or oxidative stress markers, indicating the safety of concurrent supplement consumption in healthy individuals. These findings reinforce the importance of professional monitoring and individualized assessment in supplement prescription, contributing to safer and evidence-based supplementation practices.

Keywords: Gym-goers; Sports supplements; Renal and hepatic biomarkers; Genotoxicity; Oxidative stress.

LISTA DE ABREVIATURAS E SIGLAS

ALT - Alanina aminotransferase
AST - Aspartato aminotransferase
ALP - Fosfatase alcalina
BMCyt - Ensaio micronúcleo bucal
DNA - Ácido Desoxirribonucleico
DTAC - Capacidade antioxidante total da dieta
LAPES - Laboratório de Pesquisa em Saúde (LAPES)
PPGPS - Programa de Pós-Graduação em Promoção da Saúde – Mestrado e Doutorado
TEAC- Capacidade antioxidante plasmática
TBARS - Substâncias reativas ao ácido tiobarbitúrico
TCLE - Termo de Consentimento Livre e Esclarecido
UFCSPA - Universidade Federal de Ciências da Saúde de Porto Alegre
UNISC - Universidade de Santa Cruz do Sul

SUMÁRIO

APRESENTAÇÃO

A presente dissertação, apresentada ao Programa de Pós-Graduação em Promoção da Saúde da Universidade de Santa Cruz do Sul (UNISC) e vinculada à linha de pesquisa "Biodinâmica Humana", tem como objetivo investigar a relação entre o consumo de suplementos alimentares e biomarcadores de função renal e hepática, genotoxicidade e estresse oxidativo em praticantes de academia. O estudo foi conduzido por meio de análises correlacionais e comparativas, buscando responder às seguintes questões: (1) o número de suplementos esportivos consumidos está correlacionado com biomarcadores renais, hepáticos, de genotoxicidade e de estresse oxidativo em praticantes de academia?; e (2) qual(ais) é(são) o(s) impacto(s) dos diferentes padrões de consumo de suplementos esportivos (não uso, uso isolado e uso de multi-suplementação) sobre os biomarcadores renais e hepáticos, de genotoxicidade e de estresse oxidativo em praticantes de academia?

O tema justifica-se pela crescente adesão ao uso de suplementos nutricionais entre praticantes de exercícios físicos, frequentemente sem acompanhamento profissional, o que pode gerar potenciais riscos à saúde. Nesse contexto, este estudo visa contribuir com evidências científicas que subsidiem estratégias nutricionais mais eficazes, baseadas em recomendações seguras e individualizadas.

Apresentação da autora

Sou Eduarda Limberger, nutricionista formada pela Universidade de Santa Cruz do Sul (UNISC). Durante a graduação, atuei como bolsista de iniciação científica, oportunidade que me permitiu aprofundar os conhecimentos sobre o perfil e os hábitos alimentares de praticantes de academia — área pela qual desenvolvi grande interesse e dedicação.

Minha trajetória acadêmica e profissional é marcada pelo compromisso com a promoção de uma alimentação consciente e equilibrada, pautada em evidências científicas e no respeito às individualidades. Busco compreender os potenciais efeitos do uso de suplementos esportivos sobre a saúde, especialmente quanto aos aspectos renais, hepáticos e genotóxicos, contribuindo para a construção de práticas mais seguras e efetivas na nutrição esportiva.

Articulação da dissertação com o PPGPS

A proposta desta pesquisa está alinhada à perspectiva interdisciplinar do Programa de Pós-Graduação em Promoção da Saúde (PPGPS), que busca integrar diferentes áreas do conhecimento para a compreensão dos determinantes biológicos, comportamentais e sociais da saúde.

A linha de pesquisa Biodinâmica Humana favorece a investigação de aspectos fisiológicos e

metabólicos relacionados à prática de atividade física e à alimentação, aproximando a Nutrição de outras áreas da saúde. Sob essa ótica, esta dissertação contribui para o fortalecimento das ações de promoção da saúde, ao propor reflexões sobre o uso racional de suplementos e suas repercussões no organismo humano, com base em uma abordagem científica e multiprofissional.

Produtos da dissertação

Os produtos gerados a partir desta dissertação consistem em dois manuscritos científicos:

- Manuscrito 1: *"Association between the number of supplements used and renal/hepatic, genotoxicity, and oxidative stress biomarkers in gym-goers"*, elaborado conforme as diretrizes da European Journal of Nutrition (Qualis Interdisciplinar A1; fator de impacto 4.3) e em fase de submissão.
- Manuscrito 2: *"Impact of sport supplement usage patterns and renal/hepatic, genotoxicity, and oxidative stress biomarkers in gym-goers"*, elaborado conforme as diretrizes da Sports Medicine (Qualis Interdisciplinar A2; fator de impacto 5.9) e em fase de submissão.

Estrutura da dissertação

A presente dissertação está organizada por tópicos, iniciando-se com esta Apresentação, que contempla a identificação da autora, a linha de pesquisa à qual o trabalho está vinculado, sua articulação com o Programa de Pós-Graduação em Promoção da Saúde (PPGPS), a descrição dos produtos gerados e a estrutura geral do documento.

Em seguida, apresenta-se a Introdução Geral, o Marco Teórico e os Objetivos (geral e específicos). Na sequência, constam os dois manuscritos científicos, seguidos pelas Conclusões Gerais e Considerações Finais, que sintetizam os principais achados e reflexões decorrentes da pesquisa.

Por fim, a dissertação inclui as Perspectivas Futuras, a Nota à Imprensa, o Relatório de Campo, as Referências e os Anexos, os quais complementam e documentam o percurso metodológico e os resultados do estudo.

1 INTRODUÇÃO

O uso de suplementos esportivos entre praticantes de exercícios físicos tem se tornado cada vez mais frequente nas últimas décadas, motivado por objetivos que vão desde a melhora do desempenho esportivo e composição corporal até a promoção da saúde e bem-estar geral (Borges; Sousa; da Costa, 2022; Moradi *et al*., 2024; de Oliveira *et al*., 2024). Um padrão preocupante dentro desse contexto é o consumo concomitante de dois ou mais suplementos, prática que pode aumentar significativamente o risco de interações e sobrecarga metabólica.

No Brasil, Oliveira *et al*. (2024) identificaram prevalência de 90,5% no uso de suplementos entre triatletas recreacionais, destacando a associação simultânea de diferentes produtos, como whey protein, isotônicos, creatina e cafeína. De forma semelhante, Moradi *et al*. (2024) observaram que 57,9% dos atletas de academias no Irã faziam uso combinado de suplementos, especialmente vitaminas, ômega-3 e compostos ergogênicos, com foco em desempenho e estética. Complementarmente, Borges, Sousa e da Costa (2022) relataram que 68% dos adultos fisicamente inativos em Brasília utilizavam suplementos, principalmente multivitamínicos e proteínas, indicando que o consumo extrapola o contexto esportivo. Em conjunto, esses achados revelam um padrão crescente de uso múltiplo de suplementos, com prevalências entre 57% e 90%, e reforçam a importância do acompanhamento nutricional qualificado para evitar riscos associados ao uso indiscriminado.

Apesar da popularidade desses produtos, os impactos do uso de suplementos sobre biomarcadores clínicos ainda são pouco compreendidos, especialmente em usuários de academia. A creatina, por exemplo, pode elevar a creatinina sérica sem indicar comprometimento real da função renal, o que levanta questionamentos sobre a interpretação isolada de biomarcadores tradicionais (Bender *et al*., 2021; Rauch; Latz, 2023). Além disso, estudos sugerem que o consumo excessivo de suplementos pode desencadear processos inflamatórios, estresse oxidativo e até mesmo genotoxicidade, efeitos que podem ser monitorados por meio de biomarcadores específicos e testes laboratoriais (Martínez-Sanz *et al*., 2021).

Diante dessa realidade, torna-se fundamental aprofundar a compreensão sobre a relação entre o número, bem como, o padrão de suplementos utilizados e possíveis alterações fisiológicas mensuráveis. Nesse sentido, a identificação de possíveis riscos associados ao padrão de consumo de suplementos esportivos poderá contribuir para o desenvolvimento de estratégias de educação nutricional e de regulação mais eficazes, promovendo o uso seguro e consciente desses produtos. Assim, o presente estudo define como problema**:** como o consumo de suplementos esportivos, considerando o número de suplementos utilizados e os diferentes padrões de uso, se relaciona com biomarcadores renais, hepáticos, de genotoxicidade e de estresse oxidativo em praticantes de academia?

2 RELAÇÃO ENTRE O CONSUMO DE SUPLEMENTOS ESPORTIVOS E BIOMARCADORES RENAIS, HEPÁTICOS, DE GENOTOXICIDADE E DE ESTRESSE OXIDATIVO EM PRATICANTES DE ACADEMIA

O consumo de suplementos esportivos tornou-se uma prática amplamente difundida entre praticantes de exercícios físicos, especialmente em ambientes como academias, onde há um incentivo constante à melhora estética, ao desempenho atlético e ao aumento da massa muscular (Borges; Sousa, da Costa, 2022; Moradi *et al.*, 2024; de Oliveira *et al*., 2024). Apesar da ampla comercialização e da percepção popular de segurança, o uso indiscriminado ou em combinações múltiplas desses produtos, frequentemente sem acompanhamento profissional, pode representar riscos significativos à saúde, particularmente no que diz respeito à integridade das funções hepática e renal, bem como à indução de danos celulares (Kreider *et al.*, 2017; Oliveira *et al*., 2021).

Evidências crescentes sugerem que a exposição prolongada a determinadas substâncias presentes nos suplementos pode desencadear alterações bioquímicas e moleculares mensuráveis por biomarcadores laboratoriais, indicando potenciais efeitos adversos, como estresse oxidativo, genotoxicidade e sobrecarga metabólica (Linares *et al*., 2021; Mello *et al*., 2016). A avaliação desses biomarcadores torna-se essencial para compreender as consequências do consumo abusivo ou não supervisionado, especialmente em indivíduos fisicamente ativos, cujas demandas fisiológicas já se encontram elevadas. No entanto, as evidências que relacionam diretamente o número de suplementos ingeridos com alterações específicas em biomarcadores de toxicidade ainda são escassas, indicando a necessidade de mais estudos com abordagem multidimensional e metodologias robustas (Friedrich *et al.*, 2020; Domingues *et al*., 2020).

2.1 Uso de suplementos esportivos por praticantes de exercícios físicos

O uso de suplementos esportivos por praticantes de exercícios físicos tem se tornado cada vez mais comum nas últimas décadas, impulsionado por motivações relacionadas ao desempenho esportivo, ao ganho de massa muscular e à estética corporal. Estudos recentes destacam que fatores sociodemográficos, como idade, sexo, escolaridade e classe socioeconômica, influenciam significativamente o padrão de consumo desses produtos (Fonseca *et al*., 2023; Peralta *et al*., 2021). Por exemplo, adultos jovens, homens, com maior escolaridade e poder aquisitivo tendem a utilizar suplementos com mais frequência, especialmente os classificados como proteínas, termogênicos e pré-treinos (Silva *et al*., 2024).

A prática regular de exercícios físicos em academia é um dos impulsionadores do uso de suplementos esportivos. Além disso, a exposição à cultura *fitness* em redes sociais também está entre os principais motivadores do uso de suplementos, que muitas vezes, é realizada sem

orientação de profissionais da saúde (Machado *et al*., 2022). A influência de treinadores, amigos e influenciadores digitais também tem sido apontada como relevante na decisão de iniciar ou manter a suplementação, substituindo, em muitos casos, o aconselhamento técnico de nutricionistas (Pereira *et al*., 2021; Friedrich *et al*., 2020). Todos esses fatores podem levar ao uso abusivo ou desnecessário de suplementos, inclusive com combinações de múltiplos produtos que aumentam os riscos à saúde quando não há acompanhamento profissional adequado.

Ainda que alguns suplementos possam ser benéficos em situações específicas, o uso indiscriminado levanta preocupações quanto à segurança metabólica e à dependência comportamental. Portanto, compreender os fatores que influenciam esse consumo é fundamental para o desenvolvimento de estratégias de educação em saúde, políticas públicas de regulação e incentivo à orientação nutricional individualizada (Loureiro *et al*., 2022; Linares *et al*., 2021).

2.2 Uso concomitante de múltiplos suplementos: riscos e motivações

O uso concomitante de múltiplos suplementos tem se tornado uma prática comum entre praticantes de atividade física, especialmente aqueles que buscam maximizar resultados como ganho de massa muscular, aumento de desempenho e redução de gordura corporal (Galman *et al*., 2024). Estudos indicam que uma parcela significativa dos usuários consome dois ou mais suplementos simultaneamente, o que pode estar relacionado a motivações como a crença em efeitos sinérgicos, influência das redes sociais e publicidade agressiva, além da busca por resultados rápidos (Pereira *et al*., 2021; Machado *et al*., 2022). Essas práticas, entretanto, frequentemente ocorrem sem orientação profissional adequada, elevando os riscos à saúde.

Em termos de riscos, o consumo simultâneo de múltiplos suplementos pode levar à sobrecarga metabólica, interação entre compostos ativos e elevar biomarcadores renais e hepáticos (Silva *et al*., 2024; Wei *et al*., 2021). A combinação indiscriminada aumenta a possibilidade de efeitos adversos, que podem passar despercebidos por serem subclínicos, mas que, com o tempo, podem comprometer a saúde do usuário (Fonseca *et al*., 2023). Além disso, o uso concomitante pode dificultar a identificação da causa de possíveis efeitos colaterais, uma vez que múltiplos ingredientes e dosagens diferentes são envolvidos. A literatura reforça a importância do acompanhamento profissional para garantir a segurança e a eficácia do uso de suplementos, minimizando riscos por meio de avaliações individualizadas e monitoramento contínuo (Machado *et al*., 2022; Galman *et al*., 2024).

2.3 Biomarcadores renais e hepáticos: interpretação e implicações clínicas

A avaliação de biomarcadores renais e hepáticos é essencial para monitorar a saúde de

indivíduos, especialmente aqueles expostos a fatores de risco como o uso de suplementos esportivos. Enzimas hepáticas como alanina aminotransferase (ALT) e fosfatase alcalina (ALP) são amplamente utilizadas para detectar lesões ou disfunções no fígado, uma vez que alterações nesses marcadores podem indicar processos inflamatórios ou toxicológicos hepáticos (Schlickmann *et al*., 2021). Já a creatinina sérica é o principal marcador utilizado para avaliação da função renal, refletindo a taxa de filtração glomerular e possíveis sobrecargas renais, especialmente em contextos de suplementação proteica ou ergogênica (Vilar Neto *et al*., 2020; Longobardi *et al*., 2023).

Estudos recentes evidenciam que o uso combinado e não supervisionado de suplementos esportivos pode estar associado a alterações modestas, porém clinicamente relevantes, nos níveis desses biomarcadores, sugerindo um impacto potencial sobre o metabolismo hepático e renal (Wei *et al*., 2021; Souza *et al*., 2013). Por outro lado, pesquisas em populações saudáveis apontam que suplementações controladas, como a creatina, são seguras e não resultam em danos renais significativos, apesar de elevarem a creatinina sérica como um efeito benigno (De Oliveira Vilar Neto *et al*., 2020). Essas evidências ressaltam a importância da interpretação criteriosa dos biomarcadores em conjunto com o histórico clínico e o acompanhamento profissional, para evitar diagnósticos precipitados e garantir a segurança dos praticantes de atividade física.

2.4 Potencial geração de genotoxicidade e estresse oxidativo associados ao uso de suplementos esportivos

O uso de suplementos esportivos tem crescido expressivamente entre praticantes de atividade física, mas a preocupação com seus efeitos genotóxicos potenciais vem ganhando destaque na literatura científica. A genotoxicidade refere-se à capacidade de substâncias causarem danos ao material genético, podendo levar a mutações, instabilidade cromossômica e, em longo prazo, aumento do risco de doenças crônicas, incluindo câncer (Santos *et al*., 2023). Embora muitos suplementos esportivos sejam considerados seguros, evidências recentes indicam que alguns componentes podem induzir danos ao DNA e estresse oxidativo, especialmente quando usados em combinações múltiplas ou em doses elevadas (Molz *et al*., 2023; Kerksick *et al*., 2021).

Estudos que avaliaram marcadores de genotoxicidade, como o ensaio cometa e a frequência de micronúcleos, em praticantes de academia que consumiam suplementos mostraram resultados variados. Enquanto alguns apontaram para a ausência de efeitos genotóxicos significativos (Longobardi *et al*., 2023), outros detectaram aumento discreto na frequência de danos ao DNA associado ao uso de suplementos (Molz *et al*., 2023). A presença de compostos antioxidantes em certas formulações pode atenuar esses efeitos, mas a falta de padronização e o uso indiscriminado sem supervisão profissional representam um risco

potencial à estabilidade genômica dos usuários (Velasco *et al*., 2022; Kerksick *et al*., 2021). Portanto, a avaliação rigorosa dos riscos genotóxicos deve integrar o monitoramento dos praticantes, visando minimizar danos celulares e promover o uso seguro e responsável desses produtos.

2.5 Importância do acompanhamento profissional no uso de suplementos esportivos para a promoção da saúde de praticantes de academia

O uso crescente de suplementos esportivos entre praticantes de atividade física evidencia a necessidade de orientação e acompanhamento profissional para garantir a segurança e a eficácia dessas práticas. A supervisão por nutricionistas, médicos ou outros profissionais qualificados é fundamental para individualizar a suplementação, considerando fatores como necessidades nutricionais, condições de saúde, objetivos específicos e possíveis interações medicamentosas (Galman *et al*., 2024; Moghaddam *et al*., 2022). Sem essa orientação, o consumo indiscriminado pode levar à ingestão excessiva de nutrientes, riscos de toxicidade, efeitos adversos sobre órgãos como fígado e rins, e potencial exacerbação do estresse oxidativo e danos celulares (Molz *et al*., 2023; Kerksick *et al*., 2021).

Além disso, o acompanhamento profissional possibilita o monitoramento contínuo por meio de exames laboratoriais e biomarcadores, permitindo a detecção precoce de alterações hepáticas, renais e genotóxicas, e ajustes na prescrição dos suplementos quando necessário (Galman *et al*., 2024). Esse cuidado integrado promove o uso racional dos suplementos, reduz os riscos associados à automedicação e potencializa os benefícios, especialmente em populações que fazem uso concomitante de múltiplos produtos. Dessa forma, o suporte técnico especializado se configura como uma estratégia essencial para a promoção da saúde e o desempenho esportivo sustentável (Velasco *et al*., 2022; Moghaddam *et al*., 2022).

2.6 A importância da interdisciplinaridade na relação entre o uso de suplementos esportivos e marcadores renais, hepáticos, de genotoxicidade e estresse oxidativo em praticantes de academia

A abordagem interdisciplinar no acompanhamento de praticantes de atividade física que fazem uso de suplementos esportivos tem se mostrado essencial para propiciar segurança, eficácia e saúde integral do indivíduo. Profissionais de diversas áreas, como nutricionistas, médicos, educadores físicos e psicólogos, devem atuar de forma integrada para avaliar aspectos nutricionais, funcionais, comportamentais e psicológicos relacionados à suplementação, prevenindo riscos como a sobrecarga metabólica, efeitos adversos hepáticos e renais, e o uso inadequado ou excessivo desses produtos (Galman *et al*., 2024; Molz *et al*., 2023). Essa sinergia

permite não apenas a personalização do plano alimentar e suplementar, mas também o suporte emocional e educacional, promovendo adesão consciente e mudanças de hábitos sustentáveis (Kerksick *et al*., 2021).

Além disso, o trabalho interdisciplinar facilita o monitoramento contínuo por meio de exames laboratoriais, avaliação de biomarcadores e acompanhamento clínico, proporcionando um cuidado mais completo e preventivo, sobretudo em contextos onde há o consumo concomitante de múltiplos suplementos (Velasco *et al*., 2022; Moghaddam *et al*., 2022). Ao integrar conhecimentos e práticas de diferentes áreas da saúde e do esporte, a interdisciplinaridade contribui para a otimização do desempenho físico, redução dos riscos à saúde e a promoção do bem-estar geral do praticante, configurando-se como uma estratégia indispensável frente à complexidade do consumo suplementar no meio esportivo contemporâneo.

3 OBJETIVOS

3.1 Objetivo geral

Investigar a relação entre o consumo de suplementos esportivos e biomarcadores renais, hepáticos, de genotoxicidade e de estresse oxidativo em praticantes de academia, por meio de análises correlacionais e comparativas.

3.2 Objetivos específicos

Artigo 1:

- Avaliar do número de suplementos utilizados por praticantes de academia;
- Avaliar biomarcadores renais, hepáticos, de genotoxicidade e de estresse oxidativo em praticantes de academia;
- Investigar a influência do número de suplementos utilizados nos biomarcadores renais, hepáticos, de genotoxicidade e de estresse oxidativo em praticantes de academia.

Artigo 2:

- Determinar padrões de consumo de suplementos esportivos em praticantes de academia;
- Avaliar biomarcadores renais, hepáticos, de genotoxicidade e de estresse oxidativo em praticantes de academia;
- Avaliar o impacto de diferentes padrões de consumo de suplementos esportivos (não uso, uso isolado e multisuplementação) sobre biomarcadores renais, hepáticos, de genotoxicidade e de estresse oxidativo em praticantes de academia.

4 PRODUTOS BIBLIOGRÁFICOS DA DISSERTAÇÃO

Nesta sessão, são apresentados os produtos bibliográficos resultantes desta dissertação, compostos por dois manuscritos elaborados a partir dos resultados obtidos

Manuscrito 1**,** intitulado *"Association between the number of supplements used and renal/hepatic, genotoxicity, and oxidative stress biomarkers in gym-goers"*, foi desenvolvido conforme as diretrizes da European Journal of Nutrition (Qualis Interdisciplinar A1; fator de impacto 4.3) e está em fase de submissão. Este artigo configura-se como um *Original Article* e aborda a associação entre o número de suplementos utilizados e marcadores de função renal e hepática, genotoxicidade e estresse oxidativo em praticantes de academia.

O Manuscrito 2, intitulado *"Impact of sport supplement usage patterns and renal/hepatic, genotoxicity, and oxidative stress biomarkers in gym-goers"*, foi elaborado conforme as diretrizes da revista Sports Medicine (Qualis Interdisciplinar A2; fator de impacto 5.9) e encontra-se em fase de submissão. Este estudo visa avaliar o impacto dos padrões de uso de suplementos esportivos sobre biomarcadores de função renal e hepática, genotoxicidade e estresse oxidativo em praticantes de academia.

ANEXOS

ANEXO A - AUTORIZAÇÃO PARA USO DE DADOS

UNIVERSIDADE DE SANTA CRUZ DO SUL
PROGRAMA DE PÓS-GRADUAÇÃO EM PROMOÇÃO DA SAÚDE
MESTRADO E DOUTORADO
ÁREA DE CONCENTRAÇÃO EM PROMOÇÃO DA SAÚDE

CARTA DE AUTORIZAÇÃO

Eu, Silvia Isabel Rech Franke, Docente do Departamento de Ciências da Saúde da Universidade de Santa Cruz do Sul – UNISC, coordenadora da Pesquisa intitulada "USO DE SUPLEMENTOS ALIMENTARES POR ADULTOS E IDOSOS USUÁRIOS DE ACADEMIAS: hábitos de vida, de saúde e da prática de exercícios físicos e a relação com a composição nutricional, composição corporal, marcadores hepáticos e renais e instabilidade genômica", aprovada pelo Comitê de Ética em Pesquisa do Seres Humanos da UNISC, sob parecer número 5.121.729 e CAAE 53004021.9.0000.5343, autorizo a mestranda Eduarda da Silva Limberger Castilhos, do Programa de Pós Graduação em Promoção da Saúde, a utilizar os dados referentes ao objeto do estudo da dissertação, intitulada "RELAÇÃO ENTRE O CONSUMO DE SUPLEMENTOS ESPORTIVOS E BIOMARCADORES RENAIS, HEPÁTICOS, DE GENOTOXICIDADE E DE ESTRESSE OXIDATIVO EM PRATICANTES DE ACADEMIA: uma análise correlacional e comparativa".

Santa Cruz do Sul, 25 de janeiro de 2025.

Profa. Dra. Silvia Isabel Rech Franke
Coordenadora do projeto

ANEXO B - APROVAÇÃO DO COMITÊ DE ÉTICA EM PESQUISA - UNISC

CEP COMITÊ DE ÉTICA EM PESQUISA DA UNISC

UNISC - UNIVERSIDADE DE SANTA CRUZ DO SUL

Plataforma Brasil

PARECER CONSUBSTANCIADO DO CEP

DADOS DO PROJETO DE PESQUISA

Título da Pesquisa: USO DE SUPLEMENTOS ALIMENTARES POR ADULTOS E IDOSOS USUÁRIOS DE ACADEMIAS: hábitos de vida, de saúde e da prática de exercícios físicos e a relação com a composição nutricional, composição corporal, marcadores hepáticos e renais e instabilidade genômica

Pesquisador: Silvia Isabel Rech Franke

Área Temática:

Versão: 2

CAAE: 53004021.9.0000.5343

Instituição Proponente: Universidade de Santa Cruz do Sul - UNISC

Patrocinador Principal: Financiamento Próprio

DADOS DO PARECER

Número do Parecer: 5.121.729

Apresentação do Projeto:

Trata-se da apresentação do projeto de pesquisa intitulado "USO DE SUPLEMENTOS ALIMENTARES POR ADULTOS E IDOSOS USUÁRIOS DE ACADEMIAS: hábitos de vida, de saúde e da prática de exercícios físicos e a relação com a composição nutricional, composição corporal, marcadores hepáticos e renais e instabilidade genômica", cuja pesquisadora responsável é a Profª Drª Silvia Isabel Rech Franke.

As informações foram retiradas do arquivo Informações Básicas do Projeto (PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_1852830.pdf 12/11/2021)

Objetivo da Pesquisa:

Objetivo Primário:

Avaliar e comparar o uso ou não de suplementos alimentares por adultos e idosos usuários de academias, avaliando hábitos de vida, de saúde e da prática de exercícios físicos e a relação com composição nutricional, composição corporal, da função renal e hepática e instabilidade genômica.

Objetivo Secundário:

• identificar o tipo, a quantidade e o tempo do uso de suplementos alimentares entre adultos e

Endereço: Av. Independência, nº 2293 -Bloco 13, sala 1306
Bairro: Universitario **CEP:** 96.815-900
UF: RS **Município:** SANTA CRUZ DO SUL
Telefone: (51)3717-7680 **E-mail:** cep@unisc.br

idosos usuários de academias;
• avaliar e comparar os hábitos de vida, de saúde e da prática de exercícios físicos, entre adultos e idosos usuários de academias, bem como relacionar com o uso ou não de suplementos alimentares;
• analisar e comparar a composição alimentar, levando em consideração o uso ou não de suplementos alimentares, entre adultos e idosos usuários de academias;
• avaliar e comparar a composição corporal entre adultos e idosos usuários de academias, bem como relacionar com o uso ou não de suplementos alimentares;
• verificar e comparar possíveis alterações nos marcadores bioquímicos da função renal e hepática entre adultos e idosos usuários de academias, bem como relacionar com o uso ou não de suplementos alimentares;
• associar e comparar a composição nutricional, levando em consideração o uso ou não de suplementos alimentares, de adultos e idosos usuários de academias, com possíveis alterações na função renal e hepática;
• avaliar e comparar a instabilidade genômica entre adultos e idosos usuários de academias, em como relacionar com o uso ou não de suplementos alimentares;
• associar e comparar possíveis alterações da função renal e hepática, bem como a instabilidade genômica entre adultos e idosos usuários de academias com o tipo, a quantidade e o tempo do uso de suplementos alimentares, hábitos de vida, de saúde, e da prática de exercícios físicos.
• Utilizar os dados coletados para a realização de trabalhos de conclusão de curso sob orientação da proponente da pesquisa.

As informações foram retiradas do arquivo Informações Básicas do Projeto (PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_1852830.pdf 12/11/2021)

Avaliação dos Riscos e Benefícios:

Riscos:

Problemas com a conexão de internet no momento do preenchimento do questionário on-line ou desconforto para fornecer alguns dos dados, além de cansaço ou aborrecimento por causa do tempo tomado para o preenchimento do questionário e receio pela possível quebra de sigilo. Também poderá acontecer certo constrangimento para realização da avaliação da composição corporal e do recordatório alimentar ou um pequeno arroxeado na região da punção, eventualmente, devido à coleta sanguínea que desaparece em poucos dias.

Benefícios:
Orientar aos participantes, após a entrevista, a importância do uso de suplementos alimentares de forma adequada e alertar os possíveis riscos adversos à saúde. Além, disso será disponibilizado aos participantes laudos referentes à adequação do consumo alimentar, composição corporal e dos exames bioquímicos, bem como será planejado ações e estratégias para orientações que visam melhorar o entendimento do impacto da suplementação alimentar sobre a composição nutricional e corporal, as possíveis alterações sobre os marcadores renal e hepático, bem como com marcadores de instabilidade genômica, minimizando o impacto negativo sobre a saúde.

As informações foram retiradas do arquivo Informações Básicas do Projeto
(PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_1852830.pdf 12/11/2021)

Comentários e Considerações sobre a Pesquisa:
A presente pesquisa trata-se de um estudo transversal, quantitativo, de delineamento descritivo observacional comparativo, através de pesquisa com usuários de academias, adultos e idosos, de Santa Cruz do Sul, Brasil. Contando com Tamanho da Amostral de 463 participantes.

As informações foram retiradas do arquivo Projeto Detalhado / Brochura Investigador
(Projeto_LinkQuest_TCLEalteracoes.pdf 12/11/2021)

Considerações sobre os Termos de apresentação obrigatória:
Vide campo "Conclusões ou Pendências e Lista de Inadequações".

Recomendações:
Vide campo "Conclusões ou Pendências e Lista de Inadequações".

Conclusões ou Pendências e Lista de Inadequações:
Projeto APROVADO e em condições de ser executado conforme documentos anexados à Plataforma Brasil e validados pelo CEP_UNISC.

Considerações Finais a critério do CEP:
PROJETO APROVADO e em condições de ser executado conforme documentos anexados à Plataforma Brasil e validados pelo CEP-UNISC.
Alerta-se o pesquisador responsável para a necessidade de realizar e encaminhar ao CEP-UNISC, via Plataforma Brasil, os Relatórios Parciais de Acompanhamento da Pesquisa e o Relatório Final de Acompanhamento da Pesquisa. Os formulários para os relatórios estão disponíveis no link do CEP-

UNISC (https://www.unisc.br/pt/pesquisa/comite-de-etica), aba Documentação, Arquivo "Modelo de Relatório Parcial ou Final de Pesquisa". É o mesmo formulário para ambos os relatórios (as marcações no próprio formulário é que diferem, a depender da natureza do projeto).

Este parecer foi elaborado baseado nos documentos abaixo relacionados:

Tipo Documento	Arquivo	Postagem	Autor	Situação
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_1852830.pdf	12/11/2021 16:47:53		Aceito
Projeto Detalhado / Brochura Investigador	Projeto_LinkQuest_TCLEalteracoes.pdf	12/11/2021 16:47:22	Silvia Isabel Rech Franke	Aceito
Outros	CartaRespostaCEP.pdf	12/11/2021 16:34:08	Silvia Isabel Rech Franke	Aceito
Declaração de Instituição e Infraestrutura	Carta_aceite_AcademiaG2F_assinada.pdf	12/11/2021 16:24:55	Silvia Isabel Rech Franke	Aceito
Declaração de Instituição e Infraestrutura	Carta_aceite_AcademiaSESC_assinada.pdf	12/11/2021 16:24:39	Silvia Isabel Rech Franke	Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	TCLEalteracoes.pdf	12/11/2021 16:24:12	Silvia Isabel Rech Franke	Aceito
Declaração de Instituição e Infraestrutura	Cartas_Academias.pdf	03/11/2021 15:30:36	Silvia Isabel Rech Franke	Aceito
Declaração de Instituição e Infraestrutura	cartaCEPlaboratorioBioquimicadoexercicioassinada.pdf	03/11/2021 15:04:49	Silvia Isabel Rech Franke	Aceito
Declaração de Instituição e Infraestrutura	cartaCEPlaboratorionutricaoassinada.pdf	03/11/2021 15:04:18	Silvia Isabel Rech Franke	Aceito
Folha de Rosto	Folha_de_Rosto_Assinada.pdf	03/11/2021 14:59:43	Silvia Isabel Rech Franke	Aceito
Orçamento	Orcamento_projetoAssinado.pdf	03/11/2021 12:03:58	Silvia Isabel Rech Franke	Aceito
Outros	CartaApresentacaoaoCEPAssinada.pdf	03/11/2021 12:01:40	Silvia Isabel Rech Franke	Aceito

Situação do Parecer:

Aprovado

Necessita Apreciação da CONEP:
Não

SANTA CRUZ DO SUL, 23 de Novembro de 2021

Assinado por:
Renato Nunes
(Coordenador(a))

ANEXO C- QUESTIONÁRIO ON-LINE

Pesquisa "USO DE SUPLEMENTOS ALIMENTARES POR ADULTOS E IDOSOS USUÁRIOS DE ACADEMIAS: hábitos de vida, de saúde e da prática de exercícios físicos e a relação com a composição nutricional, composição corporal, marcadores hepáticos e renais e instabilidade genômica"

*Obrigatório

1. Endereço de e-mail *

CONSENTIMIENTO INFORMADO/TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO (TCLE)

Prezado(a) senhor(a),

Você está sendo convidado/a para participar como voluntário do projeto de pesquisa intitulado "USO DE SUPLEMENTOS ALIMENTARES POR ADULTOS E IDOSOS USUÁRIOS DE ACADEMIAS: hábitos de vida, de saúde e da prática de exercícios físicos e a relação com a composição nutricional, composição corporal, marcadores hepáticos e renais e instabilidade genômica, que pretende avaliar e comparar o uso ou não de suplementos alimentares por usuários de academias brasileiros, na fase adulta e idosa, avaliando hábitos de vida, de saúde e da prática de exercícios físicos e a relação com composição nutricional, composição corporal, alterações da função renal e hepática e instabilidade genômica", vinculado ao Programa de Pós Graduação em Promoção da Saúde e ao Departamento de Ciências da Saúde da Universidade de Santa Cruz do Sul - UNISC. O pesquisador responsável por este Projeto de Pesquisa é Profa. Dra. Silvia Isabel Rech Franke, que poderá ser contatado a qualquer tempo através do número (51)99994-7595 e do e-mail silviafr@unisc.br.

Sua participação é possível, pois você atende aos critérios de inclusão previstos na pesquisa, os quais são usuários de academias de ambos os sexos, adultos e idosos, com idade mínima de 20 anos e que forem membros de uma academia com profissional técnico cadastrado no CREF2/RS. Sua participação consiste em fornecer as seguintes informações: dados demográficos, hábitos de vida e de saúde, saúde mental, atividade física, prática de exercícios físicos em academia, dieta, ritmo intestinal e de suplementação alimentar que será realizado de forma on-line e levará cerca de 10 minutos. Também será aplicado, de forma presencial, um questionário sobre o consumo alimentar e de líquidos. A composição corporal será avaliada por meio da balança de bioimpedância Omron®. Primeiramente, a estatura será avaliada com um estadiômetro compacto, estando os indivíduos descalços, com os pés unidos e em posição ereta. Depois, com roupas leves, serão avaliados o peso, índice de massa corporal (IMC), massa muscular, gordura corpórea e gordura visceral. Para avaliar os marcadores bioquímicos da função renal e hepática e instabilidade genômica, será realizada uma coleta sanguínea (4 mL) e coleta de células da mucosa oral recolhidas na região interna da bochecha, utilizando uma escova de modelo cytobrush. O consumo alimentar, a composição corporal e a coleta sanguínea,

bem como das células da mucosa oral serão realizados no mesmo dia, em horário pré-agendado, necessitando estar em jejum (pelo menos 4 horas) e com restrição de atividade física (pelo menos 12 horas). Essas coletas levarão cerca de 20 minutos, e para isso, a coleta do material será totalmente descartável e estéril, e será realizado por pessoas devidamente capacitadas nas academias e posterior análise que será realizada no Laboratório de Nutrição Experimental e no Laboratório de Bioquímica do Exercício da Universidade de Santa Cruz do Sul/RS.

Nessa condição, é possível que alguns desconfortos aconteçam, como: problemas com a conexão de internet no momento do preenchimento do questionário on-line ou desconforto para fornecer alguns dos dados, além de cansaço ou aborrecimento por causa do tempo tomado para o preenchimento do questionário e receio pela possível quebra de sigilo. Também poderá acontecer certo constrangimento para realização da avaliação da composição corporal e do recordatório alimentar ou um pequeno arroxeado na região da punção, eventualmente, devido à coleta sanguínea que desaparece em poucos dias. Os riscos/desconfortos, se ocorrerem, serão minimizados da seguinte forma: caso ocorram problemas de conexão com a internet, os participantes poderão responder ao questionário em outro momento, sem prejuízo aos participantes ou a pesquisa; para garantir a confidencialidade dos dados coletados, estes serão armazenados nos dispositivos do pesquisador responsável, sendo apagados todos os registros das plataformas virtuais, ambiente compartilhado ou "nuvem"; os participantes podem desistir de participar da pesquisa caso se sentirem desconfortáveis com alguma questão. Também para minimizar o constrangimento referente à composição corporal e dos recordatórios alimentares, as avaliações serão realizadas em salas separadas e por avaliadores do mesmo sexo e para evitar riscos durante a coleta sanguínea, o mesmo será realizado por um profissional devidamente capacitado, utilizando material totalmente descartável e respeitando as normas de biossegurança. Sua resposta a todas as perguntas é de extrema importância para a pesquisa, mas você não é obrigado a responder aquilo que não se sentir confortável e o único dado de identificação pessoal a ser coletado é o e-mail do participante, para que este receba uma cópia do presente Termo de Consentimento e as respostas informadas no questionário. Por outro lado, a sua participação trará benefícios, como de orientar aos participantes, após a entrevista, a importância do uso de suplementos alimentares de forma adequada e alertar os possíveis riscos adversos à saúde. Além, disso será disponibilizado aos participantes laudos referentes à adequação do consumo alimentar, composição corporal e dos exames bioquímicos, bem como será planejado ações e estratégias para orientações que visam melhorar o entendimento do impacto da suplementação alimentar sobre a composição nutricional e corporal, as possíveis alterações sobre os marcadores renal e hepático, bem como com marcadores de instabilidade genômica, minimizando o impacto negativo sobre a saúde. Para sua participação nessa pesquisa você não terá nenhuma despesa com transporte, alimentação, exames, materiais a serem utilizados ou despesas de qualquer natureza. Ao final da pesquisa você terá acesso aos resultados atravé de e-mail.

Pelo presente Termo de Consentimento Livre e Esclarecid eu, _____RG ou CPF _____declaro que autorizo a minha participação neste projeto de pesquisa, pois fui informado/a, de forma clara e detalhada, livre de qualquer forma de constrangimento e coerção, dos objetivos, da justificativa e dos procedimentos que serei submetido, dos riscos, desconfortos e benefícios, assim como das alternativas às quais poderia ser submetido, todos acima listados. Ademais, declaro que, quando for o caso, autorizo a utilização de minha imagem e voz de forma gratuita pelo pesquisador, em quaisquer meios de comunicação, para fins de publicação e divulgação da pesquisa, desde que eu não possa ser identificado através desses instrumentos (imagem e voz).

Fui, igualmente, informado/a:

a) da garantia de receber resposta a qualquer pergunta ou esclarecimento a qualquer dúvida acerca dos procedimentos, riscos, benefícios e outros assuntos relacionados com a pesquisa;
b) da liberdade de retirar meu consentimento, a qualquer momento, e deixar de participar do estudo, sem que isto traga prejuízo à continuação de meu cuidado e tratamento;
c) da garantia de que não serei identificado quando da divulgação dos resultados e que as informações obtidas serão utilizadas apenas para fins científicos vinculados ao presente projeto de pesquisa;
d) do compromisso de proporcionar informação atualizada obtida durante o estudo; ainda que esta possa afetar a minha vontade em continuar participando;
e) da disponibilidade de tratamento médico e indenização, conforme estabelece a legislação, caso existam danos a minha saúde, diretamente causados por esta pesquisa; e,
f) de que se existirem gastos para minha participação nessa pesquisa, esses serão absorvidos pelo orçamento da pesquisa.

O presente documento foi assinado em duas vias de igual teor, ficando uma com o voluntário da pesquisa ou seu representante legal e outra com o pesquisador responsável.

O Comitê de Ética em Pesquisa responsável pela apreciação do projeto pode ser consultado, para fins de esclarecimento, através do seguinte endereço: Av. Independência, 2293, Bloco 13 - Sala 1306; ou pelo telefone (51) 3717-7680; ou pelo e-mail cep@unisc.br

Local:
Data:

Nome e assinatura do voluntárioNome e assinatura do responsável pela de Esclarecido apresentação desse Termo Consentimento Livre e

Nome e assinatura do voluntárioNome e assinatura do responsável pela
de Esclarecidoresentação desse Termo Consentimento Livre e

Participação na pesquisa*
Aceito participar da pesquisa
Não aceito participar da pesquisa

Participação na pesquisa (Sim / Não)

Nome e sobrenome

Idade (anos)

Sexo (Feminino / Masculino)

Nível educacional (Ensino fundamental incompleto/ Ensino fundamental completo/ Ensino médio completo/ Superior incompleto/ Superior completo)

Fuma atualmente (Sim / Não)

Consumo de álcool (1 vez por semana/ 2 vezes por semana / 3 vezes por semana/ 4 vezes por semana/ 5 vezes por semana/ 6 vezes por semana/ 7 vezes por semana/ Não bebe)

Frequência semanal da prática de exercício em academia (1 vez por semana/ 2 vezes por semana / 3 vezes por semana/ 4 vezes por semana/ 5 vezes por semana/ 6 vezes por semana/ 7 vezes por semana)

Tempo por sessão de treino (30 min / 45 min / 60 min / 90 min / 120 min / 180 min)

Usa suplementos? (Sim / Não)

Descrição do suplemento utilizado (campo aberto)

ANEXO D - NORMAS DA REVISTA EUROPEAN JOURNAL OF NUTRITION

European Journal of Nutrition

Publishing model

Hybrid

Submit your manuscript

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About this journal

Articles

For authors

Journal updates

Submission guidelines

Contents

Instructions for Authors

Types of Papers

Formal requirements:

Accepted article types: Original Articles, Reviews, Short Communications, Letters to the Editors, Comments.

Case studies will not be accepted for publication.

Original Articles must not exceed 50,000 characters (including abstract and keywords, tables, captions and references). Exceptions can be made only with the agreement of the responsible Editor.

Review Articles must not exceed 100,000 characters (including abstract and keywords, tables, captions and references). Exceptions can be made only with the agreement of the responsible Editor.

Short Communications should not have more than 4 authors, and not contain more than 25,000 characters and 10 references. Summary and key words are not required. Preliminary results of highly innovative studies may be submitted as Short Communications.

Letters to the Editors should not have more than 4 authors, and not contain more than 25,000 characters and 10 references. Summary and key words are not required. Letters are expected to provide substantive comments on papers published in the European Journal of Nutrition. Both the letter and a reply, if appropriate, are published together whenever possible. Comments must not exceed 50,000 characters. Summary and key words are not required. Exceptions can be made only with the agreement of the responsible Editor. The Comment article type denotes an agenda-setting, authoritative, informed and often provocative expert piece on topical issues relevant to the journal's readership.

Submission:

• Please submit Original Articles, Reviews, Short Communications electronically via Editorial Manager using the hyperlink “Submit online".

• Please send Letters to the Editor directly to the following e-mail address: eurjnutr@gmail.com

Requirements with regards to reporting:

• Conflict of interest: Declaration of Conflict of Interest is mandatory for all submissions. Please refer to the section " Integrity of research and reporting” in the Instructions for Authors.

• Clinical Trial and Study Registration: To ensure transparency, accessibility and the integrity of the reporting of patient-centered trials, authors must register clinical trials (phase II to IV trials) in suitable publicly available repositories. Study registration is also strongly recommended for other types of participant-centered studies, e.g. studies which focus on human performance. Prospective trial registration is strongly encouraged, but the journal will also allow for retrospective trial registration if carried out before publication.

• Reporting guidelines: Authors are recommended to adhere to the minimum reporting guidelines hosted by the EQUATOR Network when preparing their manuscript. Further information can be found in the section “Standards of reporting” in the Instructions for Authors.

• Animal Studies: *European Journal of Nutrition* will consider animal studies only if they are sufficiently justified, i.e. the work in question could not have been done in human volunteers. Of course, the welfare of animals used for research must be respected. When reporting experiments on animals, authors should indicate whether the international, national, and/or institutional guidelines for the care and use of animals have been followed, and that the studies have been approved by a research ethics committee at the institution or practice at which the studies were conducted (where such a committee exists). Further information can be found in the section “Research involving animals, their data or biological material” in the Submission Guidelines.

Requirements with regards to content:

• Papers with a major focus on traditional medicine or food technology will not be accepted.

• Study protocols. *European Journal of Nutrition* will consider protocol papers which go beyond a description of the study protocol and include data and appropriate statistical analysis. Submissions for Study Protocols and Samples are welcome which describe the rationale, the design, procedures, and sample characteristics of large epidemiological studies in the context of existing research. Study protocols should be submitted as “Original articles”.

• Validation studies. *European Journal of Nutrition* will consider validation studies of protocols and methodologies assessing the instruments used, which include data and appropriate statistical analysis. Validation studies should be submitted as “Original articles”.

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Manuscript Submission

Manuscript Submission

Submission of a manuscript implies: that the work described has not been published before; that it is not under consideration for publication anywhere else; that its publication has been approved by all co-authors, if any, as well as by the responsible authorities – tacitly or explicitly – at the institute where the work has been carried out. The publisher will not be held legally responsible should there be any claims for compensation.

Permissions

Authors wishing to include figures, tables, or text passages that have already been published elsewhere are required to obtain permission from the copyright owner(s) for both the print and online format and to include evidence that such permission has been granted when submitting their papers. Any material

received without such evidence will be assumed to originate from the authors.

Online Submission

Please follow the hyperlink “Submit manuscript” and upload all of your manuscript files following the instructions given on the screen.

Source Files

Please ensure you provide all relevant editable source files at every submission and revision. Failing to submit a complete set of editable source files will result in your article not being considered for review. For your manuscript text please always submit in common word processing formats such as .docx or LaTeX.

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Title Page

Please make sure your title page contains the following information.

Title

The title should be concise and informative.

Author information

- The name(s) of the author(s)
- The affiliation(s) of the author(s), i.e. institution, (department), city, (state), country
- A clear indication and an active e-mail address of the corresponding author
- If available, the 16-digit ORCID of the author(s)

If address information is provided with the affiliation(s) it will also be published.

For authors that are (temporarily) unaffiliated we will only capture their city and country of residence, not their e-mail address unless specifically requested.

Large Language Models (LLMs), such as ChatGPT, do not currently satisfy our authorship criteria. Notably an attribution of authorship carries with it accountability for the work, which cannot be effectively applied to LLMs. Use of an LLM should be properly documented in the Methods section (and if a Methods section is not available, in a suitable alternative part) of the manuscript. The use of an LLM (or other AI-tool) for "AI assisted copy editing" purposes does not need to be declared. In this context, we define the term "AI assisted copy editing" as AI-assisted improvements to human-generated texts for readability and style, and to ensure that the texts are free of errors in grammar, spelling, punctuation and tone. These AI-assisted improvements may include wording and formatting changes to the texts, but do not include generative editorial work and autonomous content creation. In all cases, there must be human accountability for the final version of the text and agreement from the authors that the edits reflect their original work.

Abstract

Please provide a structured abstract of 150 to 250 words which should be divided into the following sections:

- Purpose (stating the main purposes and research question)
- Methods
- Results
- Conclusion

For life science journals only (when applicable)

- Trial registration number and date of registration for prospectively registered trials
- Trial registration number and date of registration followed by “retrospectively registered”, for retrospectively registered trials

Keywords

Please provide 4 to 6 keywords which can be used for indexing purposes.

Statements and Declarations

The following statements should be included under the heading "Statements and Declarations" for inclusion in the published paper. Please note that submissions that do not include relevant declarations will be returned as incomplete.

> Competing Interests: Authors are required to disclose financial or non-financial interests that are directly or indirectly related to the work submitted for publication. Please refer to "Competing Interests and Funding" below for more information on how to complete this section.

Please see the relevant sections in the submission guidelines for further information as well as various examples of wording. Please revise/customize the sample statements according to your own needs.

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Text

Text Formatting

Manuscripts should be submitted in Word.

> Use a normal, plain font (e.g., 10-point Times Roman) for text.
> Use italics for emphasis.
> Use the automatic page numbering function to number the pages.
> Do not use field functions.
> Use tab stops or other commands for indents, not the space bar.
> Use the table function, not spreadsheets, to make tables.
> Use the equation editor or MathType for equations.
> Save your file in docx format (Word 2007 or higher) or doc format (older Word versions).

Manuscripts with mathematical content can also be submitted in LaTeX. We recommend using Springer Nature's LaTeX template.

Headings

Please use no more than three levels of displayed headings.

Abbreviations

Abbreviations should be defined at first mention and used consistently thereafter.

Footnotes

Footnotes can be used to give additional information, which may include the citation of a reference included in the reference list. They should not consist solely of a reference citation, and they should never include the bibliographic details of a reference. They should also not contain any figures or tables.
Footnotes to the text are numbered consecutively; those to tables should be indicated by superscript lower-case letters (or asterisks for significance values and other statistical data). Footnotes to the title or the authors of the article are not given reference symbols.
Always use footnotes instead of endnotes.

Acknowledgments

Acknowledgments of people, grants, funds, etc. should be placed in a separate section on the title page. The names of funding organizations should be written in full.

Line numbering:

Please activate the line numbering function for your manuscript.

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References

Citation

Reference citations in the text should be identified by numbers in square brackets. Some examples:
1. Negotiation research spans many disciplines [3].
2. This result was later contradicted by Becker and Seligman [5].
3. This effect has been widely studied [1-3, 7].

Reference list

The list of references should only include works that are cited in the text and that have been published or accepted for publication. Personal communications and unpublished works should only be mentioned in the text.

The entries in the list should be numbered consecutively.
If available, please always include DOIs as full DOI links in your reference list (e.g. “https://doi.org/abc”).

Journal article
Gamelin FX, Baquet G, Berthoin S, Thevenet D, Nourry C, Nottin S, Bosquet L (2009) Effect of high intensity intermittent training on heart rate variability in prepubescent children. Eur J Appl Physiol 105:731-738. https://doi.org/10.1007/s00421-008-0955-8
Ideally, the names of all authors should be provided, but the usage of “et al” in long author lists will also be accepted:
Smith J, Jones M Jr, Houghton L et al (1999) Future of health insurance. N Engl J Med 965:325–329
Article by DOI
Slifka MK, Whitton JL (2000) Clinical implications of dysregulated cytokine production. J Mol Med. https://doi.org/10.1007/s001090000086
Book
South J, Blass B (2001) The future of modern genomics. Blackwell, London
Book chapter
Brown B, Aaron M (2001) The politics of nature. In: Smith J (ed) The rise of modern genomics, 3rd edn. Wiley, New York, pp 230-257
Online document
Cartwright J (2007) Big stars have weather too. IOP Publishing PhysicsWeb. http://physicsweb.org/articles/news/11/6/16/1. Accessed 26 June 2007
Dissertation
Trent JW (1975) Experimental acute renal failure. Dissertation, University of California

Always use the standard abbreviation of a journal’s name according to the ISSN List of Title Word Abbreviations, see
ISSN.org LTWA
If you are unsure, please use the full journal title.
Authors preparing their manuscript in LaTeX can use the bibliography style file sn-basic.bst which is included in the Springer Nature Article Template.

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Tables

All tables are to be numbered using Arabic numerals.
Tables should always be cited in text in consecutive numerical order.
For each table, please supply a table caption (title) explaining the components of the table.
Identify any previously published material by giving the original source in the form of a reference at the end of the table caption.
Footnotes to tables should be indicated by superscript lower-case letters (or asterisks for significance values and other statistical data) and included beneath the table body.

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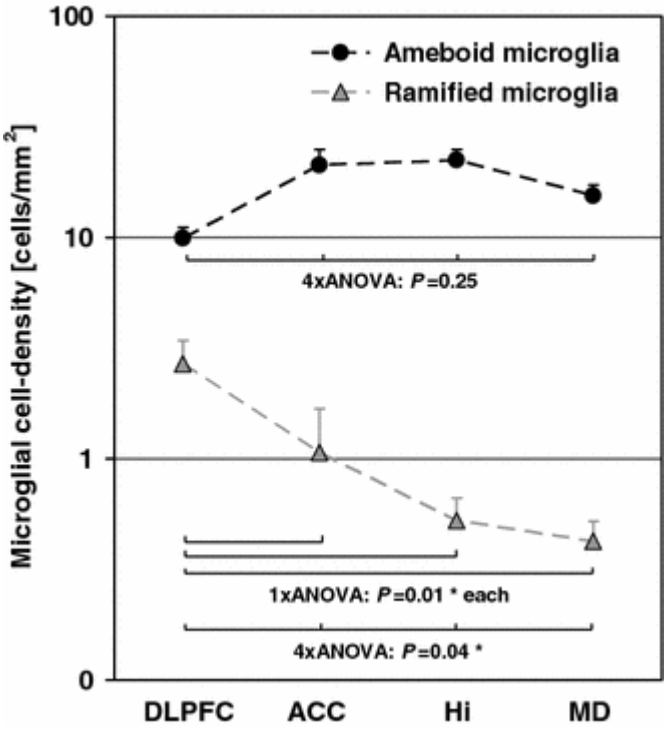
Artwork and Illustrations Guidelines

Electronic Figure Submission

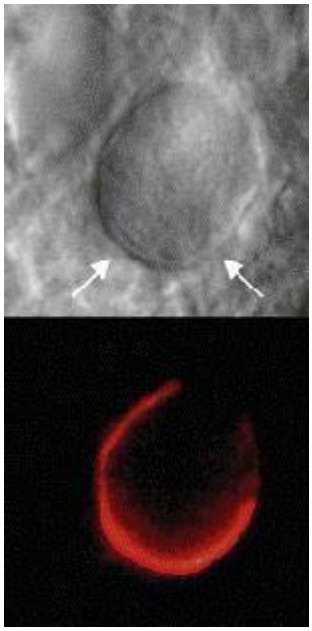
Supply all figures electronically.
Indicate what graphics program was used to create the artwork.
For vector graphics, the preferred format is EPS; for halftones, please use TIFF format.
MSOffice files are also acceptable.
Vector graphics containing fonts must have the fonts embedded in the files.
Name your figure files with "Fig" and the figure number, e.g., Fig1.eps.

Line Art



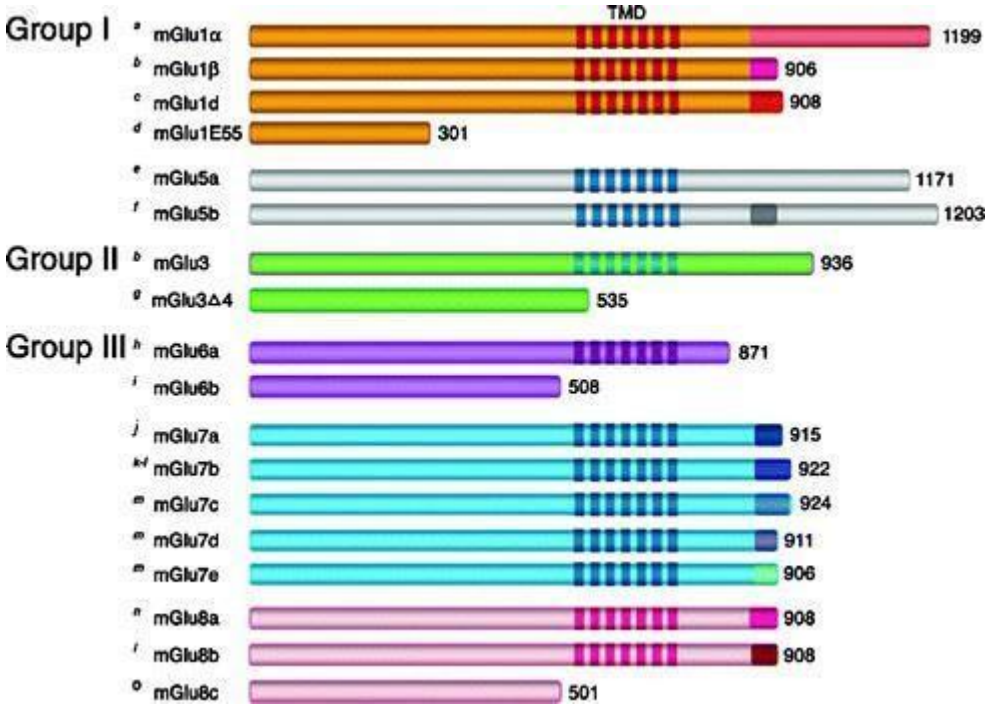
Definition: Black and white graphic with no shading.
Do not use faint lines and/or lettering and check that all lines and lettering within the figures are legible at final size.
All lines should be at least 0.1 mm (0.3 pt) wide.
Scanned line drawings and line drawings in bitmap format should have a minimum resolution of 1200 dpi.
Vector graphics containing fonts must have the fonts embedded in the files.

Halftone Art



Definition: Photographs, drawings, or paintings with fine shading, etc.
If any magnification is used in the photographs, indicate this by using scale bars within the figures themselves.
Halftones should have a minimum resolution of 300 dpi.

Combination Art



Definition: a combination of halftone and line art, e.g., halftones containing line drawing, extensive lettering, color diagrams, etc.

Combination artwork should have a minimum resolution of 600 dpi.

Color Art

Color art is free of charge for online publication.

If black and white will be shown in the print version, make sure that the main information will still be visible. Many colors are not distinguishable from one another when converted to black and white. A simple way to check this is to make a xerographic copy to see if the necessary distinctions between the different colors are still apparent.

If the figures will be printed in black and white, do not refer to color in the captions.

Color illustrations should be submitted as RGB (8 bits per channel).

Figure Lettering

To add lettering, it is best to use Helvetica or Arial (sans serif fonts).

Keep lettering consistently sized throughout your final-sized artwork, usually about 2–3 mm (8–12 pt).

Variance of type size within an illustration should be minimal, e.g., do not use 8-pt type on an axis and 20-pt type for the axis label.

Avoid effects such as shading, outline letters, etc.

Do not include titles or captions within your illustrations.

Figure Numbering

All figures are to be numbered using Arabic numerals.

Figures should always be cited in text in consecutive numerical order.

Figure parts should be denoted by lowercase letters (a, b, c, etc.).

If an appendix appears in your article and it contains one or more figures, continue the consecutive numbering of the main text. Do not number the appendix figures,"A1, A2, A3, etc." Figures in online appendices [Supplementary Information (SI)] should, however, be numbered separately.

Figure Captions

Each figure should have a concise caption describing accurately what the figure depicts.

Include the captions in the text file of the manuscript, not in the figure file.

Figure captions begin with the term Fig. in bold type, followed by the figure number, also in bold type.

No punctuation is to be included after the number, nor is any punctuation to be placed at the end of the caption.
Identify all elements found in the figure in the figure caption; and use boxes, circles, etc., as coordinate points in graphs.
Identify previously published material by giving the original source in the form of a reference citation at the end of the figure caption.

Figure Placement and Size

Figures should be submitted within the body of the text. Only if the file size of the manuscript causes problems in uploading it, the large figures should be submitted separately from the text.
When preparing your figures, size figures to fit in the column width.
For large-sized journals the figures should be 84 mm (for double-column text areas), or 174 mm (for single-column text areas) wide and not higher than 234 mm.
For small-sized journals, the figures should be 119 mm wide and not higher than 195 mm.

Permissions

If you include figures that have already been published elsewhere, you must obtain permission from the copyright owner(s) for both the print and online format. Please be aware that some publishers do not grant electronic rights for free and that Springer will not be able to refund any costs that may have occurred to receive these permissions. In such cases, material from other sources should be used.

Accessibility

In order to give people of all abilities and disabilities access to the content of your figures, please make sure that

All figures have descriptive captions (blind users could then use a text-to-speech software or a text-to-Braille hardware)
Patterns are used instead of or in addition to colors for conveying information (colorblind users would then be able to distinguish the visual elements)
Any figure lettering has a contrast ratio of at least 4.5:1

Generative AI Images

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Supplementary Information (SI)

Springer accepts electronic multimedia files (animations, movies, audio, etc.) and other supplementary files to be published online along with an article or a book chapter. This feature can add dimension to the author's article, as certain information cannot be printed or is more convenient in electronic form.
Before submitting research datasets as Supplementary Information, authors should read the journal's Research data policy. We encourage research data to be archived in data repositories wherever possible.

Submission

Supply all supplementary material in standard file formats.
Please include in each file the following information: article title, journal name, author names; affiliation and e-mail address of the corresponding author.
To accommodate user downloads, please keep in mind that larger-sized files may require very long download times and that some users may experience other problems during downloading.

Audio, Video, and Animations

Aspect ratio: 16:9 or 4:3
Maximum file size: 2 GB
Minimum video duration: 1 sec
Supported file formats: avi, wmv, mp4, mov, m2p, mp2, mpg, mpeg, flv, mxf, mts, m4v, 3gp

Text and Presentations

Submit your material in PDF format; .doc or .ppt files are not suitable for long-term viability.
A collection of figures may also be combined in a PDF file.

Spreadsheets

Spreadsheets should be submitted as .csv or .xlsx files (MS Excel).

Specialized Formats

Specialized format such as .pdb (chemical), .wrl (VRML), .nb (Mathematica notebook), and .tex can also be supplied.

Collecting Multiple Files

It is possible to collect multiple files in a .zip or .gz file.

Numbering

If supplying any supplementary material, the text must make specific mention of the material as a citation, similar to that of figures and tables.
Refer to the supplementary files as “Online Resource”, e.g., "... as shown in the animation (Online Resource 3)", “... additional data are given in Online Resource 4”.
Name the files consecutively, e.g. “ESM_3.mpg”, “ESM_4.pdf”.

Captions

For each supplementary material, please supply a concise caption describing the content of the file.

Processing of supplementary files

Supplementary Information (SI) will be published as received from the author without any conversion, editing, or reformatting.

Accessibility

In order to give people of all abilities and disabilities access to the content of your supplementary files, please make sure that

The manuscript contains a descriptive caption for each supplementary material
Video files do not contain anything that flashes more than three times per second (so that users prone to seizures caused by such effects are not put at risk)

Generative AI Images

Please check Springer’s policy on generative AI images and make sure your work adheres to the principles described therein.

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Integrity of research and reporting

Ethical standards

Manuscripts submitted for publication must contain a statement to the effect that all human and animal studies have been approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

It should also be stated clearly in the text that all persons gave their informed consent prior to their inclusion in the study. Details that might disclose the identity of the subjects under study should be omitted.

These statements should be added in a separate section before the reference list. If these statements are not applicable, authors should state: The manuscript does not contain clinical studies or patient data.

The editors reserve the right to reject manuscripts that do not comply with the above-mentioned requirements. The author will be held responsible for false statements or failure to fulfill the above-mentioned requirements

Conflict of interest

Authors must indicate whether or not they have a financial relationship with the organization that sponsored the research. This note should be added in a separate section before the reference list.

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Ethical Responsibilities of Authors

This journal is committed to upholding the integrity of the scientific record. As a member of the Committee on Publication Ethics (COPE) the journal will follow the COPE guidelines on how to deal with potential acts of misconduct.

Authors should refrain from misrepresenting research results which could damage the trust in the journal, the professionalism of scientific authorship, and ultimately the entire scientific endeavour. Maintaining integrity of the research and its presentation is helped by following the rules of good scientific practice, which include*:

- The manuscript should not be submitted to more than one journal for simultaneous consideration.
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- A single study should not be split up into several parts to increase the quantity of submissions and submitted to various journals or to one journal over time (i.e. 'salami-slicing/publishing').
- Concurrent or secondary publication is sometimes justifiable, provided certain conditions are met. Examples include: translations or a manuscript that is intended for a different group of readers.
- Results should be presented clearly, honestly, and without fabrication, falsification or inappropriate data manipulation (including image based manipulation). Authors should adhere to discipline-specific rules for acquiring, selecting and processing data.
- No data, text, or theories by others are presented as if they were the author's own ('plagiarism'). Proper acknowledgements to other works must be given (this includes material that is closely copied (near verbatim), summarized and/or paraphrased), quotation marks (to indicate words taken from another source) are used for verbatim copying of material, and permissions secured for material that is copyrighted.

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Research involving animals, their data or biological material

Research involving animals and their data or biological material
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• All procedures performed in the study were in accordance with the ARVO Statement for Use of Animals in Ophthalmic Vision and Research. The ethical principles established by the National Institutes of Health Guide for the Care and Use of Laboratory Animals (NIH Publications No. 8523, revised 2011) were followed. The research protocol was approved by the Ethics Committee on Animal Use (Protocol No. 06174/14) of FCAV/Unesp, Jaboticabal.
• This study involved a questionnaire-based survey of farmers as well as blood sampling from their animals. The study protocol was assessed and approved by Haramaya University, research and extension office. Participants provided their verbal informed consent for animal blood sampling as well as for the related survey questions. Collection of blood samples was carried out by veterinarians adhering to the regulations and guidelines on animal husbandry and welfare.
• All brown bear captures and handling were approved by the Ethical Committee on Animal Experiments, Uppsala, Sweden (Application C18/15) and the Swedish Environmental Protection Agency in compliance with Swedish laws and regulations.
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Regardless of whether material is collected from living or dead patients, they (family or guardian if the deceased has not made a pre-mortem decision) must have given prior written consent. The aspect of confidentiality as well as any wishes from the deceased should be respected.

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When biological material is donated for or data is generated as part of a research project authors should ensure, as part of the informed consent procedure, that the participants are made aware what kind of (personal) data will be processed, how it will be used and for what purpose. In case of data acquired via a biobank/biorepository, it is possible they apply a broad consent which allows research participants to consent to a broad range of uses of their data and samples which is regarded by research ethics committees as specific enough to be considered “informed”. However, authors should always check the specific biobank/biorepository policies or any other type of data provider policies (in case of non-bio research) to be sure that this is the case.

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For all research involving human subjects, freely-given, informed consent to participate in the study must be obtained from participants (or their parent or legal guardian in the case of children under 16) and a statement to this effect should appear in the manuscript. In the case of articles describing human transplantation studies, authors must include a statement declaring that no organs/tissues were obtained from prisoners and must also name the institution(s)/clinic(s)/department(s) via which organs/tissues were obtained. For manuscripts reporting studies involving vulnerable groups where there is the potential for coercion or where consent may not have been fully informed, extra care will be taken by the editor and may be referred to the Springer Nature Research Integrity Group.

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Summary of requirements

The above should be summarized in a statement and placed in a ‘Declarations’ section before the reference list under a heading of ‘Consent to participate’ and/or ‘Consent to publish’. Other declarations include Funding, Competing interests, Ethics approval, Consent, Data and/or Code availability and Authors’ contribution statements.
Please see the various examples of wording below and revise/customize the sample statements according to your own needs.
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Written informed consent was obtained from the parents.
Verbal informed consent was obtained prior tothe interview.
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Manuscript Submission

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1. Negotiation research spans many disciplines [3].

2. This result was later contradicted by Becker and Seligman [5].
3. This effect has been widely studied [1-3, 7].

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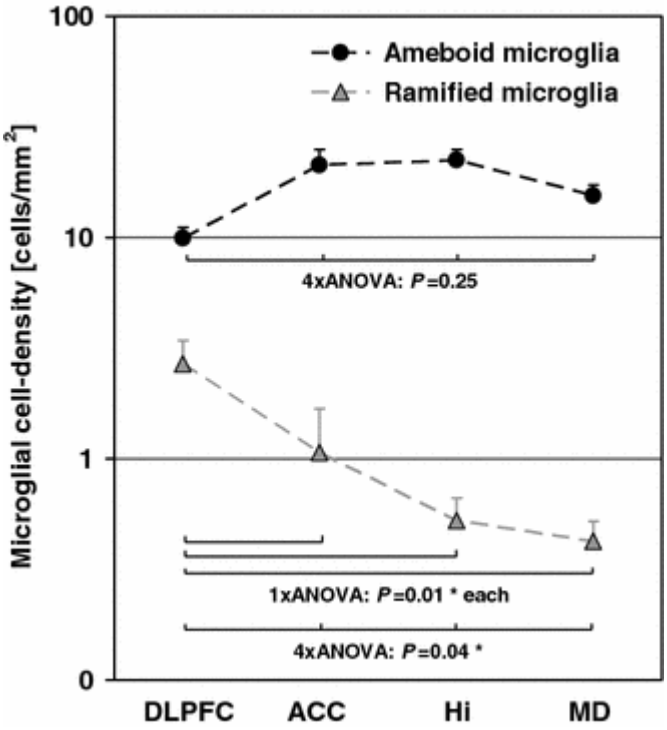

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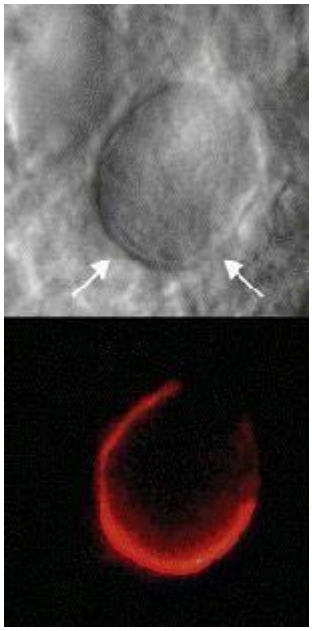

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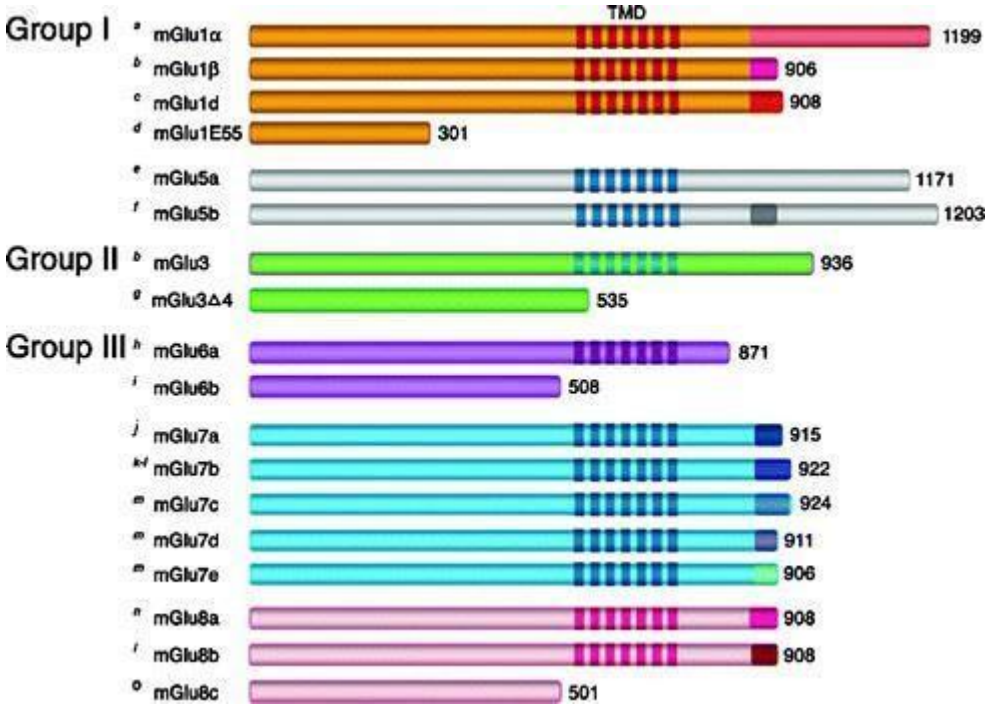

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Informed Consent

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