



XV Simposio Internacional de Actualizaciones en Entrenamiento de la Fuerza

15 - 16 de diciembre de 2023

Madrid, España

UNIVERSIDAD POLITÉCNICA DE MADRID

Facultad de Ciencias de la Actividad Física y del Deporte (INEF)

Departamento de Salud y Rendimiento Humano

Editores: Ana B. Peinado, Miguel A. Rojo-Tirado,
Cristina Maestre, Eliane A. Castro, Lara Pablos.

PROGRAMA
Y
LIBRO DE
RESÚMENES



POLITÉCNICA





XV International Symposium in Strength Training

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UNIVERSIDAD POLITÉCNICA DE MADRID

Faculty of Physical Activity and Sport Sciences (INEF)

Department of Health and Human Performance

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PROGRAM
&
BOOK OF
ABSTRACTS



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LIBRO DE RESÚMENES

Editado por:

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Organizado por:

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- Pedro J. Benito Peinado, PhD

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BIENVENIDOS

BIENVENIDOS AL XV SIMPOSIO DE FUERZA

El XV Simposio Internacional de Actualizaciones en Entrenamiento de la Fuerza (SDF) ya está aquí y deseamos que sea un evento que todo el mundo disfrute y del que se lleve grandes experiencias y aprendizajes.

El tiempo pasa muy rápido y la preparación de esta decimoquinta edición ha estado llena de cambios a nivel organizativo y de responsabilidad. Hace 12 meses el Presidente del Simposio, el profesor Pedro J. Benito Peinado, me ofreció tomar las riendas de este evento que llevamos quince años organizando. Para mí fue un momento de salto al vacío, ya que es una aventura llena de responsabilidad e ilusión. Nuestro Rector Magnífico, D. Guillermo Cisneros Pérez, suele decir que nuestra tarea como docentes e investigadores debe estar guiada por la cordura y la pasión. No puedo estar más de acuerdo. El Simposio de Fuerza nace y se mantiene con la pasión de todos los que formamos parte de él, que con cordura y decisión asumimos y realizamos los cientos de tareas que son necesarias para que un evento de estas características sea una realidad.

El SDF se ha convertido en el evento de referencia a nivel nacional en el entrenamiento de la fuerza, podría decirse que es "EL SIMPOSIO" con mayúsculas; pero es cierto que en el SDF tiene cabida todo lo que tiene que ver con el entrenamiento, la preparación física, la fisiología del ejercicio, la medicina deportiva y el ejercicio físico y la salud. El SDF no es solo fuerza, es mucho más. El programa siempre se diseña para que los mejores científicos y profesionales de las Ciencias de la Actividad Física y del Deporte nos acompañen.

Deseo que el SDF sea un evento de éxito para todos y todas y que el año que viene nos volvamos a ver en la XVI Edición del SDF. Muchas gracias por venir y formar parte de esta familia.

¡Feliz Navidad!

Ana Belén Peinado Lozano
Presidenta del XV Simposio de Actualizaciones en Entrenamiento de la Fuerza

WELCOME

WELCOME TO THE XV INTERNATIONAL SYMPOSIUM IN STRENGTH TRAINING

The XV International Symposium in Strength Training (SDF) is here, and we hope it will be an event that everyone enjoys and brings significant experiences and learnings.

Time flies and the preparation for this fifteenth edition has been filled with organizational and leadership changes. Twelve months ago, the President of the Symposium, Professor Pedro J. Benito Peinado, offered me the opportunity to take on command of this event that we have been organizing for fifteen years. For me, it was a leap into the unknown as it is an adventure full of responsibility and enthusiasm. Our Magnificent Rector, Mr. Guillermo Cisneros Pérez, often says that our task as professors and researchers should be guided by sanity and passion. I couldn't agree more. The International Symposium in Strength Training is born and sustained with the passion of all who are part of it, taking on the hundreds of tasks that are necessary for an event of this magnitude to become a reality with sanity and determination.

The SDF has become the national benchmark event in strength training. It could be said that it is "THE SYMPOSIUM" in capital letters. However, it is true that the SDF encompasses everything related to training, physical conditioning, exercise physiology, sports medicine, physical activity, and health. The SDF is not just about strength; it is much more. The program is always designed so that the best scientists and professionals in the field of Physical Activity and Sports Sciences join us.

I hope that the SDF will be a successful event for everyone and that we will see each other again next year at the XVI Edition of the SDF. Thank you very much for coming and being part of this family.

Merry Christmas!

Ana Belén Peinado Lozano
President of the XV International Symposium in Strength Training

TABLA DE CONTENIDOS / TABLE OF CONTENTS

ORGANIZACIÓN / ORGANISATION	9
BIENVENIDOS.....	11
WELCOME.....	13
TABLA DE CONTENIDOS / TABLE OF CONTENTS	15
PROGRAMA CIENTÍFICO / SCIENTIFIC PROGRAM	17
PROGRAMA AMPLIADO / EXTENDED PROGRAM	21
PONENTES / KEYNOTE SPEAKERS.....	29
COMUNICACIONES ORALES / ORAL PRESENTATION	63
VIERNES, 15 DE DICIEMBRE DE 2023	63
C0-01. 09:00 - 10:30	63
C0-02. 17:30 - 18:00	75
SÁBADO, 16 DE DICIEMBRE DE 2023.....	79
C0-03. 09:00 - 10:00	79
PRESENTACIÓN DE PÓSTERES / POSTERS PRESENTATION	87
VIERNES, 15 DE DICIEMBRE DE 2023	87
PP01. FISIOLÓGÍA DEL EJERCICIO I / EXERCISE PHYSIOLOGY I (18:00 H).....	87
PP01. MUJER Y ENTRENAMIENTO / WOMEN & TRAINING (18:00 H)	91
PP01. OPTIMIZACIÓN DEL ENTRENAMIENTO I / TRAINING OPTIMISATION I (18:00 H)	95
PP01. POBLACIONES ESPECIALES / SPECIAL POPULATIONS (18:00 H).....	97
PP01. SALUD Y ENTRENAMIENTO I / HEALTH & TRAINING I (18:00 H)	103
SÁBADO, 16 DE DICIEMBRE DE 2023	115
PP02. SALUD Y ENTRENAMIENTO II / HEALTH & TRAINING II (11:30 H).....	115
PP02. FISIOLÓGÍA DEL EJERCICIO II / EXERCISE PHYSIOLOGY II (11:30 H)	117
PP02. OPTIMIZACIÓN DEL ENTRENAMIENTO II / TRAINING OPTIMISATION (18:00 H)	119
NOTAS / NOTES.....	141
ORGANIZADORES / ORGANIZERS.....	185
PATROCINADORES / SPONSORS	187
COLABORADORES / PARTNERS	191
CON EL APOYO DE / WITH THE SUPPORT OF	195
INFORMACIÓN GENERAL / GENERAL INFORMATION	196
EXPOSICIÓN COMERCIAL / EXHIBITORS	197

PROGRAMA CIENTÍFICO / SCIENTIFIC PROGRAM

DÍA 1 / DAY 1

Horario/Time	DÍA 1 / DAY 1 15/12/2023
8:30 - 9:00 h	Acreditación / Registration
9:00 - 10:30 h	Comunicaciones orales 1 / Oral presentation 1
10:30 - 11:30 h	¿Existen adaptaciones nerviosas en respuesta al entrenamiento de fuerza? MIGUEL ÁNGEL FERNÁNDEZ DEL OLMO
11:30 - 12:00 h	DESCANSO / BREAK
12:00 - 13:00 h	Cambios en la fuerza, velocidad y potencia muscular a lo largo del ciclo vital: powerpenia y sus consecuencias JULIÁN ALCÁZAR CAMINERO
13:00 - 14:00 h	Oxidación de grasas durante el ejercicio: implicaciones para la salud y el rendimiento deportivo FRANCISCO JOSÉ AMARO GAHETE
14:00 - 15:30 h	COMIDA / LUNCH / WORKSHOP 1 JULIÁN ALCÁZAR CAMINERO (Evaluación y diseño de programas de entrenamiento de fuerza orientados a la potencia muscular en personas mayores)
15:00 h	MICROCONCIERTO DE PIANO DE MIGUEL GARRIDO ROMANOS
15:30 - 17:30 h	ACTO DE APERTURA / OPEN CEREMONY El ejercicio físico sobre los depósitos de grasa ectópicos y el síndrome metabólico en niños con sobrepeso IDOIA LABAYEN
17:30 - 18:00 h	Comunicaciones orales 2 / Oral presentation 2
18:00 - 18:30 h	DESCANSO / BREAK PRESENTACIÓN PÓSTERES / POSTER PRESENTATION
18:30 - 19:30 h	Preparación física en los deportes de combate ÓSCAR MARTÍNEZ DE QUEL PÉREZ
19:30 - 20:30 h	Programación de los ejercicios derivados de la halterofilia en el rendimiento deportivo MARCOS ANTONIO SORIANO RODRÍGUEZ

PROGRAMA CIENTÍFICO / SCIENTIFIC PROGRAM

DÍA 2 / DAY 2

Horario/Time	DÍA 2 / DAY 2 16/12/2023
8:30 - 9:00 h	Acreditación / Registration
9:00 - 10:00 h	Comunicaciones orales 3 / Oral presentation 3
10:00 - 10:15 h	Presentación de la Sociedad Española de Nutrición (SEÑ) MARCELA GONZÁLEZ GROSS
10:15 - 11:30 h	Nuevo paradigma en la relación nutrición, deporte y fuerza Nuevas estrategias nutricionales para el rendimiento deportivo RAÚL DOMÍNGUEZ HERRERA Y JUAN MIELGO AYUSO
11:30 - 12:00 h	DESCANSO / BREAK PRESENTACIÓN PÓSTERES / POSTER PRESENTATION
12:00 - 13:00 h	Relative Energy Deficiency in Sport (REDs) – potential impact on performance ANNA MELIN
13:00 - 14:00 h	Entrenamiento de fuerza en la preparación para un período de alta densidad competitiva en mujeres futbolistas BLANCA ROMERO MORALEDA
14:00 - 15:30 h	COMIDA / LUNCH / WORKSHOP 2 MARCOS ANTONIO SORIANO RODRÍGUEZ (Movimientos derivados de la halterofilia)
15:30 - 17:00 h	MESA REDONDA / ROUND TABLE: EJERCICIO EN NIÑOS Y RENDIMIENTO ACADÉMICO IDOIA LABAYEN, ANTONIO GARCÍA HERMOSO Y ÓSCAR MARTÍNEZ DE QUEL PÉREZ
17:00 - 18:00 h	Equilibrio Redox y ejercicio DAVID MORALES ÁLAMO
18:00 - 18:30 h	DESCANSO / BREAK
18:30 - 19:00 h	Conclusiones, entrega de premios y clausura del Simposio Conclusions, awards and closing ceremony
19:00 - 20:30 h	MESA REDONDA / ROUND TABLE: PROTEÍNA KLOTHO, LA PROTEÍNA DE LA LONGEVIDAD CATALINA SANTIAGO DORREGO, TAMARA ITURRIAGA RAMÍREZ Y JULIA MARTÍN-VIRGALA

PROGRAMA AMPLIADO / EXTENDED PROGRAM

VIERNES, 15 DE DICIEMBRE / FRIDAY, DECEMBER 15		
PROGRAMA DE MAÑANA/ MORNING PROGRAM		
DESCRIPCIÓN / DESCRIPTION	HORA / TIME	LUGAR / VENUE
Apertura de acreditaciones / Registration open	08:30 - 09:00 h	Entrada / Hall
Comunicaciones orales 1 / Oral Presentation 1	9:00 - 10:30 h	Auditorio/ Conference hall
1 A comparison between heart rate and power output to prescribe exercise intensity EROS ÁLVAREZ DACOSTA	9:00 h	
2 Influencia del sexo en el perfil carga-velocidad en hip-trust y peso muerto RAÚL NIETO ACEVEDO	9:15 h	
3 Acute Effects of Voluntary Isometric Contractions at Maximal Shortening on Flexibility, Strength and Jump JULIO ARTEMI HERNÁNDEZ TRUJILLO	9:30 h	
4 Influence of Inter-Repetition Rests in the Relationship Between Maximum Repetitions to Failure and Lifting Velocity CARLOS MARTÍNEZ RUBIO	9:45 h	
5 Body composition and cardiovascular fitness by sex according to bone mineral density level: A two-step cluster analysis ISABEL GUISADO CUADRADO	10:00 h	
6 Differences in the ventilatory threshold positions relative to VO ₂ max according to VO ₂ at each threshold JOSÉ ANTONIO BENÍTEZ MUÑOZ	10:15 h	
¿Existen adaptaciones nerviosas en respuesta al entrenamiento de fuerza? MIGUEL ÁNGEL FERNÁNDEZ DEL OLMO	10:30 - 11:30 h	
Descanso / Break/ Poster presentation 1	11:30 - 12:00 h	Entrada / Hall
Cambios en la fuerza, velocidad y potencia muscular a lo largo del ciclo vital: powerpenia y sus consecuencias JULIÁN ALCÁZAR CAMINERO	12:00 - 13:00 h	Auditorio/ Conference hall
Oxidación de grasas durante el ejercicio: implicaciones para la salud y el rendimiento deportivo FRANCISCO JOSÉ AMARO GAHETE	13:00 - 14:00 h	
Comida / Lunch	14:00 - 15:30 h	
WORKSHOP 1: Evaluación y diseño de programas de entrenamiento de fuerza orientados a la potencia muscular en personas mayores JULIÁN ALCÁZAR CAMINERO	14:00 - 15:30 h	Sala centro deportivo / Sport center room

PROGRAMA AMPLIADO / EXTENDED PROGRAM

VIERNES, 15 DE DICIEMBRE / FRIDAY, DECEMBER 15		
PROGRAMA DE TARDE/ AFTERNOON PROGRAM		
DESCRIPCIÓN / DESCRIPTION	HORA / TIME	LUGAR / VENUE
MICRO CONCIERTO/MICROCONCERT MIGUEL GARRIDO ROMANOS	15:00 - 15:30 h	Auditorio/ Conference hall
CONFERENCIA INAUGURAL / OPENING CEREMONY	15:30 - 15:45 h	
El ejercicio físico sobre los depósitos de grasa ectópicas y el síndrome metabólico en niños con sobrepeso IDOIA LABAYEN	15:45 - 17:30 h	
Comunicaciones orales 2 / Oral Presentation 2	17:30 - 18:00 h	Entrada / Hall
1 Effects of short-term detraining period on strength and jump performance in semi-professional female handball players CARLOS GARCÍA SÁNCHEZ	17:30:00 h	Auditorio/ Conference hall
2 Effect of rotary inertia devices on sprint curve performance in semi-professional female soccer players JAVIER ANTONIO GONZÁLEZ ALCÁNTARA	17:45:00 h	
Descanso / Break/ Poster presentation 2	18:00- 18:30 h	Entrada / Hall
Preparación física en los deportes de combate ÓSCAR MARTÍNEZ DE QUEL PÉREZ	18:30 - 19:30 h	Auditorio/ Conference hall
Programación de los ejercicios derivados de la halterofilia en el rendimiento deportivo MARCOS ANTONIO SORIANO RODRÍGUEZ	19:30 - 20:30 h	

PROGRAMA AMPLIADO / EXTENDED PROGRAM

SÁBADO, 16 DE DICIEMBRE / SATURDAY, DECEMBER 16			
PROGRAMA DE MAÑANA/ MORNING PROGRAM			
DESCRIPCIÓN / DESCRIPTION	HORA / TIME	LUGAR / VENUE	
Apertura de acreditaciones / Registration open	08:30 - 09:00 h	Entrada / Hall	
Comunicaciones orales 3 / Oral Presentation 3	9:00 - 10:00 h	Auditorio/ Conference hall	
1 Relación entre fuerza con el EDSS y capacidad funcional en personas con Esclerosis Múltiple ALBERTO RANDO MARTÍN	9:00 h		
2 Immersive Virtual Reality: Impact on Quality of Life in Individuals with Physical Disabilities SARA ALONSO GUNTÍN	9:15 h		
3 Efecto del entrenamiento de HIIT en pacientes con cáncer de mama durante la quimioterapia ÁLEX MOTA MARTÍN	9:30 h		
4 Analysis of movement variability to quantify fatigue after CrossFit vs traditional strength training ALEJANDRO OLIVER LÓPEZ	9:45 h		
Presentación de la Sociedad Española de Nutrición (SEÑ) MARCELA GONZÁLEZ-GROSS	10:00 h		
Nuevo paradigma en la relación nutrición, deporte y fuerza RAÚL DOMÍNGUEZ HERRERA	10:15 - 11:30 h		
Nuevas estrategias nutricionales para el rendimiento deportivo JUAN MIELGO AYUSO			
Descanso / Break/ Poster presentation 3	11:30 - 12:00 h		Entrada / Hall
Relative Energy Deficiency in Sport (REDS) - potential impact on performance ANNA MELIN	12:00 - 13:00 h		Auditorio/ Conference hall
Entrenamiento de fuerza en la preparación para un periodo de alta densidad competitiva en mujeres BLANCA ROMERO MORALEDA	13:00 - 14:00 h		
Comida / Lunch	14:00 - 15:30 h		
WORKSHOP 2: Movimientos derivados de la alterofilia MARCOS ANTONIO SORIANO RODRÍGUEZ	14:00 - 15:30 h	Sala centro deportivo / Sport center room	

PROGRAMA AMPLIADO / EXTENDED PROGRAM

SÁBADO, 16 DE DICIEMBRE / SATURDAY, DECEMBER 16		
PROGRAMA DE TARDE/ AFTERNOON PROGRAM		
DESCRIPCIÓN / DESCRIPTION	HORA / TIME	LUGAR / VENUE
Mesa redonda / Round Table: Ejercicio en niños y rendimiento académico IDOIA LABAYEN, ANTONIO GARCÍA HERMOSO, ÓSCAR MARTÍNEZ DE QUEL PÉREZ	15:30 - 17:00 h	Auditorio/ Conference hall
Equilibrio Redox y ejercicio DAVID MORALES ÁLAMO	17:00 - 18:00 h	
DESCANSO / BREAK	18:00- 18:30 h	Entrada / Hall
Conclusiones, entrega de premios y clausura del Simposio / Conclusios, awards and closing ceremony	18:30 - 19:00 h	Auditorio/ Conference hall
Mesa redonda / Round Table: Klotho, la proteína de la longevidad CATALINA SANTIAGO DORREGO, TAMARA ITURRIAGA RAMÍREZ, JULIA MARTÍN-VIRGALA	19:00 - 20:30 h	

PONENTES / KEYNOTE SPEAKERS

SATURDAY, DECEMBER 16, 2023

12:00 - 13:00 H



ANNA MELIN
LINNAEUS UNIVERSITY, DENMARK

Relative energy deficiency in Sport (REDS) - Potential impact on performance

Anna es graduada en nutrición y dietética clínica además de master y doctorada en la Universidad de Copenhague (Dinamarca), donde paso una parte de su trayectoria académica. Su labor docente e investigadora en el ámbito de las Ciencias del Deporte se centra principalmente en el campo de las Ciencias Naturales, y más concretamente, en la nutrición y la Medicina Deportiva, investigando sobre la deficiencia energética relativa en el deporte (REDS) y los trastornos alimentarios. Comenzó los estudios de doctorado tras 15 años de trabajo clínico como dietista certificada en el deporte de élite danés (Team Denmark). Sus experiencias clínicas han contribuido a su interés por generar conocimientos basados en pruebas que puedan ser útiles para atletas, entrenadores, fisiólogos del deporte, nutricionistas y otros profesionales que trabajan en el campo de la medicina deportiva.

Anna holds a degree in clinical nutrition and dietetics as well as a master's degree and a PhD from the University of Copenhagen (Denmark), where she spent part of her academic career. Her teaching and research within sports science mainly belongs in the field of natural science and specifically within sports nutrition and sports medicine, searching about Relative Energy Deficiency in Sport (REDS) and eating disorders. She started the doctoral studies after 15 years of clinical work as a certified sports dietitian within Danish elite sports (Team Denmark). Her clinical experiences have contributed to her interest in generating evidence-based knowledge that may be useful for athletes, coaches, sports physiologists, nutritionists and others working in the field of sports medicine.



IDOIA LABAYEN GOÑI, PHD
UNIVERSIDAD PÚBLICA DE NAVARRA, (PAÍS VASCO)

El ejercicio físico sobre los depósitos de grasa ectópicos y el síndrome metabólico en niños con sobrepeso

Idoia Labayen es Doctora en Fisiología y Nutrición por la Universidad de Navarra (UNAV) y profesora titular del Departamento de Ciencias de la Salud de la Universidad Pública de Navarra (UPNA). Ha trabajado como investigadora en el Departamento de Fisiología y Nutrición de la Universidad de Navarra (1997-2002) y como Profesora Titular de Nutrición y Bromatología en la Facultad de Farmacia de la Universidad del País Vasco (2002-2017). Es la directora del grupo de investigación ELIKOS de la UPNA (ELikadura, arIketa fisikoa eta OSasuna, Nutrición, Actividad Física y Salud), del Grupo de "Diabetes y Enfermedades Metabólicas" del Instituto de Investigación Sanitaria de Navarra (IdiSNA) y del Grupo de Acción Campus Iberus PEANUT (PErsonAlised NUTrition and healthy lifestyle) y ha participado y/o dirigido proyectos de investigación de ámbito nacional y europeo publicando más de 200 artículos científicos. Actualmente, la línea de investigación en la que trabaja es el estudio de la obesidad y sus comorbilidades y centra una gran parte de su investigación en el papel del ejercicio físico en prevención y el tratamiento de la misma, fundamentalmente en la etapa infantil y adolescente. Idoia Labayen es profesora de la asignatura "Fisiología Humana" en el Grado de medicina en la UPNA y del Máster Universitario Nutrición y Salud de la Universidad del País Vasco. Actualmente, es la directora del Research Institute for Sustainability & Food Chain Innovation (IS-FOOD).

Idoia Labayen holds a PhD in Physiology and Nutrition from the University of Navarra (UNAV) and is a full professor in the Department of Health Sciences at the Public University of Navarra (UPNA). She has worked as a researcher in the Department of Physiology and Nutrition at the University of Navarra (1997-2002) and as Full Professor of Nutrition and Bromatology at the Faculty of Pharmacy of the University of the Basque Country (2002-2017). She is the director of the research group ELIKOS of the UPNA (ELikadura, arIketa fisikoa eta OSasuna, Nutrition, Physical Activity and Health), of the "Diabetes and Metabolic Diseases" Group of the Institute of Health Research of Navarra (IdiSNA) and of the Campus Iberus Action Group PEANUT (PErsonAlised NUTrition and healthy lifestyle) and has participated and/or directed national and European research projects publishing more than 200 scientific articles. She is currently the director of the Research Institute for Sustainability & Food Chain Innovation (IS-FOOD).



MIGUEL ÁNGEL FERNÁNDEZ DEL OLMO, PHD
UNIVERSIDAD REY JUAN CARLOS - COL. 65605

¿Existen adaptaciones nerviosas en respuesta al entrenamiento de fuerza?

Miguel Ángel Fernández es Catedrático de Universidad, actualmente trabaja en la Universidad Rey Juan Carlos de Madrid en la Facultad de Ciencias de la Educación y del Deporte y Estudios Interdisciplinarios. Su conocimiento se ha visto enriquecido por numerosas estancias en diferentes universidades del mundo como la Universidad de Ann Arbor (Michigan), la Universidad de Barcelona, la University College London o la University California Berkeley. Cuenta con más de 25 años de experiencia en docencia universitaria e investigación sobre cómo el sistema nervioso controla el movimiento humano, fundamentalmente sus estudios abarcan ámbitos relacionados con las adaptaciones nerviosas al entrenamiento de fuerza o el ejercicio en la enfermedad de Parkinson, obteniendo diversos reconocimientos a lo largo de su carrera profesional.

Miguel Ángel Fernández is a University Professor, currently working at the Universidad Rey Juan Carlos de Madrid in the Faculty of Education and Sport Sciences and Interdisciplinary Studies. His knowledge has been enriched by numerous stays in different universities around the world such as the University of Ann Arbor (Michigan), the University of Barcelona, the University College London or the University California Berkeley. He has more than 25 years of experience in university teaching and research on how the nervous system controls human movement. His studies mainly cover areas related to nerve adaptations to strength training or exercise in Parkinson's disease, obtaining several awards throughout his professional career.



JULIÁN ALCÁZAR CAMINERO, PHD
UNIVERSIDAD DE CASTILLA-LA MANCHA - COL. 54876

Cambios en la fuerza, velocidad y potencia muscular a lo largo del ciclo vital: Powerpenia y sus consecuencias

Julián Alcázar Caminero es Graduado en Ciencias de la Actividad Física y el Deporte por la Universidad de Castilla-La Mancha, actualmente lleva a cabo su trabajo investigador en el Grupo de Investigación GENUUD Toledo, en la Facultad de Ciencias de la Actividad Física y el Deporte de la Universidad de Castilla-La Mancha y en el CIBER sobre Fragilidad y Envejecimiento Saludable en el Instituto Carlos III de Madrid. Además de ser graduado cuenta con un Máster en Investigación en Ciencias del Deporte y es Doctor en Investigación Sociosanitaria y de la Actividad Física por la Universidad de Castilla-La Mancha, ha realizado estancias de investigación en diferentes instituciones como la Universidad de las Palmas de Gran Canaria, el Bispebjerg University Hospital o la Universidad de Viena. Cuenta con 43 publicaciones científicas en revistas JCR como co-autor y un índice $h = 19$. Sus trabajos científicos están relacionados con la comprensión de los cambios (y mecanismos) en el sistema neuromuscular y la relación fuerza-potencia-velocidad así como la patología (lesión y enfermedad) y envejecimiento.

Julián Alcázar Caminero is a graduate in Physical Activity and Sport Sciences at Universidad de Castilla-La Mancha, he currently carries out his research work in the GENUUD Toledo Research Group, in the Faculty of Physical Activity and Sport Sciences of the Universidad de Castilla-La Mancha and in the CIBER on Fragility and Healthy Ageing at Instituto Carlos III de Madrid. In addition to being a graduate, he's done a Master's degree in Sport Science Research and a PhD in Health and Physical Activity Research at Universidad de Castilla-La Mancha, he has carried out research stays in different institutions such as the University of Las Palmas de Gran Canaria, the Bispebjerg University Hospital or the University of Vienna. He has 43 scientific publications in JCR journals as co-author and an h-index = 19. His scientific works are related to the understanding of changes (and mechanisms) in the neuromuscular system and the force-power-velocity relationship as well as pathology (injury and disease) and ageing.



FRANCISCO JOSÉ AMARO GAHETE, PHD
INSTITUTO DE SALUD CARLOS III - COL. 57309

Oxidación de grasas durante el ejercicio: implicaciones para la salud y el rendimiento deportivo

Francisco José Amaro es profesor contratado doctor en el Instituto Mixto Universitario de Deporte y Salud, también desarrolla su labor científica en el Instituto de Investigación Biosanitaria de Granada y en el CIBER de Fisiopatología de la Obesidad y Nutrición en el Instituto de Salud Carlos III de Madrid. Francisco José ha realizado estancias de investigación internacionales pre y post doctorales en el XLab en la Universidad de Copenhague con el Profesor Jørn W. Helge. A pesar de su juventud, su trayectoria investigadora es muy amplia siendo autor de más de 130 artículos, con un índice h = 21, ha sido galardonado con varios prestigiosos premios como el "PhD Academy Award" otorgado por la British Journal of Sports Medicine o el "Premio Extraordinario de Doctorando" entregado por la Universidad de Granada. Francisco José ha supervisado 5 tesis doctorales, 4 de ellas internacionales y está supervisando a 8 doctorandos actualmente. También cabe destacar que mantiene relaciones activas con otros grupos de investigación de otros países.

Francisco José Amaro is a PhD Professor at the Instituto Mixto Universitario de Deporte y Salud, he also carries out his scientific work at the Instituto de Investigación Biosanitaria de Granada and at the CIBER de Fisiopatología de la Obesidad y Nutrición at the Instituto de Salud Carlos III de Madrid. Francisco José has carried out international pre- and post-doctoral research stays at the XLab at the University of Copenhagen with Professor Jørn W. Helge. Despite his youth, his research career is very broad and he is the author of more than 130 articles, with an h index = 21, and has been awarded several prestigious prizes such as the "PhD Academy Award" granted by the British Journal of Sports Medicine or the "Premio Extraordinario de Doctorando" awarded by the Universidad de Granada. Francisco José has supervised 5 doctoral theses, 4 of them international, and he is currently supervising 8 doctoral students. He also maintains active relationships with other research groups in other countries.

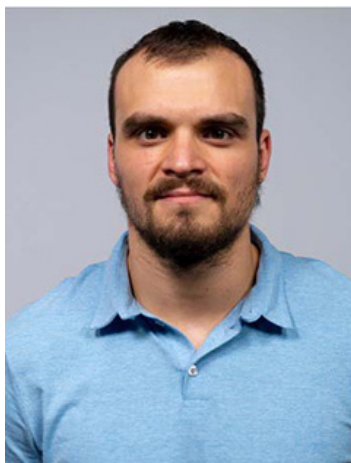


OSCAR MARTÍNEZ DE QUEL PÉREZ
UNIVERSIDAD POLITÉCNICA DE MADRID - COL. 60507

Preparación física en los deportes de combate

Oscar Martínez de Quel es licenciado y doctor en Ciencias de la Actividad Física y del Deporte por la Universidad Politécnica de Madrid, además de licenciado en Psicología por la UNED, en la especialidad de psicología de la educación. Su investigación se centra en la psicología, la salud, la condición física, el control motor y los deportes de combate y otros temas relacionados con la actividad física y el deporte. Junto con su carrera académica, fue deportista de alto nivel y entre sus éxitos encontramos dos oros (2002 y 2006), una plata (2004) y un bronce (2008) en Campeonatos del Mundo absolutos de Karate; un oro (2008), dos platas (2004-2010) y un bronce (2003) en Campeonatos europeos de Karate y 17 oros en Campeonatos de España. Fue preparador físico de la Real Federación Española de Karate entre los años 1999-2016. Es profesor de la Universidad Complutense de Madrid (UCM) desde 2004. Actualmente es contratado doctor en la Facultad de Educación e investigador en la sección de Neurociencia Cognitiva del grupo de investigación mixto ISCIII-UCM para la Evolución y el Comportamiento Humano.

Óscar Martínez de Quel holds a degree and PhD in Physical Activity and Sport Sciences from the Polytechnic University of Madrid, as well as a degree in Psychology from the UNED, specializing in educational psychology. His research focuses on psychology, health, physical fitness, motor control and combat sports and other topics related to physical activity and sport. Along with his academic career, he was a high-level athlete and among his successes we find two golds (2002 and 2006), a silver (2004) and a bronze (2008) in Karate World Championships; a gold (2008), two silvers (2004-2010) and a bronze (2003) in Karate European Championships and 17 golds in Spanish Championships. He was physical trainer of the Royal Spanish Karate Federation between 1999-2016. He has been a professor at the Complutense University of Madrid (UCM) since 2004. He is currently a doctoral candidate in the Faculty of Education and researcher in the Cognitive Neuroscience section of the mixed ISCIII-UCM research group for Evolution and Human Behavior.



MARCOS ANTONIO SORIANO RODRÍGUEZ
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Programación de los ejercicios derivados de la halterofilia en el rendimiento deportivo

Marcos Antonio Soriano, es docente e investigador en la Universidad Camilo José Cela (UCJC). Profesor acreditado como contratado doctor. Director de título del Máster en Entrenamiento de Fuerza y Rendimiento Neuromuscular de la UCJC. Honorary Research Fellow en University of Salford (Manchester, Reino Unido). Doctor internacional por la Universidad de Murcia. Premio extraordinario de doctorado en Ciencias de la Actividad Física y el deporte, en los años 2020 y 2021, en la Universidad de Murcia. Docente en la Real Federación Española de Halterofilia. Director del grupo de investigación "Strength Training and Neuromuscular Performance (STreNghtP) research group" de la Universidad Camilo José Cela. Miembro e investigador de la "Red de Optimización del Entrenamiento de Fuerza y del Rendimiento Neuromuscular" del proyecto REDES del Ministerio y CSD.

Marcos Antonio Soriano is a lecturer and researcher at the Universidad Camilo José Cela (UCJC). Professor accredited as a contracted doctorate. Director of the Master's Degree in Strength Training and Neuromuscular Performance at UCJC. Honorary Research Fellow at University of Salford (Manchester, UK). International Doctorate from the University of Murcia. Extraordinary Doctorate Award in Physical Activity and Sport Sciences, in the years 2020 and 2021, at the University of Murcia. Teacher at the Royal Spanish Weightlifting Federation. Director of the research group "Strength Training and Neuromuscular Performance (STreNghtP) research group" at the University Camilo José Cela. Member and researcher of the "Strength Training and Neuromuscular Performance Optimization Network" of the REDES project of the Ministry and CSD.

**RAÚL DOMÍNGUEZ HERRERA, PHD**

*DPTO. MOTRICIDAD HUMANA Y RENDIMIENTO
DEPORTIVO, UNIVERSIDAD DE SEVILLA - COL. 69427*

Nuevo paradigma en la relación Nutrición, Deporte y Fuerza

Raúl Domínguez Herrera es Profesor Ayudante Doctor en Departamento de Motricidad Humana y Rendimiento Deportivo y miembro del grupo de investigación GEPREN de la Universidad de Lavras, la trayectoria científica de Raúl está centrada en el área de la Nutrición Deportiva, específicamente en el estudio de diferentes suplementos deportivos sobre el rendimiento físico y la fatiga. Actualmente, es investigador principal de la Red de Investigación financiada por el CSD Nutrición Aplicada a la Mujer Deportista NAMUD.

Raúl Domínguez Herrera is Assistant Professor Doctor in the Department of Human Motricity and Sports Performance and member of the GEPREN research group at the University of Lavras, Raul's scientific career is focused in the area of Sports Nutrition, specifically in the study of different sports supplements on physical performance and fatigue. Currently, is principal investigator of the CSD-funded Research Network Nutrition Applied to Female Athletes NAMUD.

**JUAN MIELGO AYUSO***DPTO. CIENCIAS DE LA SALUD, UNIVERSIDAD DE BURGOS*

Nuevas estrategias nutricionales para el rendimiento deportivo

Juan Mielgo Ayuso es diplomado en Nutrición y Dietética por la Universidad de Navarra y doctor por la Universidad del País Vasco – Euskal Herriko Unibertsitatea. Cuenta además con varios master en las Universidades de Valencia, Sevilla y País Vasco. Actualmente es Profesor Titular del Departamento de Ciencias de la Salud de la Universidad de Burgos; y forma parte del grupo de investigación de Fisiología Celular y Molecular, de este mismo departamento. Su área de especialización es el análisis del efecto de diferentes suplementos sobre el rendimiento físico y la fatiga en deportistas. Su producción literaria se compone de más de 100 publicaciones científicas, 15 libros publicados, 21 capítulos de libros y 2 aportaciones en congresos sobre el tema.

Juan Mielgo Ayuso holds a degree in Nutrition and Dietetics from the University of Navarra and a PhD from the University of the Basque Country - Euskal Herriko Unibertsitatea. He also holds various master's degrees from the Universities of Valencia, Seville and the Basque Country. He is currently Professor in the Department of Health Sciences at the University of Burgos and is a member of the Cellular and Molecular Physiology research group in the same department. His expertise area is the analysis of the effect of different supplements on physical performance and fatigue in athletes. His literary production consists of more than 100 scientific publications, 15 published books, 21 book chapters and 2 contributions to conferences on the subject.



BLANCA ROMERO MORALEDA, PHD
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Entrenamiento de fuerza en la preparación para un periodo de alta densidad competitiva en mujeres futbolistas

Blanca Romero Moraleda es licenciada y doctora en Ciencias de la Actividad Física y el Deporte por la Universidad Politécnica de Madrid, y graduada en fisioterapia por la Universidad Autónoma de Madrid. Además, ha completado su formación con varios cursos de especialización universitaria, tanto en prevención y readaptación de lesiones como en entrenamiento personal. Actualmente es profesora en la Universidad Autónoma de Madrid y preparadora física de la Selección Española de Fútbol Femenino, que recientemente ha logrado proclamarse Campeona del Mundo por primera vez en la historia de España. En cuanto su actividad investigadora, ha contribuido también en numerosos artículos de diversas temáticas; aunque predominantemente, relacionados con el Fútbol.

Blanca Romero Moraleda holds a degree and PhD in Physical Activity and Sport Sciences from the Polytechnic University of Madrid, and a degree in physiotherapy from the Autonomous University of Madrid. In addition, she has completed her studies with several university specialisation courses, both in prevention and rehabilitation of injuries and in personal training. She is currently a professor at the Autonomous University of Madrid and physical trainer of the Spanish Women's Football Team, which recently won the World Cup for the first time in the history of Spain. As a researcher, she has also contributed to numerous articles on various subjects, although predominantly related to football.

**DAVID MORALES ÁLAMO**

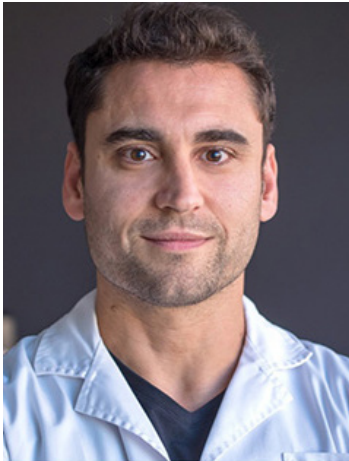
UNIVERSIDAD DE LAS PALMAS DE GRAN CANARIA.
COL. 55697

Equilibrio Redox y Ejercicio

David Morales Álamo es licenciado en Ciencias de la Actividad Física y Doctor en la universidad de las Palmas de Gran Canaria. Actualmente trabaja en la Universidad de las Palmas de Gran Canaria como profesor de Fisiología del Ejercicio y Nutrición Deportiva. Además, es investigador del Grupo de Rendimiento Humano, Ejercicio Físico y Salud del instituto Universitario de Investigaciones Biomédicas y Sanitarias. Para complementar su formación ha realizado estancias de formación con el Prof. Robert Boushel en el The Swedish School of Sport and Health Sciences (Estocolmo, Suecia), con el Prof. Paul Greenhaff en la Facultad de Medicina de The University of Nottingham (Reino Unido) y con la Profesora Roser Cusso en la Facultad de Medicina de la Universitat de Barcelona.

Sus trabajos se centran en el estudio de los mecanismos que producen la fatiga, a la vez que en el estudio de los mecanismos moleculares que regulan las adaptaciones al ejercicio. Principalmente en entender el papel de los radicales libres en las adaptaciones del músculo en respuesta al ejercicio de alta intensidad, la hipoxia severa aguda, y recientemente el entrenamiento con oclusión.

David Morales Álamo has a degree in Physical Activity Sciences and a PhD from the Universidad de las Palmas de Gran Canaria. He currently works at the Universidad de las Palmas de Gran Canaria as a professor of Exercise Physiology and Sports Nutrition. He is also a researcher in the Grupo de Rendimiento Humano, Ejercicio Físico y Salud del instituto Universitario de Investigaciones Biomédicas y Sanitarias. To complement his training he has made stays with Prof. Robert Boushel at The Swedish School of Sport and Health Sciences (Stockholm, Sweden), with Prof. Paul Greenhaff at the Faculty of Medicine of The University of Nottingham (UK) and with Prof. Roser Cusso at the Facultad de Medicina de la Universitat de Barcelona. His work focuses on the study of the mechanisms that produce fatigue, as well as on the study of the molecular mechanisms that regulate adaptations to exercise. Mainly in understanding the role of free radicals in muscle adaptations in response to high intensity exercise, acute severe hypoxia, and recently occlusion training.



ANTONIO GARCÍA HERMOSO, PHD
*HOSPITAL UNIVERSITARIO DE NAVARRA,
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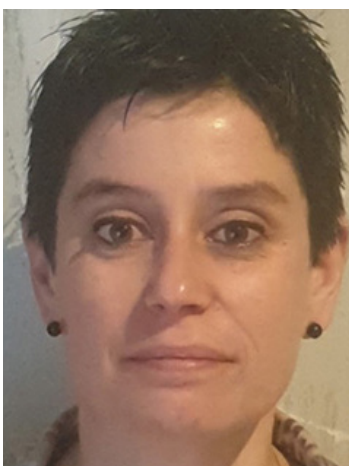
Mesa redonda: Ejercicio en niños y rendimiento académico

Antonio García Hermoso es Licenciado y doctor en Ciencias de la Actividad Física y la Salud por la Universidad de Extremadura (España). Especializado en actividad física pediátrica, condición física y salud cardiometabólica. Actualmente dirige la Unidad de Actividad Física Infanto-Juvenil del Centro de investigación biomédica Navarrabiomed (Pamplona, España) con un contrato Miguel Servet (<https://www.navarrabiomed.es/es/investigacion/unidades-de-investigacion/actividad-fisica-infanto-juvenil>).

Su trabajo se centra principalmente en el efecto que puede provocar de la actividad física y el ejercicio sobre la salud de los jóvenes. Ha contribuido a más de 250 publicaciones en revistas revisadas por pares y publicadas en PubMed (<https://www.ncbi.nlm.nih.gov/pubmed/?term=garc%C3%ADa-hermoso+a>).

Antonio García Hermoso is Graduate and PhD in Physical Activity and Health Sciences from the University of Extremadura (Spain). Specialized in pediatric physical activity, fitness and cardiometabolic health. He currently directs the Child-Adolescent Physical Activity Unit of the Navarrabiomed Biomedical Research Center (Pamplona, Spain) with a Miguel Servet contract (<https://www.navarrabiomed.es/es/investigacion/unidades-de-investigacion/actividad-physical-child-youth>).

His work focuses mainly on the effect that physical activity and exercise can have on the health of young people. He has contributed to more than 250 publications in peer-reviewed journals published in PubMed (<https://www.ncbi.nlm.nih.gov/pubmed/?term=garc%C3%ADa-hermoso+a>).



CATALINA SANTIAGO DORREGO, PHD
UNIVERSIDAD EUROPEA DE MADRID

Mesa redonda: Proteína Klotho, la proteína de la longevidad

Catalina Santiago Dorrego es Licenciada en Biología, Doctora por la Universidad Complutense de Madrid y Catedrática de Genética de la Universidad Europea de Madrid. En la Universidad Europea de Madrid formó parte del Grupo de Investigación de Biomedicina y Biopatología Molecular donde estudió la asociación genotipo-fenotipo en la caracterización genotípica de polimorfismos relacionados con el rendimiento deportivo y físico en deportistas. En año 2017, la Unidad de Biomedicina de la que formaba parte se incorporó al grupo de investigación de la Universidad Europea ESBIDA (Ejercicio, Salud y Biomarcadores Aplicados) del cual es actualmente Investigadora Principal. Sus principales líneas de investigación son los estudios de marcadores biológicos aplicados a la salud y el ejercicio y la genética y su relación con la actividad física. Ha participado como autora/coautora en más de 90 artículos científicos, en 6 capítulos de libros y en más de 60 comunicaciones a congresos nacionales e internacionales. Además, ha dirigido 6 tesis doctorales.

Catalina Santiago Dorrego has a degree in Biology, a PhD from the Universidad Complutense de Madrid and is Professor of Genetics at the Universidad Europea de Madrid. At the Universidad Europea de Madrid she was part of the Grupo de Investigación de Biomedicina y Biopatología Molecular where she studied the genotype-phenotype association in the genotypic characterization of polymorphisms related to sports and physical performance in athletes. In 2017, the Unidad de Biomedicina of which she was part joined the Universidad Europea ESBIDA (Ejercicio, Salud y Biomarcadores Aplicados) of which she is currently Principal Investigator. Her main lines of research are the study of biomarkers applied to health and exercise and genetics and its relationship with physical activity. She has participated as author/co-author in more than 90 scientific articles, in 6 book chapters and in more than 60 communications to national and international congresses. In addition, she has supervised 6 doctoral theses.



TAMARA ITURRIAGA RAMÍREZ, PHD
UNIVERSIDAD EUROPEA DE MADRID

Mesa Redonda: Proteína Klotho, la proteína de la longevidad

Tamara Iturriaga es licenciada y doctora en Ciencias de la Actividad Física y el Deporte. Actualmente trabaja de docente e investigadora en la Facultad de Ciencias de la Actividad Física, el Deporte y Fisioterapia de la Universidad Europea de Madrid donde además es colaboradora del grupo de investigación Ejercicio, Salud y Biomarcadores Aplicados (ESBIDA) de la UEM. Sus áreas de docencia son el estudio de biomarcadores aplicados a las ciencias del deporte y la aplicación del ejercicio físico como herramienta coadyudante en distintas patologías. Dentro de su ámbito profesional también ejerce como entrenadora personal para clientes de poblaciones especiales.

Tamara Iturriaga has a degree and PhD in Physical Activity and Sport Sciences. She currently works as a teacher and researcher at the Facultad de Ciencias de la Actividad Física, el Deporte y Fisioterapia de la Universidad Europea de Madrid where she is also a collaborator of the research group Ejercicio, Salud y Biomarcadores Aplicados (ESBIDA) of the UEM. Her teaching areas are the study of biomarkers applied to sports science and the application of physical exercise as a tool to help in different pathologies. Within her professional field she also works as a personal trainer for special populations.



JULIA MARTÍN VÍRGALA, PHD
*INSTITUTO DE INVESTIGACIÓN
SANITARIA PRINCIPADO DE ASTURIAS*

Mesa redonda: Proteína Klotho, la proteína de la longevidad

Julia Martín es graduada en biología por la Universidad de Oviedo, donde también cursó un master en Biomedicina y Oncología molecular. Actualmente está realizando su tesis doctoral en el laboratorio de Metabolismo óseo, vascular y enfermedades inflamatorias crónicas del Instituto de Investigación Sanitaria del Principado de Asturias (ISPA), con un contrato de Formación de Profesorado Universitario (FPU). El trabajo de tesis se centra en el papel de la proteína Klotho soluble como posible biomarcador de las alteraciones del metabolismo óseo y mineral asociadas a la enfermedad renal crónica. Durante el proceso doctoral realizó una estancia de 6 meses en el Servicio de Nefrología del Hospital Curry Cabral (Lisboa, Portugal). Además, trabaja en redes como Investigación Cooperativa Orientadas a Resultados en Salud (RICORS), RICORS2040 (Kidney Disease).

Julia Martín has a degree in Biology from the Universidad de Oviedo, where she also completed a Master in Biomedicine and Molecular Oncology. She is currently working on her PhD thesis at the Metabolismo óseo, vascular y enfermedades inflamatorias crónicas laboratory of the Instituto de Investigación Sanitaria del Principado de Asturias (ISPA), with a University Faculty Training (FPU) contract. The thesis work focuses on the role of soluble Klotho protein as a possible biomarker of bone and mineral metabolism alterations associated with chronic kidney disease. During the doctoral process she spent 6 months at the Nephrology Department of the Curry Cabral Hospital (Lisbon, Portugal). In addition, she works in networks such as RICORS and RICORS2040 (Kidney Disease).



JULIÁN ALCÁZAR CAMINERO, PHD
UNIVERSIDAD POLITÉCNICA DE MADRID - COL. 67816

Evaluación y Diseño de Programas de entrenamiento de fuerza orientados a la potencia muscular en personas mayores



MARCOS ANTONIO SORIANO RODRÍGUEZ
UNIVERSIDAD CAMILO JOSÉ CELA - COL. 58024

Movimientos derivados de la halterofilia

COMUNICACIONES ORALES / ORAL PRESENTATION

FRIDAY, DECEMBER 15, 2023

9:00 - 10:30 H

Comunicaciones orales 1 / Oral presentation 1

09:00 - 09:15 h

A COMPARISON BETWEEN HEART RATE AND POWER OUTPUT TO PRESCRIBE EXERCISE INTENSITY

ÁLVAREZ-DACOSTA, E.¹, BENÍTEZ-MUÑOZ, J.A.¹, GUISSADO-CUADRADO, I.¹, ROJO-TIRADO, M.A.¹, ALCOCER-AYUGA, M.^{1,2}, ROMERO-PARRA, N.^{1,3}, PEINADO, A.B.¹, CUPEIRO R.¹

¹LIFE RESEARCH GROUP, DEPARTMENT OF HEALTH AND HUMAN PERFORMANCE, FACULTY OF PHYSICAL ACTIVITY AND SPORTS SCIENCE, UNIVERSIDAD POLITÉCNICA DE MADRID, SPAIN. ²OLYMPIA SPORT & LIFESTYLE CENTERS, GRUPO QUIRÓNSALUD. ³DEPARTMENT OF PHYSICAL THERAPY, OCCUPATIONAL THERAPY, REHABILITATION AND PHYSICAL MEDICINE, FACULTY OF HEALTH SCIENCES, UNIVERSIDAD REY JUAN CARLOS, ALCORCÓN, SPAIN.

INTRODUCTION: Exercise intensity can be prescribed based on internal (e.g., heart rate [HR]) or external variables (e.g., power output [PO]). However, these variables may be affected by different aspects like environmental temperature or nutritional status (1). Thus, the purpose of this work was to analyse the possible changes in HR and PO under different situations: control, glycogen depletion (GD) and hyperthermia.

METHODS: Four women (61.6±3.9kg; 166.1±6.6cm; 23.6±2.9years) and eight men (70.7±5.2kg; 175.48±2.2cm; 21.73±2.9years) performed an incremental exercise test on a cycle ergometer (Lode Excalibur, Germany) in three situations: control, GD and hyperthermia (~36°C). The test started at 30W with 30W increase every 3 min until exhaustion. HR and breathing exchange were monitored constantly using a gas analyser (Jaeger, CareFusion, Germany). First (VT1) and second (VT2) ventilatory thresholds were determined as previously described (2). HR and PO at VT1 and VT2 were compared between situations using a two-way repeated measures ANOVA and Bonferroni as post hoc. The effect size was calculated by partial eta-squared (η^2_p).

RESULTS: A significant main effect of situation was observed in PO ($p=0.005$; $\eta^2_p=0.353$). PO was significantly higher in control (VT1: 115.21±35.06W; VT2: 185.83±31.29W) compared to hyperthermia (VT1: 95.58±39.98W; VT2: 166.25±29.22W; $p=0.011$), whereas it was significantly higher in GD (VT1: 117.50±26.44W; VT2: 189.42±27.54W) compared to hyperthermia (VT1: 95.58±39.98W; VT2: 166.25±29.22W; $p=0.046$). In contrast, it was not found a significant effect of situations in HR (VT1 control: 132±20bpm; VT1 depletion: 130±16bpm; VT1 hyperthermia: 129±19bpm; VT2 control: 158±17bpm; VT2 depletion: 152±26bpm; VT2 hyperthermia: 158±15bpm; $p=0.354$; $\eta^2_p=0.109$).

CONCLUSION: PO at VT1 and VT2 appears to change between situations while HR does not seem to be affected, supporting previous results (1). Therefore, if the objective is to stimulate a metabolic pathway it is recommended to prescribe exercise intensity based on an internal variable, such as HR, to induce the same metabolic stimulus. However, if the purpose is to analyse changes in performance, we suggest observing mechanical variables, such as PO at the VT1 and VT2. Nevertheless, more research is needed to further investigate the relationship between these variables and whether these differences would be maintained in steady states.

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1. Maunders et al. 2021. DOI: 10.1080/02701367.1980.10609285.
2. Keir et al. 2022. DOI: 10.1007/s40279-021-01581-z.

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Abstracts were prepared by the authors and printed as submitted.

INFLUENCIA DEL SEXO EN EL PERFIL CARGA-VELOCIDAD EN HIP-TRUST Y PESO MUERTO

NIETO-ACEVEDO, R., ROMERO-MORALEDA, B., MONTAL-VO-PÉREZ, A., VALDÉS-ÁLVAREZ, A., GARCÍA-SÁNCHEZ, C., MON-LÓPEZ D.

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INTRODUCCIÓN: El entrenamiento basado en velocidad (VBT) se ha propuesto como alternativa para evaluar la fuerza de forma indirecta (1). El VBT puede implementarse en varios aspectos del entrenamiento de fuerza, por ejemplo, para controlar la carga, series ó número de repeticiones (2-3). Una de las aplicaciones más interesantes del VBT es la posibilidad de estimar la fuerza 1RM a partir de la velocidad frente a cargas submáximas. Las relaciones generales de carga-velocidad (L-V), introducidas por González-Badillo y Sánchez-Medina (4), son cada vez más utilizadas para estimar la 1RM. Sin embargo, algunos estudios han demostrado que la generalización de las relaciones L-V es limitada porque existen diferencias de sexo entre los porcentajes de 1RM y las velocidades (5). En este metanálisis (5), se observa que los hombres muestran mayores velocidades a las mismas cargas relativas (%1RM) que las mujeres, particularmente con cargas ligeras y moderadas. Por lo tanto, el objetivo de este estudio era comparar el perfil de carga-velocidad entre hombres y mujeres durante hip-thrust y el peso muerto.

MÉTODO: Dieciséis hombres y dieciséis mujeres fueron medidos en un test de carga incremental siguiendo procedimientos estándar para los ejercicios de hip-thrust y peso muerto. Se utilizó la correlación de Pearson (r) para medir la fuerza de la correlación entre la velocidad de movimiento y la carga (%1RM). Las diferencias en la relación carga-velocidad entre hombres y mujeres se evaluaron mediante un ANOVA de medidas repetidas 2 (sexo) × 15 (cargas).

RESULTADOS: Los principales resultados revelaron que: (I) la relación carga-velocidad fue siempre fuerte y lineal en ambos ejercicios (rango R²: 0,88-0,94), (II) los hombres mostraron mayores velocidades para cargas ligeras (30-50%1RM; tamaño del efecto: 0,9-0,96) que las mujeres para el peso muerto, pero no se encontraron diferencias significativas para el hip-thrust.

DISCUSIÓN: Nuestros resultados coinciden con los de Pareja-Blanco et al. 2020 García-Ramos et al. 2021 y Balsalobre-Fernández et al. 2019, que encontraron diferencias de sexo desde cargas ligeras a moderadas para el press de banca, press de banca inclinado, press militar y sentadilla. En cuanto a las diferencias de sexo, una posible explicación podría ser que las mujeres tienen una mayor proporción de fibras musculares lentas en comparación con los hombres (6).

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ACUTE EFFECTS OF VOLUNTARY ISOMETRIC CONTRACTIONS AT MAXIMAL SHORTENING ON FLEXIBILITY, STRENGTH AND JUMP

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INTRODUCTION: It is known that in contractions where the muscle is shortened, strength gains are especially due to neural adaptations (1). In these positions, the effectiveness of the movement depends on the muscle spindles being able to send information to the central nervous system by stretching intrafusal fibers via gamma motor neurons (2). Tests have been used to detect neuroproprioceptive vulnerability based on the assessment of strength in positions of maximum muscle shortening (3). The aim of this study is to analyze the acute response regarding flexibility, strength and jump height after Voluntary Isometric Contraction at Maximal Shortening (VICAMS) vs Ballistic Stretching (BS) of the same joint movement.

METHODS: A total of 60 healthy, physically active subjects were randomly distributed into 3 groups and given different interventions: VICAMS; BS; no intervention to a control group (CG). VICAMS group performed 1 set of 9 repetitions of 5 seconds per leg of isometric contraction in flexion, extension, abduction, adduction of hip and flexion, extension of knee. On the other hand, BS achieved 3 sets of 20 seconds per leg to work. Active range of motion (AROM), maximal voluntary isometric force (MVIF) and countermovement jumping (CMJ) were measured pre and post the intervention as performance measure to each protocol. The CG was re-measured 20 minutes after the pretest.

RESULTS: ANOVA test has been used to see the difference between groups finding significant differences ($p < 0.01$) between the VICAMS group versus the others in hip and knee extension. CMJ and MVIF in right and left hip were measured before and after the intervention. Improvements were made based on premeasures only in the VICAMS group.

DISCUSSION: In conclusion, we can state that use VICAMS in the warm up has proven to be an effective system for improving flexibility, strength and jump height, due to acute effects have been significantly better than BS. The application of VICAMS can be useful for trainers due to its speed, effectiveness, low cost and small space required for its application.

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INFLUENCE OF INTER-REPETITION RESTS IN THE RELATIONSHIP BETWEEN MAXIMUM REPETITIONS TO FAILURE AND LIFTING VELOCITY

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INTRODUCTION: The maximum number of repetitions performed to failure (RTF) and the fastest mean velocity (MVfastest) relationships in a set have been proposed for the prescription of the loads associated with a specific RTF to decide how many repetitions to perform in each training set (1). This study compared the goodness-of-fit of the relationships between the RTF-MVfastest, under different inter-repetition rest (IRR) configurations (zero seconds [IRR0], three seconds [IRR3], and self-selected interval less than five seconds [SSIRR]) during the free-weight back squat and bench press exercises. Additionally, the influence of IRR on the MVfastest associated with different RTFs has been examined.

METHODS: Eighteen male students completed one session per IRR configuration, consisting of three single sets of repetitions to failure (65-75-85% of the one-repetition maximum) during the free-weight back squat and bench press exercises. The relative loads were estimated in each session through the load-velocity relationship. The generalized RTF-MVfastest relationships were obtained by pooling together the data from all subjects, whereas the individualized RTF-MVfastest relationships were determined specifically for each subject.

RESULTS: Individualized RTF-MVfastest were stronger than generalized (median R² = 0.98 vs. 0.65 and SEE = 1.2 vs 3.7 repetitions). The goodness-of-fit of the relationships was stronger for SSIRR than IRR0 during the back squat ($P \leq 0.004$) and comparable between IRRs during the bench press ($P \geq 0.279$). During the back squat, MVfastest values were higher for IRR0 than IRR3 and SSIRR (8th-15th RTF; $P \leq 0.065$), while during the bench press, they were higher for IRR0 than for IRR3 (11th-15th RTF; $P \geq 0.279$).

DISCUSSION: These results highlight the importance of standardizing the IRR during sets to failure used to establish RTF-MVfastest profiles. From a practical perspective, an SSIRR could be recommended as a more ecologically valid (i.e., subjects adopt a brief IRR based on their needs), accurate (i.e., higher goodness of fit of RTF-MVfastest) and objective procedure (i.e., steeper RTF-MVfastest due to higher RTF and velocity maintenance in the set) in free weight back squat and bench press exercises.

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BODY COMPOSITION AND CARDIOVASCULAR FITNESS BY SEX ACCORDING TO BONE MINERAL DENSITY LEVEL: A TWO-STEP CLUSTER ANALYSIS

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INTRODUCCIÓN: Muscle contraction is the main source of mechanical loading leading to bone adaptations due to bone and muscle are mechanically, biochemically and molecularly coupled (1). However, bone health may also be influenced by aging, body composition, or sex (2). Therefore, the objectives of this work were: i) to identify the main bone mineral density (BMD) clusters based on BMD of body regions, and ii) to compare body composition, cardiovascular fitness and age between these groups.

METHODS: Body composition and BMD were analysed by dual-energy X-ray absorptiometry (GE Lunar Prodigy) and cardiovascular fitness by a gas analyzer (JAEGER® Vyntus CPX) in 189 males (age: 42.7±12.5 years; weight: 75.5±9.1 kg; height: 175.8 cm; VO₂max: 48.6±9 ml·kg⁻¹·min⁻¹) and 143 females (age: 33.7±12.1 years; weight: 59.5±8.6 kg; height: 163.5±5.8 cm; VO₂max: 39±17.3ml·kg⁻¹·min⁻¹). A two-step cluster was conducted to determine the number of clusters using the Bayesian Information Criterion (BIC). One-way ANOVA, independent T-test, and non-parametric tests were used to compare previously determined cluster characteristics among males and females, respectively.

RESULTS: Three clusters were determined for males and 2 for females. Main effect for males (higher, medium and lower, respectively) was observed in fat mass (15.5±8.5 vs. 14.5±6.8 vs. 11.6±5.9 kg; p=0.034), fat-free mass (62.6±5.8 vs. 58.5±5.1 vs. 55.2±6.1 kg; p<0.001) and VO₂max (3849.5±655.3 vs. 3653±600.3 vs 3346.8±645 ml·min⁻¹; p<0.001), but not in age. Significant differences in females (higher and lower, respectively) were observed in age (31.3±11.7 vs. 37.3±12 years; p=0.004), fat mass (16.7±6.8 vs. 13.6±4.9 kg; p=0.008), fat-free mass (44.6±5 vs. 40.7±2.9 kg; p<0.001) and VO₂max (2785.9±518 vs. 2491.3±395 ml·min⁻¹; p<0.001).

DISCUSSION: This study reinforces the important role of lean mass in BMD, as previously suggested (1). Furthermore, it seems that there may be factors associated with fat mass that may have a positive effect on bone health. However, it is unknown if this is weight-independent or if it only contributes to increased mechanical stress due to increased loading, as previous studies suggest that excessive fat mass can have detrimental effects on bone health (3). On the other hand, age seems to influence BMD in females, which could be related to the sudden drop in sex hormone concentrations and BMD after menopause, in contrast to men who have a steady decrease in testosterone and BMD (2).

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DIFFERENCES IN THE VENTILATORY THRESHOLD POSITIONS RELATIVE TO VO₂MAX ACCORDING TO VO₂ AT EACH THRESHOLD

BENÍTEZ-MUÑOZ, J.A.¹, BENITO, P.J.¹, GUIADO-CUADRADO, I.¹, CUPEIRO, R.¹, ALCOCER-AYUGA, M.^{1,2}, PEINADO, A.B.¹

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INTRODUCTION: Zapico's study observed that ventilatory threshold 1 (VT1) and 2 (VT2) increased in percentage of VO₂max during a season (1). On the contrary, Iannetta's study (2) suggested the percentage of VO₂max at which lactate threshold and maximal lactate steady state occurs (i.e., reflection of VT1 and VT2 when measuring lactate) are similar in individuals with different fitness level. Based on these apparently contradictory results the aim of the present work was to observe whether training status affects VT1 and VT2 position relative to VO₂max.

METHODS: The sample size consisted of 971 males and 301 females. They performed a ramp-incremental test on a treadmill which typically consisted of three-minute warm-up between 4-6km/h followed by an incremental phase increasing 1km/h/min. Breath by breath oxygen consumption (VO₂) was analyzed with a Jaeger Oxycon-Pro (Erich Jaeger, Germany) or JAEGER®-Vyntus-CPX (Jaeger-CareFusion, Germany). VT1 and VT2 were determined as previously described (3). Participants were subsequently classified in terciles (high, medium and low) considering the relative VO₂ at VT1 and VT2 separately (one classification per threshold).

RESULTS: Males with a higher VO₂ at VT1 had a greater VT1 position relative to VO₂max (high:68.3±5.5%; medium:65.2±5.5%; low:59.9±8%; p<0.001). The same occurred for VT2 (high: 91.1±4.2%; medium:89±4.8%; low:85.4±7.3; p<0.001). Females with a higher training status at VT1 had a greater VT1 position relative to VO₂max (high:70.8±5.7%; medium:67.1±4.3%; low:61.1±8%; p<0.001). The same was true for VT2 (high: 86.4±7.6%; medium:90.6±4.8%; low:86.4±7.6; p<0.003).

DISCUSSION: Our results are in line with Zapico et al. (1). However, they are not aligned with Iannetta et al. (2), who suggested the percentage of VO₂max at which lactate threshold and maximal lactate steady state occurs are not different in individuals with different fitness level. The main difference is that they classified participants according to relative VO₂max and we classified participants according to relative VO₂ at VT1 and VT2. In conclusion, VO₂ at VT1 and VT2 seems to influence on VT1 and VT2 positions relative to VO₂max, respectively, in females and males. Therefore, our results show that athletes may be in a different training zone even when they exercise at the same relative intensity determined from VO₂max.

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FRIDAY, DECEMBER 15, 2023

17:30 - 18:00 H

Comunicaciones orales 2 / Oral presentation 2

17:30 - 17:45 h

EFFECTS OF SHORT-TERM DETRAINING PERIOD ON STRENGTH AND JUMP PERFORMANCE IN SEMI-PROFESSIONAL FEMALE HANDBALL PLAYERS

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INTRODUCTION: The concept of “short-term detraining” was defined as a period less than four weeks in which training is reduced or interrupted [1]. In handball, several studies have examined the effects of short- and long-term training programs [2,3]. However, the impact of detraining periods on physical and physiological performance factors have been little investigated, specifically in female players. Thus, the aim of this study was to analyze the effects of 3 weeks of detraining on strength and jump performance in semi-professional female handball players.

METHODS: Fourteen semi-professional female handball players (age: 20.5 ± 3.0 years; height: 167.3 ± 6.1 cm; body mass: 66.9 ± 8.8 kg) from the same team performed 3 trials of the countermovement jump (CMJ) and isometric mid-thigh pull (IMTP) on a previously validated portable force plate [4] during two separate testing sessions. Normality of data was confirmed using the Shapiro–Wilk test. A paired T-test were used to assess the differences between testing sessions in CMJ jump height (cm) and IMTP peak force (N) and RFD 0-250ms (N·s-1). Statistical significance level was set as $p < 0.05$.

RESULTS: Players showed a significant decrease in CMJ jump height (28.68 ± 3.71 vs. 25.92 ± 3.75 cm; $p < 0.001$) and no significant differences in IMTP peak force and RFD 0-250ms were found after the short-term training interruption ($p = 0.288$; $p = 0.139$, respectively).

DISCUSSION AND CONCLUSION: These results suggest that 3 weeks of detraining are insufficient to produce a significant decrease in force production (maximal and explosive), although are sufficient to induce a significant decrease in jump height. This reduction in CMJ jump height could be explained by two reasons: (i) a significant decline in eccentric force [1] and (ii) an alteration of technique factors [5]. This information may help technical staff to design appropriate training interventions to enhance performance after a training cessation period.

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EFFECT OF ROTARY INERTIA DEVICES ON SPRINT CURVE PERFORMANCE IN SEMI-PROFESSIONAL FEMALE SOCCER PLAYERS

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INTRODUCTION: Rotary inertia devices (RID) resistance training is shown effective in improving sprinting and unilateral deficit performance in male soccer players (1, 2), however, this is not clear in female soccer players. We aimed to assess the effect of RID on this physical abilities in female soccer players.

METHODS: 32 semi-professional soccer players were divided into an experimental group [EG (n=16); mean \pm SD: 21.24 \pm 2.57 years] and in a control group [CG (n=16); mean \pm SD: 24.21 \pm 5.69 years]. All the players participated in 3 specific soccer training sessions per week lasting an hour and a half, to which was added the weekly match league competition. The EG performed two training sessions per week with rotary inertia devices (2 sets of 6 repetitions with each leg consisted of frontal and lateral resisted movements), while the CG did not perform any additional resistance training program during the 8 weeks that the work lasted. Time in the curve sprint to the right (mid test: SCMd and end of test: SCFd) and curve sprint to the left (mid test: SCMi and end of test: SCFi) were assessed. Time difference between half curve sprint to the right and to the left (SCMd-SCMi) and time difference between the final curve sprint to the right and to the left (SCFd-SCFi) were calculated.

RESULTS: There is a significant reduction on the SCMi performance in the EG respects to the CG (5.53%; SE=0.372). Its performance increases with signs of significance in SCMd $p=0.08$; SE=0.384) as well as there is a significant reduction in the unilateral SCMd-SCMi deficit in the EG respected to the CG (p -value=0.015; SE=0.375).

CONCLUSION: The use of this type of exercises carried out with rotary inertia resistance have achieved the balance of the unilateral deficit in a task of progressive curve COD during 8 weeks of training in a group of semi-professional female soccer players.

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SATURDAY, DECEMBER 16, 2023

9:00 - 9:45 H

Comunicaciones orales 3 / Oral presentation 3

09:00 - 09:15 h

RELACIÓN ENTRE FUERZA CON EL EDSS Y CAPACIDAD FUNCIONAL EN PERSONAS CON ESCLEROSIS MÚLTIPLE

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INTRODUCCIÓN: La esclerosis múltiple (EM) es una enfermedad neurológica progresiva que conduce a una capacidad funcional reducida y, en consecuencia, una peor calidad de vida debido a las características que puede presentar la enfermedad (1). Sin embargo, no está bien establecido que manifestación de fuerza (máxima o explosiva) podría condicionar más la discapacidad y la actividad funcional (2,3). El objetivo del presente estudio fue analizar el papel de la fuerza isométrica máxima (MVIC) y la fuerza explosiva (RFD) en relación con la escala de discapacidad (EDSS) y los resultados de los test funcionales en personas con EM.

MÉTODOS: Un total de 49 participantes tomaron parte en el estudio. La composición corporal, análisis de la capacidad funcional (10 m walk test: 10MWT; 6 minutes walk test: 6MWT; sit to stand y timed up and go: TUG), así como la fuerza muscular mediante MVIC y RFD en ambas piernas fueron evaluadas. Posteriormente se realizó un análisis de mediación (medmod 1.1.0 del software Jamovi) para examinar la influencia de la MVIC y la RFD con la puntuación en la EDSS y la capacidad funcional.

RESULTADOS: La relación entre la EDSS y 6MWT ($p=0.013$), 10MWT ($p=0.015$) y TUG ($p=0.003$) disminuyó cuando incrementaba la MVIC. Además, la relación del EDSS en 6MWT ($p=0.0048$), 10MWT ($p=0.0021$) y TUG ($p=0.0014$) también disminuyó cuando el RFD tardío (0-200) era mayor.

DISCUSIÓN: Por tanto, y basándonos en los datos plasmados anteriormente la MVIC y el RFD tardío juegan un papel importante influenciando en la relación entre EDSS y la capacidad funcional. En este sentido, los entrenadores deberían dirigir sus entrenamientos hacia la fuerza máxima para así disminuir la sintomatología y aumentar la funcionalidad asociada con la EDSS.

FINANCIACIÓN: Esta investigación fue subvencionada por el Consejo Superior de Deportes (España), convocatoria Proyectos de Proyectos de Investigación en Ciencia y Tecnología aplicada a la Actividad Física Beneficiosa para la Salud (AFBS) y la Medicina Deportiva, financiadas en el marco del Plan de Recuperación, Transformación y Resiliencia, grant number EXP_75066.

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IMMERSIVE VIRTUAL REALITY: IMPACT ON QUALITY OF LIFE IN INDIVIDUALS WITH PHYSICAL DISABILITIESALONSO, S.¹, RODRÍGUEZ, J.²¹FACULTAD DE CIENCIAS DE LA SALUD, UNIVERSIDADE DA CORUÑA. ²FUNDACIÓ ISIDRE ESTEVE, OLIANA, CATALUÑA.

INTRODUCTION: Immersive Virtual Reality (IVR) can offer better outcomes in certain exercises compared to conventional rehabilitation. In 2020, the use of IVR was compared to conventional rehabilitation in individuals with Parkinson's disease (1), and the latest systematic review on IVR and physical activity related to therapy (2) noted that most participants were stroke patients. The objective of this research was to determine if there was a significant improvement in quality of life (QoL) and functionality level after an IVR protocol in individuals with disabilities.

METHODS: This was a quasi-experimental study involving 44 subjects with physical disabilities from the Puente Centers of the Fundació Isidre Esteve. The study followed the Declaration of Helsinki, and subjects provided informed consent before being randomly divided into a control group (CG) and an experimental group (EG). All participants underwent a QoL test (GENCAT) and various functionality tests, which varied depending on whether they used a wheelchair.

For wheelchair users, an upper limb functionality test (DASH) and a central stability test (MFRT) were administered, while those who could walk underwent a functionality test (TGUGT), the Berg scale to measure the risk of falling, and a central stability test (FRT). The EG carried out an IVR protocol three times a week for ten weeks. Each session, lasting ten minutes, included two different activities with a physical component, ranging from fine motor skills to high-level sports activities.

RESULTS: The EG improved their QoL test score by 9% ($p=0.001$); 6% ($p=0.024$) and 14% ($p=0.002$) in functionality tests for individuals who did not require a wheelchair, and 13% ($p=0.015$) in the central stability test for wheelchair-dependent individuals.

DISCUSSION: The results align with the existing literature (1), as a positive outcome was observed in individuals with reduced mobility due to stroke or sclerosis who were not wheelchair-dependent. Following the latest reviews (3), IVR is considered a tool for post-stroke rehabilitation, improving QoL and functional aspects, as well as having a moderate effect on depression (4).

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EFFECTO DEL ENTRENAMIENTO DE HIIT EN PACIENTES CON CÁNCER DE MAMA DURANTE LA QUIMIOTERAPIA

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INTRODUCCIÓN: El cáncer de mama es una de las principales causas de muerte prematura en mujeres menores de 70 años en todo el mundo, llegando a ser uno de los cánceres con mayor frecuencia de diagnóstico (1). Muchas veces, para su tratamiento se expone al paciente a quimioterapia y radiación, afectando negativamente a su salud física y bienestar general. De ahí, que investigaciones anteriores hayan encontrado evidencias en el ejercicio para la reducción de los efectos adversos del cáncer. Y pese a que el HIIT consta de ser uno de los protocolos más eficaces para la mejora cardiovascular en pacientes con cáncer, su investigación en el cáncer de mama sigue siendo escasa (2).

El objetivo principal es evaluar los efectos del entrenamiento de alta intensidad (HIIT) sobre pacientes que sufren de cáncer de mama.

MÉTODOS: Se realizó una revisión sistemática siguiendo las recomendaciones establecidas en los protocolos PRISMA. Realizando una búsqueda bibliográfica en 4 bases de datos en marzo del 2023. Y cuyas palabras clave fueron: (breast cancer patients, AND HIIT OR high intensity interval training, AND therapy OR intervention AND chemotherapy). Obteniéndose un total de 625 artículos, de los cuales, siguiendo los métodos de inclusión y exclusión, se redujeron a 11 estudios.

RESULTADOS: Se observó que tanto la calidad de vida, la fuerza muscular, la capacidad cardiorrespiratoria como la sintomatología de la enfermedad mejoraron claramente después de haber realizado la intervención. A excepción de variables como la disminución de la fatiga percibida o los niveles de masa corporal que se consiguieron mantener estables en comparación con el grupo control que empeoraron.

DISCUSIÓN: En la presente revisión podemos concluir que el HIIT podría tener efectos beneficiosos durante el periodo de quimioterapia del cáncer de mama, logrando mejoras a nivel de salud física y mental. En cuanto a las aplicaciones prácticas hemos podido otorgar diferentes ejemplos de entrenamiento en los que se verifica esa efectividad del HIIT en estos pacientes.

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ANALYSIS OF MOVEMENT VARIABILITY TO QUANTIFY FATIGUE AFTER CROSSFIT VS TRADITIONAL STRENGTH TRAINING

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INTRODUCTION: Neuromuscular fatigue is a process induced by exercise that results in a decrease in the body's capacity to generate force. In sports, excessive fatigue can lead to a loss of performance and/or an increased risk of injury (1). Analysis of force variability has been proposed as a tool to describe fatigue or to know effects of increasing difficulty in standing balance tasks (2). CrossFit training have shown responses of fatigue such RPE, accumulated lactate and muscle damage higher than traditional strength training (3). This study aimed to analyse movement variability after traditional strength training (ST) and CrossFit training (CT) to verify if this marker can be used for fatigue monitoring.

METHODS: Ten participants were enrolled for two weeks, and they would perform ST and CT. Pre- and post-training participants performed 30 seconds of single leg stance; in addition, these measures were repeated 24 and 48 hours after training. The signals were analysed with an accelerometer (ISEN) using Detrended Fluctuation Analysis (DFA), Entropy Fuzzy (FuzzyEn) and Standard Deviation (SD). Differences among training methods and time points (pre; post; ret1; ret2) were analysed with repeated measures ANOVA. Statistically significant was set at $p < .05$.

RESULTS: Between types of training only a significant effect was found in ret2 for the SD of unilateral balance on the right leg ($p = .034$) returning to initial deviation in ST but no in CT. Nevertheless, inside groups significant differences were found in time points in the DFA in the right leg between post-ret1 ($p = .036$), and in the DFA in the left leg between post-ret1 ($p = .023$). As well differences were founded in left and right leg in the FuzzyEn ($p = .030$; $p = 0.20$)

DISCUSSION: Analysis of movement variability could be a useful tool to detect fatigue process after ST or CT, however only the traditional measure SD of the signal could detect differences between methods after 48 hours post-training.

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KEYWORDS: Variability, CrossFit, fatigue.

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PRESENTACIÓN DE PÓSTERES / POSTER PRESENTATION

FRIDAY, DECEMBER 15, 2023

18:00 - 18:30 H

Presentación de pósteres 1 / Poster presentation 1 - PP01

PP01 - FISIOLÓGÍA DEL EJERCICIO I / EXERCISE PHYSIOLOGY I

18:00 - 18:30 h

SPORT SUPPLEMENTS WITH POSSIBLE ERGOGENIC EFFECT ON WOMEN SWIMMERS

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INTRODUCTION: Differences above 1.6% distance a gold medal from a fourth position in a final of the Olympic Games in swimming. Competitive swimmers present a prevalence of 86.9% in the consumption of sport supplements (SS) without differences based on sex (1). Possible ergogenic effects of SS are mediated by mechanical and metabolic demands of each sport modality (2). In addition, it exists differences at anatomical and physiological level based on sex who could explain differences on the possible ergogenic effect of SS. Recently, it has been reported an underrepresentation of women athletes in the studies which assess the effect of SS (3). Therefore, the aim of this study was to analyse the effect of different SS in female swimmers.

METHODS: This systematic review/meta-analysis was performed following the PRISMA guidelines. A search strategy that combined "supplement*" and "ergogenic aid" with "aquatic sport", "swimming" and "swimmers" was inserted in 5 different databases (Dialnet, DOAJ, Pubmed, Scielo, Scopus and SportDiscus). Two researchers independently (with a third for solving discrepancies) selected studies that assessed the effect of SS on swimming performance in studies that included women in the sample. In SS with at least three studies, a meta-analysis was performed.

RESULTS: From 3036 articles, only 23 studies were focused in the assessment of SS on performance in swimmers. However, only in 16 studies the sample included women (38.2% women vs. 61.8% men). Meta-analysis was applied to three groups of SS (creatine, beetroot juice, and β -alanine and sodium bicarbonate). Meta-analysis reported a significant effect of creatine in swimming performance (ES = -0.54 (from -0.95 to -0.13); $p=0.01$), but no effect was found for beetroot juice (ES = -0.14; $p = 0.42$) and β -alanine and sodium bicarbonate (ES = -0.12; $p = 0.48$).

DISCUSSION: The results of this study reflected an underrepresentation of women of studies focused on the assessment of the effect of SS in swimmers. This study concluded that creatine supplementation should be considered as ergogenic aids in women swimmers, while it could be found a non-significant effect of other SS (i.e., beetroot juice, β -alanine and sodium bicarbonate), which could be more extensive studied in the future for creating specific recommendations based on scientific evidence.

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DFA1 0.75 AS A BIOMARKER OF THE FIRST VENTILATORY THRESHOLD? SOMETHING CHANGES IN OLDER WOMEN

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INTRODUCTION: Aligned with the first ventilatory threshold (VT1), the so-called Heart Rate Variability Threshold Low (HRVTL) reflects parasympathetic stabilization in response to increasing intensity in a cardiopulmonary exercise test (CPET) [1]. More specifically, the short exponent of the detrended fluctuation analysis (DFA1) at 0.75ua confirms promising as an inexpensive non-invasive biomarker of these moderate-to-heavy intensity boundaries [2,3]. Since this evidence is limited to men, this study analyses DFA1 along a cycling CPET in active women over-60, once after VT1 and VT2 detection. Whether DFA1_0.75 matches muscle power (w) at VT1 will give light to their autonomic/cardiometabolic responses.

METHODS: Seventeen normotensive active women (65.88±6.46 years) completed a submaximal cycling CPET, previously detailed [4] (10W*3min15sec stages). Lowest EqO₂ (VE/VO₂) and ExCO₂/VO₂ for VT1; together with lowest LnEqCO₂ (VE/VCO₂) and RER/VO₂ increase for VT2, were calculated. HRV was registered continuously by means of the Polar-H10 band and the Sensor-Polar-Logger App, for further DFA1 calculations with Kubios-HRV-scientific software [3]. The last 2min in each stage were considered [5], retaining DFA1 at VT1 (HRVTL), VT2, and at the end of the test (P100).

RESULTS: DFA1 decreased from HRVpre-test, sitting, to HRVTL [1.17ua (1.02-1.31) to 0,99ua (0.82-1.15)], at the power of 41.88w (35.07-48.67) in VT1. Conversely to expected, DFA_0.75 appeared at VT2 [0.75ua (0,55-0.95)], and lost complexity only at P100 [0.56ua (0.41-0.71)]. Average powers where, then, 68.13w (59.60-76.66) and 82.50w (75.35-89.65) respectively. RER [0.90ua (0.87-0.93)], RPE_1-10_scale [0.81ua (0.33-1.30)], VAS_1-10_scale [0.44ua (0.00-0.99)], and VO₂ [12.66ml/kg*min⁻¹ (10.28-15.04)], completed the information at VT1, which was located at the 72.39% (61.09-83.69) of VO₂peak [17.36ml/kg*min⁻¹ (13.42-21.30)]. Noteworthy, HRVTL differed significantly (p<0.05) from DFA1_pre-test, DFA_VT2 and DFA_P100.

DISCUSIÓN: The concept DFA_0.75=HRVTL failed, despite DFA1 mirrored the vagal withdrawal, and HRVTL confirmed its capacity to differentiate moderate-to-heavy exercise intensities [2,3]. A severe reduction in muscle power and anticipated glucose dependence in older women [4], confirmed by our data and RER>0.85ua in VT1, might reflect a very small, almost inexistent lipolytic zone, and thus the start of complexity reduction displaced to VT2. Effort duration and intensity might be, then, enough demanding (i.e., higher cardiac autonomic coordination and ATP needs).

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INFLUENCE OF THE MENSTRUAL CYCLE ON NEUROMUSCULAR PERFORMANCE IN PROFESSIONAL HANDBALL PLAYERS

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INTRODUCTION: Despite limited evidence regarding the influence of the menstrual cycle (MC) on performance, there is a widespread belief in the negative impact of the hormonal changes associated with the MC on female athletes' physical performance (1). Thus, this study aimed to assess changes in neuromuscular and sport-specific skills performance during a complete MC in professional handball players.

METHODS: Sixteen professional female handball players (21.7±3.2 years) voluntarily participated in this study. Neuromuscular and sport-specific skills were tested each 48 hours during a complete MC (14 average testing sessions in total). During each testing session, kinetic and kinematic variables of the countermovement jump (CMJ) and the drop jump (DJ), peak force and rate of force development (RFD) of the mid-thigh pull test (MTP), and overhead throwing velocity were measured.

RESULTS: Significant differences were found in the time taken for takeoff during CMJ, with the 20-23 days of the MC showing longer times compared to the other measurements. Additionally, differences were observed in the relative strength index (RSI) during the DJ, showing significant lower values on day 6 and 8 compared to the 13th measurement. However, no significant differences were observed on jump height, peak propulsive force, propulsive phase power, peak landing force, propulsive impulse and mRSI during the CMJ and DJ between the different testing days of a complete MC. Regarding peak force and RFD during the MTP and peak throwing velocity, no differences were found between measurements.

DISCUSSION: In conclusion, no fluctuation in vertical jump performance, isometric strength, and throwing velocity was observed over a complete MC in professional handball players. The only variables that were slightly affected in specific measurements were the time taken for takeoff in the CMJ and the RSI in the DJ.

CONCLUSION: Therefore, these results demonstrate that contrary to theoretical models positing an increase in performance during the late luteal and ovulation phase, and a decrease during the follicular and menstrual phases, neuromuscular performance and handball-specific explosive actions such as throwing velocity remain unaffected by the hormonal changes associated with the MC. However, our findings open the door to future research on explosive strength, as it is one of the most important skills in handball and can contribute to injury prevention.

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EVALUACIÓN Y ENTRENAMIENTO DE LA MUSCULATURA DEL SUELO PÉLVICO EN MUJERES PRACTICANTES DE CROSSFIT

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INTRODUCCIÓN: El CrossFit es un programa de acondicionamiento físico de alta intensidad donde se realizan ejercicios de fuerza combinados con ejercicios de alto impacto. La repetición continua de estos ejercicios durante los entrenamientos provoca un aumento de la presión intraabdominal, fatigando la musculatura del suelo pélvico y aumentando el riesgo de desarrollar incontinencia urinaria (1). Por ello, el objetivo de este trabajo consiste en definir unas pautas de evaluación del estado de la musculatura del suelo pélvico, así como proponer un protocolo de entrenamiento para mejorar su fuerza y activación muscular para prevenir y/o tratar posibles disfunciones.

MÉTODOS: Se utilizará un pelvómetro o pinza tonimétrica para medir el grado de activación muscular y la fuerza contráctil voluntaria del periné (2). Este dispositivo intracavitario formado por una pinza abierta 5°, medirá estas variables mediante una contracción voluntaria de 10" isométrica ejercida sobre las ramas del pelvómetro bloqueado. Se realizarán dos contracciones dejando 20" de descanso entre medias. Para mejorar la activación y la capacidad contráctil de los músculos del suelo pélvico se propone un protocolo de 12 semanas de duración, 3 días por semana, basado en ejercicios de Kegel. Este protocolo se divide en tres fases: (i) propiocepción de la activación del suelo pélvico e integración con la respiración, (ii) estabilización y fortalecimiento de la musculatura del suelo pélvico mediante una sobrecarga progresiva, y (iii) transferencia de estos ejercicios a la práctica de CrossFit.

CONCLUSIÓN: Así, se busca otorgar a los profesionales de la salud y la actividad física de herramientas prácticas tanto para evaluar el estado del suelo pélvico de las deportistas como para entrenar esta musculatura y con ello prevenir y mejorar posibles disfunciones de suelo pélvico, lo que puede repercutir en una mejora de la calidad de vida de las mujeres (3) y en un aumento de su rendimiento deportivo.

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PP01. Optimización del entrenamiento I / Training Optimisation I

EFFECTS OF COMBINED TREATMENT WITH TRANSCRANIAL AND PERIPHERAL ELECTROMAGNETIC STIMULATION ON PERFORMANCE AND PAIN RECOVERY FROM DELAYED ONSET MUSCLE SORENESS INDUCED BY ECCENTRIC EXERCISE IN YOUNG ATHLETES. A RANDOMIZED CONTROL TRIAL

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INTRODUCTION: There is a common interest in finding a common consensus in the approach of athletes suffering from DOMS with the aim of improving symptoms and thereby enhancing performance. Additionally, the incorporation by the trainers of eccentric exercises into training is known for its clinical benefits and improved physiological adaptations. The objective of this study was to observe the effects of a paired-associative transcranial and peripheral electromagnetic stimulation on young athletes suffering from DOMS, induced by 1 hour of eccentric and plyometric exercises.

METHODS: Forty-eight young athletes participated in this randomized control trial: 13 were assigned to the peripheral group (SP); 12 were in the control group (PL); 11 were assigned to the transcranial group (TS) and 12 were included in the paired-associative group (AS). The Visual Analogue Scale of pain perception, the mechanical pressure pain threshold were the tools used to analyze the symptoms of DOMS. On the other hand, the Half Squat test evaluated with an accelerometer, and 30 meters sprint velocity were used to observe the evolution of the sports performance of the lower limbs. All evaluations were performed before and after the eccentric exercise session that caused DOMS, as well as at 24-48, and 72 hours afterward.

RESULTS: The treatment session with the paired-associative electromagnetic stimulation did improve the symptoms of the induced DOMS, since significant differences were observed. Based on the results a treatment with both peripheral and transcranial electromagnetic stimulation improves recovery and performance in athletes at 72 hours, although these data would need to be verified in future research with a larger sample size.

CONCLUSIONS: Paired-associative electromagnetic stimulation slightly improve DOMS symptomatology, velocity, and sports performance in the lower limbs.

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PP01. Poblaciones especiales / Special populations

ENHANCING CARDIOVASCULAR HEALTH ASSESSMENT: A COMPREHENSIVE HANDGRIP STRENGTH DYNAMOMETRY REFERENCE FOR SPANISH CHILDREN AND ADOLESCENTSZARATE-OSUNA, F.^{1,2}, ZAPICO, A.G.^{1,3}, GONZÁLEZ-GROSS, M.^{1,4}

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INTRODUCTION: Handgrip Strength Dynamometry (HSD) has emerged as a valuable indicator of health, particularly in relation to Body Mass Index (BMI) and Body Composition, offering insights into cardiovascular health in children and adolescents. However, up-to-date reference values for HSD percentiles in this demographic are scarce. Robust studies with large sample sizes are essential to provide accurate and reliable reference data. In Spain, the PESCA program initiated yearly HSD measurements for children in 2018. This study seeks to expand and enhance the existing reference table for HSD percentiles by incorporating data from two other comprehensive studies: PASOS, and ASOMAD, encompassing a combined total of 3400 participants.

METHODS: The PESCA program utilizes a five-step protocol encompassing a questionnaire, BMI assessment, Body Composition Bioimpedance Analysis (BIA), Handgrip Strength Dynamometry (HSD), and a physician-conducted physical examination. This PESCA analysis is based on data collected from 1772 children and adolescents. Additionally, 851 participants from the ASOMAD study and 777 participants from the PASOS study were included. HSD measurements were obtained using a Takei dynamometer (0-100Kg). Two measurements, taken 60 seconds apart, involved the child standing with the dominant arm extended parallel to the trunk, exerting maximal force for 10 seconds. The highest recorded measurement was retained for analysis. Data were processed using SPSS 25v, with stratification by age and sex. Descriptive statistics, including averages, standard deviations, and percentiles, were calculated for each age group from 3 to 16 years.

RESULTS: Of the total sample of 3400 participants (48,5 % girls), 33 individuals were excluded due to incomplete handgrip technique or data recording issues. Data from children aged 2, as well as girls and boys aged over 17, were not included in percentile calculations due to insufficient group sizes. The revised HSD percentile curves for boys and girls will be presented, reflecting the amalgamation of data from the PESCA, PASOS, and ASOMAD studies.

CONCLUSION: This study provides a comprehensive and up-to-date reference for HSD percentiles in Spanish children and adolescents. The incorporation of data from the PESCA, PASOS, and ASOMAD studies, with a total of 3400 participants, ensures the robustness and reliability of these reference values. Moreover, these HSD percentiles offer a powerful tool for both screening and monitoring cardiovascular health. By establishing normative values, healthcare professionals can better assess cardiovascular risk factors and track changes in muscle strength over time, ultimately contributing to more effective preventive strategies and improved cardiovascular outcomes in children and adolescents.

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EVALUATION OF INTER-REPETITION RELIABILITY AND HANDGRIP STRENGTH DIFFERENCES BETWEEN RIGHT AND LEFT HANDS IN MILITARY PERSONNEL

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INTRODUCTION: Physical fitness in special operations forces requires a high degree of physical and psychological attributes. Grip strength (HG) is frequently used to measure upper-body muscular strength due to its relevance to physical fitness tasks (1), as well as combat grips, carrying heavy loads or equipment, and relationship to shooting, among others (2). The aim of this study was to evaluate the inter-repetition reliability and analyze grip strength differences between the left and right hands in military personnel.

METHODS: Eighteen male soldiers (age: 39.61 ± 5.42 years; body mass: 76.04 ± 7.73 kg) performed a grip strength test using a hydraulic device (Takei Scientific Instruments Co. Ltd, Tokyo, Japan). The device was placed between the palm and the middle phalanx of the hand, with the elbow fully extended. Two attempts were performed with a five-second contraction for right (RHG) and left hands (LHG). Officers identified and reported their dominant hand as the one they naturally prefer to use for activities (e.g. writing). To assess the inter-repetition reliability, the intraclass correlation coefficient (ICC; model 3.1) (3), the % coefficient of variation (CV) (4), and paired samples t-test were used. Paired samples t-test was used to compare the mean strength values (5) between right and left hands. Statistical significance was set up at $p < 0.05$.

RESULTS: Excellent reliability was found in the right hand (ICC=0.91) and the left hand (ICC=0.88), with acceptable coefficient of variation (CV < 6%). Significant differences were found between repetitions in the right hand (RHG $p=0.04$), but not in the left hand (LHG $p=0.80$). The t-test did not reveal any significant difference between the right hand (RHG= 47.83 ± 6.38 kg) and the left hand (LHG= 46.19 ± 6.65 kg).

DISCUSSION: The grip strength test demonstrated excellent reliability with acceptable variation, despite minor differences between repetitions. Although statistically significant, the differences between repetitions in the right hand represent minimal variations, and the coefficient of CV remains acceptable, possibly due to individual factors. Furthermore, no significant differences were observed between grip strength in both hands. These findings support the use of grip strength tests in military personnel, and training in both hands should be considered due to its relevance for performing various tasks in the military context

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PP01. Poblaciones especiales / Special populations

DIACTIVE-1 APP: POTENCIANDO LA FUERZA MUSCULAR EN JÓVENES CON DIABETES TIPO 1

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INTRODUCCIÓN: Los efectos positivos de la actividad física en pacientes con diabetes mellitus tipo 1 (DMT1) son ampliamente conocidos (1–3). Sin embargo, el manejo y control de los niveles de glucosa antes, durante y después del ejercicio representan un desafío. El propósito de este estudio consiste en analizar el impacto de un programa de entrenamiento de fuerza personalizado en el control glucémico y la adherencia al tratamiento en niños y adolescentes con DMT1, utilizando la Aplicación Diactive-1.

MÉTODOS: La aplicación Diactive-1 cuenta más de 350 ejercicios, tanto de fuerza como aeróbicos, divididos en tres modalidades de entrenamiento: entrenamiento con material (bandas elásticas y aquaball), entrenamiento sin material y entrenamiento en parejas. Esta herramienta se está utilizando actualmente en el proyecto DIACTIVE-1 (NCT06048757), en el que niños y adolescentes (8-18 años) con DMT1, son asignados aleatoriamente a dos grupos. Un grupo está realizando un programa de ejercicios de fuerza al menos 3 veces por semana durante 24 semanas usando la aplicación; el otro recibe atención estándar. La hipótesis principal se centra en la reducción de las dosis de insulina por kilogramo de peso, y en el aumento de fuerza muscular en jóvenes con DMT1.

RESULTADOS: Se muestran datos actualizados de la participación de los niños y adolescentes a las sesiones de fuerza, mostrando su nivel de satisfacción, frecuencia cardíaca, y nivel de glucemia pre y post ejercicio.

DISCUSIÓN: El proyecto Diactive-1 se está llevado a cabo tras completar un estudio longitudinal de tres años con una cohorte de jóvenes con DMT1 en el que se ha observado que tan sólo el 6% de los participantes cumplen con las recomendaciones de actividades aeróbicas y de fortalecimiento muscular. Por lo tanto, esta aplicación tiene el potencial de ayudar a los niños y adolescentes con DMT1 en el manejo de la diabetes y de educar para realizar entrenamientos de fuerza, teniendo en cuenta las consideraciones necesarias para prevenir eventos de hipoglucemia e hiperglucemia. Al eliminar esta barrera, la aplicación podría contribuir a reducir la dosis de insulina requerida y mejorar la calidad de vida de estos pacientes.

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HIGH FOOD-SPECIFIC IGE ANTIBODY REACTIONS IN OLDER SPANISH ADULTS WITH GOOD PHYSICAL FITNESS

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INTRODUCTION: Type I hypersensitivity are IgE-mediated food and beverages adverse reactions to foodstuffs that can be measured using food-specific IgE antibody reactions (AbR)(1). It affects almost 5% of the adult population in developed countries(2). The aim of this study was to analyze food-specific IgE AbR in Spanish adults according to their physical fitness (PF).

METHODS: 263 Spanish adults older than 18 years old volunteered for the study. PF was determined through the Åstrand-Ryhming Step Test (stÅ-R)(3). Participants were classified in ≤45y and >45y; normal PF(<85%predictedVO₂max) and good PF(≥85%predictedVO₂max). Food-specific IgE AbR against 41 food allergens were determined through HELIA®-HELMED® Line Immunoassay (AESKU. GROUP, Wendelsheim, Germany). IgE positive AbR were considered as ≥3.5 kUA/l. Statistical analysis was performed using IBM-SPSS® Statistics software v.25.0. Odds ratio (OR) were used as a measurement of association and random-effects risk model. Statistical significance was set at 0.05. This study was approved by the Ethics Committee of the Universidad Politécnica de Madrid (ref.20200602) and registered on ClinicalTrials.gov (NCT05802017).

RESULTS: A total of 263 sample (60.1% females) with: age 43.5±12y; body mass index (BMI) 24.42±4.51kg/m²; and estimated VO₂max 39.37±9.86ml/kg*min (Mean±SD), were analyzed. Positive IgE AbR for normal vs good PF were 25.4% and 31.20%, respectively(p>0.05). Positive IgE AbR for young adults vs older adults with good PF were 25.3% and 30.9% (p<0.05), respectively. It was 2.30 times more likely to have nut allergy when belonging to the group of good PF and being >45y (OR:2.30;CI:0.85-2.90,p>0.05). However, none of the moderator variables (age, sex and PF) represented a significant epidemiological risk factor over the food-specific IgE AbR (p>0.05 all cases).

CONCLUSION: Total food-specific IgE AbR were not different across the established categories of PF. However, age was an influencing variable of contrast between young adults and older adults. PF represents neither a risk factor nor a protective factor, these singularities are observed both in the total IgE AbR and in the IgE AbR against all studied food groups.

CONFLICT OF INTEREST: TM is part of Aesku.Diagnostics GmbH staff. Aesku.Diagnostics GmbH did not participate in the analysis and interpretation of the data. The rest of the authors have nothing to report.

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ROMPIENDO EL MITO DE LA IMAGEN CORPORAL DE LOS GAMERS: COMPARATIVA EN MARCADORES DE SALUD CON ESTUDIANTES UNIVERSITARIOS

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INTRODUCCIÓN: En los últimos años, la industria de los deportes electrónicos (esports) ha experimentado un crecimiento constante, lo que ha dado lugar a una mayor demanda de investigación en diversos ámbitos, incluida el área de salud. El objetivo de este estudio era evaluar el estado de salud general de los jugadores de esports (gamers) y establecer una comparación entre distintas métricas de salud respecto a estudiantes universitarios de Ciencias del Deporte que no participan en esports.

MÉTODOS: La investigación se llevó a cabo con una muestra de 53 participantes varones, divididos en dos grupos: jugadores de esports y no jugadores. Los instrumentos de recogida de datos incluían un cuestionario demográfico y un análisis antropométrico en el que se emplearon herramientas como una cinta métrica, básculas y bioimpedancia eléctrica.

RESULTADOS: Los resultados no mostraron diferencias significativas en el peso ($p = .564$), en los kilos de masa grasa en hidratación ($p = .398$), en el porcentaje de grasa ($p = .371$) o en el Índice de Masa Muscular ($p = .428$), sin embargo, los valores de los gamers fueron superiores en la mayoría de los casos.

DISCUSIÓN: Este hecho va en línea con diferentes estudios anteriores, haciendo alusión a un estigma preconcebido sobre la imagen corporal de los gamers, pese a que puedan presentar un mayor número de jugadores de esports en los rangos de obesidad de tipo 2 y 3 en comparación a la población general.

CONCLUSIÓN: En resumen, este estudio aporta información valiosa sobre los perfiles de salud de los jugadores de deportes electrónicos, ya que no muestra disparidades significativas en comparación con los no jugadores de la muestra. Este hallazgo tiene implicaciones para el desarrollo de programas de entrenamiento y salud adaptados a la industria de los deportes electrónicos. Además, subraya la necesidad de seguir investigando para profundizar en el conocimiento de indicadores de salud en función del nivel de los gamers y sus características particulares.

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DESARROLLO DE UN DISPOSITIVO DE MEDICIÓN DE TEMPERATURA DE LA PIEL A TIEMPO REAL

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INTRODUCCIÓN: La monitorización de la temperatura de la piel es utilizada como indicador de la fatiga muscular durante el entrenamiento, siendo una herramienta útil para la prevención de lesiones. Los objetivos del presente estudio son I) desarrollar un dispositivo de lectura de la temperatura de la piel con un entorno gráfico que permita la observación de las variaciones a tiempo real en un ejercicio específico y II) evaluar el grado de asociación que presenta con los dispositivos Gold Standard iButtons.

MÉTODOS: Para ello, se creó en primer lugar un dispositivo de bajo coste que nos diese la oportunidad de realizar dichas mediciones y observarlas en el preciso instante en el que se producen, midiendo así variaciones de temperatura del cuerpo ante diferentes ejercicios y protocolos de entrenamiento. Este dispositivo está compuesto por 8 sensores DS18B20, una placa Arduino, una resistencia de 4,7 ohmios y un LED indicador. Los sensores poseen un cable de 4 metros de longitud para llegar hasta la piel del usuario, adheridos con los parches FreeStyle. La metodología utilizada para este estudio fue la comparación directa de este dispositivo con los dispositivos Gold Standard iButtons mediante el coeficiente de correlación de Pearson en dos test: I) prueba de frío y calor en un recipiente con agua II) prueba sobre dos sujetos con un mismo protocolo de intervención en el ejercicio de press banca.

RESULTADOS: Los resultados obtenidos han sido I) una asociación casi perfecta de ambos dispositivos en el test de frío calor en un recipiente con agua ($r = 0,94$) y II) una asociación casi perfecta en ambos dispositivos en la prueba de press banca (r_1 a $r_6 > 0,96$).

CONCLUSIÓN: La conclusión que nos ofrece este estudio es que este dispositivo es válido para la realización de pruebas de temperatura de la piel en el ejercicio físico, motivo por el que se confeccionó.

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COMPARATIVA DEL ENTRENAMIENTO INTERVÁLICO FUNCIONAL (HIFT) Y EL ENTRENAMIENTO DE FUERZA SOBRE LA FLEXIBILIDAD METABÓLICA

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INTRODUCCIÓN: El HIFT focaliza en los movimientos funcionales multiarticulares mediante ejercicios aeróbicos y de fortalecimiento muscular (1); Se ha demostrado que el HIFT induce mejoras aeróbicas en la misma medida que el ejercicio de resistencia tradicional, con el beneficio añadido de la mejora del rendimiento muscular (2). La flexibilidad metabólica es la capacidad de adaptarse a cambios condicionales en la demanda metabólica(3), que va asociada a adaptaciones a nivel molecular en las vías que gestionan la captación, transporte, almacenamiento y utilización de sustratos energéticos(4).

OBJETIVOS: Este estudio tuvo como objetivo comparar los efectos de dos protocolos de entrenamiento, entrenamiento convencional (CLA) vs entrenamiento interválico funcional (HIFT) sobre parámetros metabólicos y de rendimiento.

MÉTODOS: Un total de 8 adultos (27-52 años) fueron divididos de manera aleatoria en dos grupos: CLA: Entrenamiento convencional seriado, HIFT: Entrenamiento interválico funcional. CLA consistió en una rutina full body con barras y mancuernas compuesto de 4 ejercicios de tren superior y 4 ejercicios del tren inferior (3 x 6-12 repeticiones) con intensidad del 70 - 85% del RM. HIFT consistió en una rutina full body por tiempo ascendente con kettlebells, balones medicinales y el peso corporal compuesta de 3 ejercicios del tren superior, 3 ejercicios del tren inferior, 1 ejercicio de CORE y 1 ejercicio de carácter aeróbico (20-40" de trabajo, 10-20" descanso y 60- 120" de recuperación entre series) con intensidad del 7 al 10 del RPE. Ambos protocolos tuvieron una duración de 6 semanas. El punto máximo de oxidación de grasa (Fat Max), tasa metabólica basal (TMB), salto vertical (SJ), test de repetición máxima (RM) en press de banca y sentadilla, volumen máximo de oxígeno (VO2 Max) se midieron al inicio y después de la intervención.

RESULTADOS: Se observó una mejora significativa del nivel de fuerza máxima en press de banca tras la intervención CLA. Sin embargo, el HIFT no produjo ninguna mejoría en los valores de flexibilidad metabólica con respecto al CLA.

DISCUSIÓN: Los resultados del estudio han puesto de manifiesto que el entrenamiento HIFT no produjo mejoras sobre la flexibilidad metabólica. Deben realizarse más estudios teniendo en cuenta el tipo de entrenamiento (ejercicios, volumen, intensidad, duración) y el perfil de los participantes.

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SOCIO-DEMOGRAPHIC AND PHYSICAL ACTIVITY FACTORS ASSOCIATED WITH ADHERENCE TO BEHAVIORAL INTERVENTIONS FOR WEIGHT LOSS

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INTRODUCTION: Adequate adherence is the key to achieving optimal benefits from the weight loss intervention. Despite the large number of studies exploring factors that promote adherence, their findings suggest inconsistent and fragmented evidence. The aim of this study was to review the determinants of adherence specifically focusing on socio-demographic and physical activity factors within weight loss interventions.

METHODS: The review searched six databases. After the selection process, 9 studies were included. A total of nine factors were identified: a) sociodemographic (n = 7), b) physical activity (n=2) as relevant to adherence.

RESULTS: Socio-demographic factors were reported in four reviews. Regarding sex, more evidence supports male prediction adherence. Specifically, being male and older predicted adherence to lifestyle interventions, while younger females showed opposite effects. It has also been suggested that being male is a predictor of greater adherence to self-monitoring. In addition, this condition has been shown to be a predictor of attrition in behavioral and dietary programs. Additionally, older age, higher educational level, lower baseline BMI, higher stages of change at baseline and greater initial weight loss may predict better adherence. Although most of the included studies showed that higher expectations were associated with attrition. However, limitations and conflicting results make the relationship unclear. Acceptance and commitment therapy (ACT) and behavioural contract were 2 factors related to adherence to physical activity. ACT Interventions showed an increase in physical activity adherence over 3 to 6 months. However, the behavioral contract did not improve adherence in either the short or long term (>12 months).

DISCUSSION: There are some factors that are not modifiable, such as sociodemographic factors (i.e., sex and age), which have been shown in the literature to be related to adherence to interventions and attrition levels, which should be considered in advance before starting any intervention, allowing individualization of the intervention for the person (1). In physical activity interventions, results confirmed that the use of ACT increased physical activity adherence. Our findings are consistent with a previous study that identified the potential of ACT to promote physical activity (2). Additionally, ACT improves psychological flexibility, which is an individual's ability to meet challenges. Furthermore, it is promising that explicitly the importance and weightage of each factor in future research, as this fosters a more personalized and nuanced intervention, ultimately promotes adherence.

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IMPACT OF BEETROOT JUICE INGESTION ON NEUROMUSCULAR PERFORMANCE IN HEALTHY OLDER WOMEN

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INTRODUCTION: Aging process is linked to impairment of neuromuscular function and functionality, a phenomenon attributed to the progressive deterioration of various physiological processes. Notably, one of these processes affected is the nitrate (NO₃⁻) - nitrite (NO₂⁻) - nitric oxide (NO) pathway, which experiences impairment, resulting in a decreased availability of nitric oxide (NO) (1). Thus, the main objective of this study was to determine the effect of acute ingestion with 70 mL of beetroot juice (6.4 mmol NO₃⁻) or 70 mL placebo (0.04 mmol NO₃⁻) on neuromuscular and functionality parameters in healthy older women (65-79 years).

METHODS: Nine healthy women (mean age: 75.44 ± 4.67 years) participated in this randomized clinical trial, during which they underwent a battery of neuromuscular assessments. These assessments included a 6-meter walking test, a manual isometric strength test, the time-up-and-go test, a sit-to-stand muscle power test, and a 6-minute walk test. These assessments were performed both before and after the ingestion of either 70 mL of beetroot juice (containing 6.4 mmol of NO₃⁻) or a placebo (containing 0.04 mmol of NO₃⁻).

RESULTS: Beetroot juice ingestion led to a statistically significant improvement in isometric handgrip strength values in the dominant hand (9.6%, p = 0.046, effect size [ES] = 0.29). However, no statistically significant differences were observed in the non-dominant hand (1.2%, p = 0.553, SE = 0.08). Furthermore, there were no significant differences noted in the 6-meter walking test (-3.3%; p = 0.306; ES = -0.19), the time-up-and-go test (-5.0%; p = 0.225; ES = -0.17), the sit-to-stand muscle power test (5.0%; p = 0.121; ES = -0.25), or the 6-minute walk test (-7.7%; p = 0.110; ES = -0.48).

CONCLUSIONS: The consumption of 70 mL of beetroot juice resulted in improved isometric handgrip strength in the dominant hand, although no significant differences were observed in other neuromuscular variables when compared to the placebo condition.

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11:30 - 12:00 H

Presentaciones de pósteres 2 / Poster presentation 2

PP02 - SALUD Y ENTRENAMIENTO II / HEALTH & TRAINING II

11:30 - 12:00 h

DIFERENCIAS DE SEXO EN LA FUNCIONALIDAD Y LA FUERZA MUSCULAR EN PERSONAS CON ESCLEROSIS MÚLTIPLE

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INTRODUCCIÓN: La esclerosis múltiple (EM) es un trastorno multifocal del sistema nervioso central, caracterizado por lesiones inflamatorias desmielinizantes progresivas y crónicas con etiología parcialmente desconocida [1]. Uno de los factores condicionante de su progresión es el sexo, debido a la interacción de las hormonas femeninas con los factores inflamatorios Th1 y Th2 [2], pero no hay suficiente evidencia que relacione el sexo con la funcionalidad y la fuerza muscular. El objetivo del estudio fue analizar las diferencias de sexo en personas con EM sobre la escala de discapacidad (EDSS), composición corporal, fuerza de los miembros inferiores y funcionalidad.

MÉTODOS: 39 voluntarios (17 hombres y 22 mujeres), formaron parte del estudio. Se evaluó la composición corporal mediante bioimpedancia eléctrica (BIA) y la funcionalidad con el Test de Caminata de 10 metros (10MWT), el Test de Caminata de 6 minutos (6MWT), el Test de Sentarse y Levantarse (STS), y la prueba "Timed Up and Go" (TUG). Además, se midió la Máxima Contracción Voluntaria Isométrica (MVIC) y la Tasa de Desarrollo de Fuerza RFD (temprano [0-50] y tardío [0-200]). Estas mediciones se realizaron en ambas piernas con un descanso de 5 minutos entre repeticiones y se calculó la media entre ambas. Se realizó una prueba de media T para muestras independientes con el software Jamovi para analizar las diferencias entre hombres y mujeres.

RESULTADOS: Se observaron diferencias estadísticamente significativas en la talla ($p=0.007$; d =efecto grande), masa muscular ($p<0.001$; d = efecto grande), RFD temprano [0-100] ($p= 0.023$; d = efecto grande), RFD tardío [0-200] ($p= 0.035$; d = efecto grande) y MVIC ($p= 0.021$; d = efecto grande). Sin embargo, no hubo diferencias en la EDSS, peso, Índice de Masa Corporal (IMC) ni en los tests funcionales.

DISCUSIÓN: Se observaron mayores valores de fuerza en los hombres, probablemente condicionado por la diferencia de masa muscular. Sorprendentemente, no se encontraron diferencias de sexo respecto a la funcionalidad. Debido a los resultados obtenidos, se sugiere que los futuros profesionales que trabajen con esta población promuevan entrenamientos tanto de fuerza como de hipertrofia, especialmente en mujeres, sin dejar de trabajar el desarrollo de la funcionalidad, aunque éste sea normal.

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EFFECTS OF L-CARNITINE AND ALPHA-LIPOIC ACID SUPPLEMENTATION ON ANAEROBIC PERFORMANCE DECAY UNDER FATIGUE CONDITIONS

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INTRODUCTION: AlcaLip® is a commercial nutritional supplement composed of alpha-lipoic acid and acetyl-L-carnitine(1). Acetyl-L-carnitine could have positive effects on high-intensity exercise performance(2) and alpha-lipoic acid have shown to reduce exercise-related oxidative stress(3). In the cycling field, there is growing evidence showing that the ability to maintain power output under fatigue conditions makes a difference between cyclists(4). The main aim of this study was to determine the effects of 4 weeks of supplementation AlcaLip® on anaerobic performance deterioration and lactate concentration between fresh and under fatigue conditions.

METHODS: Forty-one highly-trained male cyclists (age: 36±12 y.o.; BMI: 23.11±2.49 kg/m²) were randomized into two different groups: placebo group (PLA; n=22), and AlcaLip® group (ALC; n=19) that took 2250 mg/day of AlcaLip®. Before (PRE) and after 4 weeks (POST) of intervention, participants performed two Wingate tests: with no previous fatigue (WG1), and immediately after a maximal graded exercise test (WG2). The power output decrement for mean power (PAVG) and peak power (P_{MAX}) was assessed as the difference between WG1 and WG2 expressed as a percentage of the first, and calculated according to the equation $[(WG2-WG1)/WG1] \times 100$. Lactate concentration was measured 3 minutes after each Wingate.

RESULTS: Mean power was significantly lower under fatigue conditions ($p=0.011$) for ALC, while no fatigue effect was observed for PLA ($p=0.106$). Peak power was significantly higher under fatigue conditions ($p=0.006$ and $p=0.034$) for ALC and PLA respectively. However, there was no significant group-time interaction on PAVG decay ($p=0.235$) neither on P_{MAX} increase ($p=0.542$). A significant group-time interaction was observed for the lactate concentration measured at after the WG2 ($p<0.038$; $\eta^2=0.094$). Lactate concentration was 1.6±0.6 mmol/L lower in POST compared to PRE for ALC group.

DISCUSSION: Four weeks of supplementation could not be sufficient to improve the impairment of anaerobic performance under fatigue conditions, despite the reduction in blood lactate accumulation. Further research is needed to evaluate the effects of this supplement under conditions of increased fatigue and with longer supplementation periods.

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COUNTERMOVEMENT JUMP AS A PREDICTOR OF SPRINT PERFORMANCE IN CYCLISTS

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INTRODUCTION: In cycling, particularly in some disciplines such as track or BMX Racing, it is common to assess performance using the Wingate test (1). To prevent fatigue associated with this effort, the countermovement jump (CMJ) has been proposed as a valid technique to measure sprint performance in team sports (2,3). In cycling, a significant correlation has also been found between CMJ and Wingate peak power (P_{MAX}) or average power (P_{AVG}) (4). However, cycling involves sprinting under fatigued conditions and it is unknown whether CMJ can be a valid tool to assess changes in anaerobic performance due to stress. It is hypothesized that CMJ may be an effective alternative for assessing changes in anaerobic performance due to fatigue and training.

METHODS: Forty-three well-trained male cyclists (36±12 years; 177.8±7.0 cm; 72.7±7.9 kg) visited the laboratory on two different days, the first for familiarization and the second for evaluation. Each day they completed 5 physical tests after a standardized warm-up: a CMJ and a Wingate without previous fatigue (CMJ1 and WG1), a maximal graded exercise test, and a Wingate and CMJ in fatigue (WG2 and CMJ2).

RESULTS: With fatigue, CMJ was lower (mean difference=2.0 cm; p<.001; ES=0.797), P_{MAX} increased (mean difference=0.48 W/kg; p=.010; ES=0.423), and P_{AVG} dropped (mean difference=0.39 W/kg; p<.001; ES=0.617). Both without fatigue and with previous fatigue, the CMJ showed a strong and significantly correlation with the Wingate performance variables (without fatigue: CMJ1 vs P_{MAX} WG1, r=0.791; CMJ1 vs P_{AVG} WG1, r=0.786; with fatigue: CMJ2 vs P_{MAX} WG2, r=0.758; CMJ2 vs P_{AVG} WG2, r=0.743; p<.001 in all cases).

DISCUSSION: The CMJ has shown a strong correlation with both P_{MAX} and P_{AVG} of the Wingate, without fatigue and with prior fatigue, although without fatigue, the strength of the correlation was slightly higher. However, it is surprising that while fatigue reduced CMJ height and Wingate P_{AVG}, P_{MAX} increased. Therefore, it appears that moderate fatigue does not affect the ability to achieve a high P_{MAX} at the start of a sprint.

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PP02. Optimización del entrenamiento II / Training Optimisation II

CALF MUSCLE INJURIES IN SOCCER PLAYERS: WHAT ARE THE STRENGTH-RELATED RETURN TO PLAY CRITERIA? A SYSTEMATIC REVIEW

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INTRODUCTION: Total injuries in soccer have significantly decreased in recent seasons, although muscle injuries incidence has not decreased [1]. Calf muscle injuries are among the four most prevalent muscle injuries in soccer, with a mean time-loss only surpassed by quadriceps injuries [2]. In addition, re-injuries of these index calf injuries present a higher time-loss [2]. In this line, it is important to establish return to play criteria for a safe return to sport [3].

METHODS: The present review is one of a 4-parts systematic review project. Five databases were searched. 51140 studies were screened. Studies that included soccer players with a calf injury and established return to play criteria were included.

RESULTS: 18 studies were included. Strength-related return to play criteria were: 1) Symmetry and pre-injury score (i.e., > 30 repetitions) in calf raise test; 2) Symmetry and pre-injury score in vertical and horizontal hopping; 3) Symmetry and pre-injury levels on dynamometric tests; 4) Symmetry and pre-injury levels on drop jump test; 5) Pre-test differences in Barrow and shuttle 8 x 5 m test lower than 10%; 6) Symmetry in concentric and eccentric countermovement jump kinematics variables (i.e., impulse 100 ms, peak force, force at zero velocity, eccentric deceleration RFD, eccentric peak force and eccentric:concentric ratio). Several return to play criteria about pain, external load parameters or range of motion should be considered.

DISCUSSION: Regarding strength evaluation after a calf muscle injury in a soccer player, strength and conditioning coaches should assess the calf raise test, vertical and horizontal hoppings, analytical dynamometry plantar flexors isometric tests, agility tests and countermovement jumps kinematics for a safe return to play.

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GENDER DIFFERENCES IN COUNTER MOVEMENT JUMP AFTER A CROSSFIT WOD

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INTRODUCTION: CrossFit is considered high-intensity functional training, consisting of a variety of exercises performed repeatedly, quickly, and with limited or no recovery time (2). It is common to use the term WOD (workouts of the day) to refer to these workouts. Neuromuscular performance tests such as the countermovement jump (CMJ) can be used to measure the influence of each WOD on fatigue (1). The aim of this study was to compare the effect of a CrossFit WOD on neuromuscular fatigue between the genders.

METHODS: Nineteen physically trained women and twenty-one physically trained men performed a paired WOD consisting of 150 thrusters, 20 bar muscle ups, 40 handstand push-ups and 60 toes to bar in the shortest possible time. CMJ jump height was recorded using a contact platform and software (Chronojump Boscosystem) before (PRE) and after (POST) the WOD. IBM SPSS version 26 statistical software was used to statistically analyze the data and an ANOVA analysis was performed to determine the differences between the PRE and POST measurements between genders.

RESULTS: ANOVA results showed significant differences ($p < 0.05$) in CMJ measurements between PRE and POST for the male group. However, no significant differences in CMJ measurements were observed for the female group before and after WOD performance.

DISCUSSION: These results show that men are more susceptible to fatigue on neuromuscular performance following a CrossFit workout compared to the effects on women. These findings highlight the need to consider gender-specific training approaches in the context of CrossFit.

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PP02. Optimización del entrenamiento II / Training Optimisation II

RELATIONSHIP BETWEEN MAXIMUM NUMBER OF REPETITIONS AND LIFTING VELOCITY

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INTRODUCTION: This study aimed to explore the goodness-of-fit and accuracy of generalized and individualized relationships between the maximum number of repetitions performed to failure (RTF) and the fastest mean velocity of the set (MVfastest) in both the free-weight and Smith machine bench press exercises.

METHODS: Twenty-eight (16 men and 12 women) individuals completed one familiarization session followed by four experimental sessions (two using free-weight and two using Smith machine). These experimental sessions were identical, involving three single sets of repetitions to momentary failure against the 65%, 75%, and 85% of the one-repetition maximum, interspersed by 10-min of rest.

RESULTS: Individualized RTF-MVfastest relationships were always stronger than generalized RTF-MVfastest relationships (R^2 range: 0.73- 1.00 vs. 0.33-0.69). The goodness-of-fit between both exercise modes and sexes was comparable ($P \geq 0.510$). There were not significant differences in the estimated MVfastest values between exercise modes ($P \geq 0.258$), while the MVfastest associated with RTF from 6 to 15 was higher for men than for women ($P \leq 0.043$; $ES \geq 0.69$). The precision (absolute errors) in estimating the RTF during the second experimental session, using RTF-MVfastest equations from the first session, was comparable between exercise modes and loads ($P < 0.076$), but higher for men (< 2 RTF) than for women (≥ 2 RTF) ($P \leq 0.018$; $ES \geq 0.58$).

CONCLUSION: These findings suggest using individualized RTF-MVfastest to accurately estimate the RTF associated with a specific velocity in recreationally trained men during both free-weight and Smith machine bench press exercises, but not with women.

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PP02. Optimización del entrenamiento II / Training Optimisation II

¿INFLUYE EL TIPO DE HUELLA EN EL RATIO DE ACTIVACIÓN MUSCULAR DEL GEMELO EXTERNO E INTERNO?

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INTRODUCCIÓN: El análisis electromiográfico y de la huella plantar son dos aspectos que se tienen en cuenta en el diagnóstico y tratamiento de lesiones musculoesqueléticas. No obstante, existe muy poca evidencia científica que relacione el tipo de huella plantar con la actividad muscular del gemelo interno (GI) y el externo (GE). El objetivo del siguiente estudio es determinar en qué medida el tipo de huella plantar puede influir en el ratio de activación del GI y el GE en la acción de caminar y de trotar descalzo.

MÉTODOS: Treinta y cinco voluntarios (media (DS) edad de 24,8 (4,3) años; peso de 69,2 (11,2) kg y altura de 174,5 (8,1) cms) sanos participaron en este estudio. Se utilizó la electromiografía de superficie para la valoración de la activación neuromuscular del GI y GE de ambas piernas en las acciones de andar y trotar descalzo. El cálculo del ratio de activación de ambos gemelos se realizó: % de activación del GE / % de activación del GI. Se utilizó una plataforma de presiones para valorar la huella plantar en estático (de pie) y dinámico (andando) a partir del cálculo del arco plantar (entre 0,21- 0,26 huella normal, huella plana >0,26 y huella cava ≤0,21)¹. Se utilizaron los valores de máxima contracción obtenidos en el sprint para normalizar los datos de la EMG y el ANOVA factorial para determinar si existían diferencias entre las variables estudiadas (nivel de significancia, $p < 0,05$).

RESULTADOS: En el análisis de la huella estática se obtuvo una media de 13% de pies planos, 46% de pies cavos y 41% de pies normales. En la huella dinámica se obtuvo una media de 9% de pies planos, 57% de pies cavos y 34% de pies normales. Los pies cavos aumentaron un 11% en la huella dinámica. El GI obtuvo mayores niveles de activación que el GE en ambas acciones. En esta línea, se obtuvieron ratios de activación muscular mayores cuando se realizaba la acción de trotar (0,66-0,79) en comparación a la de andar (0,55-0,70). El tipo de huella no influyó en el ratio de actividad muscular del GI y GE en las acciones de andar y trotar descalzos, obteniéndose una $p > 0,05$.

CONCLUSIONES: El tipo de huella, tanto estática como dinámica, no influye en el ratio de activación de los gemelos interno y externo.

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PP02. Optimización del entrenamiento II / Training optimization II

INDIRECT MARKERS TO DETERMINE MUSCLE FATIGUE RECOVERY IN WOMEN AND MEN

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INTRODUCTION: During sprinting, repeated high intensity eccentric contractions result in hamstring muscle strain and potentially, loss of muscle function (1). Although there are several indirect markers of muscle damage, the loss of force-generating capacity (FGC) is highly correlated with muscle fiber ultrastructural alterations (2). Therefore, the purpose of the study was to determine muscle recovery using FGC in men and women, and to explore its relationship with other indirect markers of muscle low frequency fatigue.

METHODS: Healthy females [n = 14, age = 22.2 ± 3.1 years (mean ± SD)] and males [n = 15, age = 22.5 ± 3.2 years (mean ± SD)] completed 10 sets of 40-meter sprints, resting for 3 minutes between sets. Isometric FGC, range of motion (ROM), perceived soreness (PS), jumping performance and sprint mechanical properties were tested at baseline and 24-, 48- and 72-hours post-exercise. According to FGC loss during the recovery period, subjects were classified into high responders (HR) and low responders (LR) in accordance with the criteria of Paulsen et al. (3).

RESULTS: Both HR males and females showed unrecovered FGC during the 72-hour recovery period [F (3,81) = 4.576, p = 0.005]. Similarly, HR individuals reported significant decreases in ROM at +24h [MD = 11.0% (2.8 to 19.3%), p = 0.005], +48h (MD = 9.6% (3.6 to 15.4%), p < 0.001) and +72h (MD = 14.3% (3.9 to 24.7%), p = 0.004) and increases of PS at +24h [MD = 1.4 AU (0.5 to 2.3 AU), p = 0.003], +48h (MD = 1.9 AU (0.8 to 3.1 AU), p < 0.001) and +72h (MD = 1.2 AU (0.3 to 2.0 AU), p = 0.006). However, there were no differences between groups in relation to sprint mechanical properties (time to 40m, V0 and F0). Finally, HR and LR individuals presented no decrease in jumping performance.

CONCLUSION: The findings support that both isometric FGC and ROM are powerful indirect tests for monitoring muscle recovery, in a cost-effective way. There is, however, a high inter-individual variability in sprint mechanical properties. Finally, jumping performance is not related to muscle recovery after repeated sprint training.

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PP02. Optimización del entrenamiento II / Training optimization II

CRITERION VALIDITY AND RELIABILITY OF A LOW-COST HANDGRIP DYNAMOMETER: THE CAMRY DYNAMOMETER

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INTRODUCTION: Handgrip strength has been related with multiple health outcomes, including all-cause mortality and morbidity(1). Handgrip testing is a highly valid and reliable method, included in evidence-based fitness test batteries for different age groups(2,3). Previously, Jamar and TKK dynamometers have shown a good reliability and validity against known-weights(4,5). However, the economic cost of these dynamometers might be a limitation, particularly for its use at large scale. Recently, a cheaper (10% of the price) version (Camry Dynamometer) has been used in fitness surveillance systems (such as Hungary or Slovenia), though its reliability and validity, compared to known weights and other well-validated dynamometers, remains unknown. Therefore, the aims of the current study were to test the criterion-related validity of Camry dynamometer, using calibrated known weights, to examine test-retest reliability, intermodel reliability (comparing a Camry dynamometer with over 1000 uses versus a new Camry dynamometer), and interinstrument reliability (Camry dynamometer versus TKK dynamometer).

METHODS: A digital TKK dynamometer (range measurement: 5-100kg) and two Camry dynamometers (range measurement: 1-90kg) were used. For the verification of the weights, we used a high precision SECA scale (Model 769; SECA, Hamburg, Germany). Dynamometers were placed between two stable bases, and weights were suspended from the dynamometer with a loading belt. Dynamometers and the weights were tested in a randomized order.

Intra-instrument and interinstrument reliability, and criterion related validity were assessed using Bland and Altman's method.

RESULTS: According to the intra-instrument test-retest reliability, New Camry dynamometer had the smallest mean error (0.01 ± 0.49 kg), followed by its old version (-0.10 ± 0.49 kg) and TKK dynamometer (0.14 ± 0.77 kg). When comparing between instruments, the mean differences between the two Camry dynamometers resulted smaller (0.03 ± 0.57 kg) than the differences between Camry dynamometers and TKK (New Camry VS TKK: 0.84 ± 0.79 kg; Old Camry VS TKK: 0.88 ± 0.85 kg). Criterion related validity showed a small-magnitude negative systematic error in the three instruments (New Camry: -0.21 ± 0.35 kg; Old Camry: -0.18 ± 0.79 kg; TKK: -1.07 ± 0.75 kg).

DISCUSSION: The three instruments showed good test-retest reliability (all systematic error ≤ 0.14 kg). All dynamometers showed an acceptable error compared to known weights, yet the Camry dynamometers showed higher criterion-related validity than Digital TKK dynamometer. Our results support that Camry dynamometer has solid reliability and validity and can be therefore used for handgrip strength assessment.

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PP02. Optimización del entrenamiento II / Training optimization II

PREVALENCE AND SEVERITY OF URINARY INCONTINENCE AMONG MALE AND FEMALE COMPETITORS AND RECREATIONAL CROSSFIT® PRACTITIONERS

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OBJECTIVE: This study aimed to determine the prevalence, severity and type of urinary incontinence (UI) in female and male CrossFit® practitioners.

METHODS: The study design is an online cross-sectional survey distributed to CrossFit® practitioners across all Spanish regions. The questionnaire included categorical questions related to CrossFit® practice, multiple-choice questions to determine the exercises performed during reported UI symptoms, and The International Consultation on Incontinence Questionnaire Short-Form questionnaire items.

RESULTS: Five hundred seventy-one practitioners (34.0 ± 8.37 years, Body Mass Index 24.20 ± 3.34 kg/m²) met inclusion criteria and completed the survey. There were 316 females and 255 males. Around 45 % of women and 6 % of men reported having UI ($p < 0.001$). The severity of UI mainly was slight (30.3 % women, 3.5 % men) and moderate (11.7 % women, 2.3 % men) ($p < 0.001$). Stress and urgent UI were the most prevalent types among women (36 %) and men (5 %) ($p < 0.001$).

CONCLUSIONS: This study found that UI is relatively common among female CrossFit® practitioners, especially in repetitive jumps. The practitioners' profile (amateur/competitor) does not affect the prevalence or severity of UI. Male athletes can also experience urine leakage while performing CrossFit®, although its prevalence is much lower when compared to female practitioners.

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PP02. Optimización del entrenamiento II / Training optimization II

ASSESSING THE EFFECTS OF POST-COMBAT FATIGUE ON BALANCE: IMPLICATIONS FOR PERFORMANCE AND TRAINING STRATEGIES

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INTRODUCTION: Fatigue management is crucial in sports performance, particularly in sports such as boxing, where leg fatigue can impact punch power and ring performance [1]. The identification of accessible and non-invasive fatigue markers is essential for coaches and athletes. Some studies have attempted to detect fatigue by means of dynamic equilibrium [2]. Although some studies have utilized acceleration measures to assess fatigue during combat simulations [3], more specific research is needed in real combat situations where low-cost and easily implementable measures are applied. This study aimed to address this gap.

METHODS: A total of nine participants (mean age: 21 ± 3.87 years; average height: 179.71 ± 6.82 cm; mean weight: 71.41 ± 8.99 kg) underwent pre and post-match assessments, adhering to the regulations set forth by the International Boxing Association (IBA). Acceleration measurements were captured at the sacrum using a smartphone during a 30-second unipedal balance task performed on both legs. The recorded acceleration signals were subsequently analyzed using standard deviation and Detrended Analysis Fluctuation (DFA) techniques. A repeated measures analysis was conducted to detect significant variations acceleration signals before and after the match.

RESULTS: Statistically significant differences in standard deviation were not detected for either leg ($p > 0.050$). However, in the DFA analysis, no significant differences were observed in the dominant leg ($t = 0.720$; $p = 0.492$), while significant differences were found in the non-dominant leg ($t = 2.513$; $p = 0.036$).

DISCUSSION: The results suggest that the match did not affect balance in the dominant leg but did impact the non-dominant leg. This divergence may indicate that the specific demands of boxing affect the legs differently (e.g., increased requirement of the hip stabilizers). The decrease in DFA of the leading leg could reflect quicker adjustments in balance due to combat demands. This implies that analyzing balance in the leading leg of boxers may serve as a sensitive indicator of central-level changes provoked by combat.

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ACUTE EFFECTS OF DIFFERENT TRAINING SEQUENCES WITHIN COMPLEX TRAINING

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BACKGROUND: Combining heavy and light loads in strength training sessions promotes a shift upwards and to the right of the force-velocity relationship (1). Complex training combines both type of loads and can be ascending (light loads followed by heavy loads) or descending (vice-versa). Chronic effects between different sequences have been analyzed in addition to acute performance enhancement where complex training has shown promising results increasing jump height and peak power (2). Acute performance and fatigue differences in ascending and descending training have not been analyzed. Therefore, the aim of this study was to evaluate acute effects produced by these training sequences.

METHODS: Twenty-two active males (mean \pm SD: 23.0 \pm 3.5 years, 72.6 \pm 7.8 Kg and squat relative force: 1.4 \pm 0.3 1RM/Kg) were involved in this study. Participants were randomly divided into two groups and performed the training sequences separated by one week in a different order. One countermovement jump (CMJ) was carried out before the training and three more 1', 4' and 8' after to analyze effects in jump height (cm), average power (W), reactive strength index (RSI), jump time (s) and push-off time (s) produced by ascending and descending sessions.

RESULTS: The main result was a significant improvement trend in jump height following LL-HL sequence from post 4' on sustained by force and power values which were significantly higher in post 4' compared to post 1' in both sequences but this tendency only remained significant in post 8' compared to post 1' in LL-HL.

DISCUSSION: Despite no significant improvements between baseline and post evaluations, LL-HL sequence made athletes recover height, average power and force values significantly sooner than HL-LL throughout post - evaluations. However, fatigue indicators (RSI, jump time and push-off time) remained and behaved similar along baseline and post- training evaluations following both training sequences. More studies are needed to check the "warmup effect" produced by light loads performed at the beginning of the session and the fatigue dragging effect when heavy loads are performed first.

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EFFECTOS DEL ENTRENAMIENTO DE FUERZA DE ALTA INTENSIDAD SOBRE LA COMPOSICIÓN CORPORAL EN FUTBOLISTAS CADETES DEL VALENCIA CF: VELOCIDAD LENTA VS ISOMETRÍA

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INTRODUCCIÓN: El entrenamiento de fuerza es crucial para los futbolistas, contribuyendo tanto al alto rendimiento como a la prevención de lesiones. Cada vez se aumenta más la carga competitiva, especialmente en un entorno profesional [1, 2]. La ejecución lenta y la isometría permiten aumentar la eficiencia de forma segura. Estos métodos se utilizan con lesionados en casos como la regeneración de tendones [3]. Para aumentar la producción de fuerza existen diferentes métodos basados en ejercicios dinámicos, isométricos, etc. [4, 5]. Atendiendo a las isometrías, hay estudios que indican que es menos probable que un programa intenso provoque dolor muscular [6, 7]. El propósito del estudio fue demostrar que el entrenamiento ISO a alta intensidad es válido para mejorar en la composición corporal. Se aplicaron dos programas intensos: ejercicios lentos DINAM, y ejercicios isométricos ISO.

MÉTODOS: Un total de 26 jugadores de edad cadete del Valencia Club de Fútbol se unieron al estudio de la temporada 21-22. El plan de entrenamientos DINAM lo terminaron 16 futbolistas y 10 el de ISO. Se hicieron mediciones antes y después de aplicar el programa de 6 semanas. El test antropométrico fue de perfil restringido ISAK. Los jugadores dieron su consentimiento informado y se siguieron las pautas éticas de la declaración de Helsinki para la investigación con humanos.

RESULTADOS: Se identificaron mejoras significativas en la composición corporal de todos los sujetos. Destacando el G2 de entrenamiento ISO con un cambio muy significativo en el aumento de la masa muscular absoluta (MM) y relativa (%MM) además de un aumento del peso total (weight). Para el G1 de entrenamiento DINAM se mostró una tendencia a la mejora aunque no de manera tan relevante en la masa muscular (MM) y sí significativamente en %MM. Por otro lado, en el G2 (ISO) hubo una disminución de la masa grasa que fue medida a través del sumatorio de 6 pliegues (6 skinfolds), aunque no estadísticamente significativa.

CONCLUSIONES: El entrenamiento isométrico tiene beneficios sobre la composición corporal y en consecuencia de la fuerza. La alta intensidad aplicada con carga isométrica o velocidad lenta son parámetros diferenciales para obtener mejoras de forma segura, la clave es la intensidad. Destacando los beneficios de la carga isométrica en deportistas sanos y no reducir su uso únicamente a procesos iniciales de lesión.

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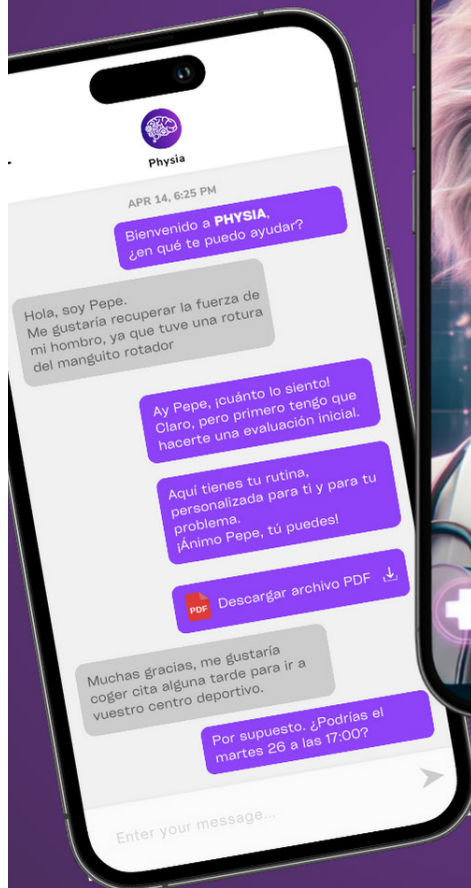
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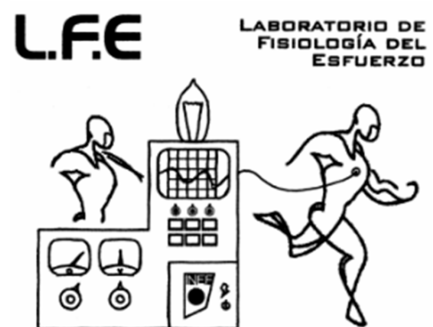
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