XVI Simposio Internacional de Actualizaciones en Entrenamiento de la Fuerza

Simposio Satélite EXERNET

Madrid, 13-14 de diciembre de 2024

Madrid, Spain

UNIVERSIDAD POLITÉCNICA DE MADRID
Faculty of Physical Activity and Sport Sciences (INEF)
Department of Health and Human Performance

Editores: Pedro J. Benito, Ana B. Peinado,
Miguel A. Rojo-Tirado, Lara Pablos.

PROGRAMA
&
LIBRO DE
ABSTRACTS

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EXERNET Satellite Symposium

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PROGRAM
&
BOOK OF
ABSTRACTS

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13 - 14 diciembre 2024, Madrid - España

LIBRO DE RESÚMENES

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Benito, Pedro J.; Peinado, Ana B.;
Rojo-Tirado, Miguel A.; Pablos, Lara.

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Universidad Politécnica de Madrid

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Pedro J. Benito
Ana B. Peinado
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BIENVENIDOS

BIENVENIDOS AL XVI SIMPOSIO DE FUERZA

El XVI Simposio Internacional de Actualizaciones en Entrenamiento de la Fuerza (SDF) ya está aquí y vuelve con una nueva edición acogiendo también al Simposio Satélite EXERNET. Para nosotros es un orgullo que el SDF pueda unir sus fuerzas a la prestigiosa Red de Investigación en Ejercicio Físico y Salud, conocida como Red EXERNET, y presidida por el Dr. Germán Vicente. EXERNET ha sido financiada en los últimos años por las convocatorias del CSD "Redes de investigación en Ciencias del Deporte". Además, en 2024 ha contado también con financiación de la convocatoria de Redes de Investigación de la Agencia Estatal de Investigación, dirigiendo este proyecto la Dra. Mari Carmen Gómez Cabrera, con la que contaremos para dar la conferencia inaugural, y donde todos podremos disfrutar de las investigaciones que está realizando a nivel molecular en el músculo esquelético. Queremos agradecer enormemente a Germán y Mari Carmen, así como a toda la Red EXERNET, que nos hayan "elegido" para llevar a cabo su Simposio Satélite.

Para nosotros presidir y organizar el Simposio de Fuerza es un orgullo y un reto, que se mantiene con la pasión de todos los que formamos parte de él, que con responsabilidad asumimos y realizamos los cientos de tareas que son necesarias para que un evento de estas características sea una realidad. Además, somos conscientes de que el SDF se ha convertido en el evento de referencia a nivel nacional en el entrenamiento de la fuerza, siendo "EL SIMPOSIO" con mayúsculas. Este año la sinergia con la Red EXERNET nos permite decir más alto que nunca que la FUERZA ES SALUD, y el programa repleto de ponencias y mesas redondas que nos mostrarán la importancia de entrenar la fuerza para la vida, como bien dice nuestro compañero Javier Butragueño.

Deseamos que el SDF sea un evento de éxito y que volvamos a ver en la XVII Edición. Muchas gracias por venir y formar parte de esta familia.

¡Feliz Navidad!

Ana Belén Peinado Lozano y Pedro José Benito Peinado
Presidentes del XVI Simposio de Actualizaciones en Entrenamiento de la Fuerza

WELCOME

WELCOME TO THE XVI INTERNATIONAL SYMPOSIUM IN STRENGTH TRAINING

The XVI International Symposium in Strength Training (SDF) is here, returning with a new edition and also hosting the EXERNET Satellite Symposium. We are proud that the SDF can join forces with the prestigious Research Network on Physical Exercise and Health, known as the EXERNET Network, headed by Dr. Germán Vicente. Over recent years, EXERNET has been funded by the CSD's "Research Networks in Sports Sciences" calls. Furthermore, in 2024, it has also received funding from the Research Networks call of the Spanish State Research Agency, led by Dr. Mari Carmen Gómez Cabrera, who will deliver the opening lecture. We will all have the opportunity to enjoy the groundbreaking molecular-level research she is conducting on skeletal muscle. We extend our heartfelt thanks to Germán, Mari Carmen, and the entire EXERNET Network for "choosing" us to host their Satellite Symposium.

For us, chairing and organizing the SDF is both an honor and a challenge, driven by the passion of everyone involved. With great responsibility, we undertake and carry out the hundreds of tasks required to make an event of this caliber a reality. Moreover, we are aware that the SDF has become the national benchmark event in strength training, earning the title of "THE SYMPOSIUM," in capital letters. This year, the synergy with the EXERNET Network allows us to say louder than ever that STRENGTH IS HEALTH. The program is packed with lectures and round tables highlighting the importance of strength training for life, as our colleague Javier Butragueño rightly says.

We hope the SDF will be a successful event, and we look forward to seeing you again at the 17th Edition. Thank you very much for coming and being part of this family.

Merry Christmas!

Ana Belén Peinado Lozano y Pedro José Benito Peinado
Presidentes del XVI Simposio de Actualizaciones en Entrenamiento de la Fuerza

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PROGRAMA CIENTÍFICO / SCIENTIFIC PROGRAM

DÍA 1/ DAY 1

Horario	DÍA 1 / DAY 1 (15/12/2023)
8:30-9:00	**Acreditación / Registration**
9:15-10:30	**Comunicaciones orales 1/ Oral presentation 1**
10:30-12:00	Mesa redonda: LÍMITES Y TRANSFERENCIAS DE LA FORMACIÓN UNIVERSITARIA AL CAMPO PROFESIONAL EN LAS CIENCIAS DE LA ACTIVIDAD FÍSICA Y DEL DEPORTE
12:00-12:30	**DESCANSO / BREAK / POSTER PRESENTATION**
12:30-14:00	**Mesa redonda EXERNET: EVALUACIÓN Y ENTRENAMIENTO DE FUERZA EN PERSONAS CON OBESIDAD**
14:00-15:30	**COMIDA / LUNCH** **WORKSHOP 1: USO DE LA ECOGRAFÍA PARA LA EVALUACIÓN DE LA ESTRUCTURA MUSCULOESQUELÉTICA** **ALEJANDRO HERNÁNDEZ BELMONTE**
15:00-15:30	MICROCONCIERTO DE MIGUEL GARRIDO ROMANOS (pianista INEF)
15:30-17:30	**ACTO DE APERTURA/ OPEN CEREMONY**
	EJERCICIO Y SEÑALIZACIÓN CELULAR. IMPLICACIONES EN EL ENVEJECIMIENTO MUSCULAR
	Mª CARMEN GÓMEZ CABRERA
17:30-18:00	**Comunicaciones orales 2/ Oral presentation 2**
18:00-18:30	**DESCANSO / BREAK / POSTER PRESENTATION**
18:30-19:30	LA ADAPTACIÓN METABÓLICA EN OBESIDAD: ROL DE LA ACTIVIDAD FÍSICA Y LA NUTRICIÓN
	CLOTILDE VÁZQUEZ MARTÍNEZ
19:30-20:30	NOVEDADES METODOLÓGICAS DEL ENTRENAMIENTO DE FUERZA EN CICLISMO
	JESÚS GARCÍA PALLARÉS

PROGRAMA CIENTÍFICO / SCIENTIFIC PROGRAM

DÍA 2/ DAY 2

Horario	DÍA 2/ DAY 2 (16/12/2023)
8:30-9:00	**Acreditación / Registration**
9:00-10:00	**Comunicaciones orales 3/ Oral presentation 3**
10:00-11:30	Mesa redonda EXERNET: ENTRENAMIENTO DE FUERZA COMO ESTRATEGIA TERAPÉUTICA
11:30-12:00	**DESCANSO / BREAK / POSTER PRESENTATION**
12:00-13:00	OPTIMIZACIÓN DE LAS ADAPTACIONES AL EJERCICIO AERÓBICO: ¿CUÁL ES LA INTENSIDAD ADECUADA? **JUAN MANUEL MURIAS**
13:00-14:00	OVARIAN HORMONE PROFILING - HOW DOES IT WORK IN PRACTICE? **KIRSTY ELLIOTT-SALE**
14:00-15:30	**COMIDA / LUNCH** **WORKSHOP 2: VALORACIÓN NEUROMUSCULAR, PLATAFORMAS Y EMG** **ALEJANDRO SAN JUAN, JAVIER RUEDA OJEDA Y GONZALO GARRIDO LÓPEZ**
15:30-16:30	**RETURN TO PLAY - THE PARADOX OF INJURY AND MUSCLE DISUSE** RADO PISOT
16:30-18:00	EL USO DE BACTERIAS INTESTINALES PARA LA MEJORA DE LA FUERZA MUSCULAR **BORJA MARTÍNEZ TÉLLEZ**
18:00-18:30	**DESCANSO / BREAK / POSTER PRESENTATION**
18:30-19:00	**Conclusiones, entrega de premios y clausura del Simposio** **Conclusions, awards and closing ceremony**
19:00-20:30	**Mesa redonda EXERNET: COSTE-EFECTIVIDAD Y EFICACIA DE DIFERENTES INTERVENCIONES DE EJERCICIO FÍSICO Y ENTRENAMIENTO DE FUERZA**

PROGRAMA AMPLIADO / EXTENDED PROGRAM

Horario/Time		DÍA 1 / DAY 1 13/12/2024
8:00 - 9:15 h		**Acreditación / Registration**
9:15 -10:30 h		**Comunicaciones orales 1 / Oral presentation 1**
1	**9:15 h**	Impact of Handgrip Strength Asymmetry and Weakness on Disability and Quality of Life in Seniors **SONGXIN TANG**
2	**9:30 h**	Could individualized resistance training improve psychological symptoms in anorexia nervosa? **MARÍA FERNÁNDEZ DEL VALLE**
3	**9:45 h**	Time-Restricted Eating and Resistance Training Effects on Skeletal Muscle Function in Postmenopausal Women with Obesity **VÍCTOR MANUEL ALFARO MAGALLANES**
4	**10:00 h**	Impact of low relative sit-to-stand power on falls, fractures, hospitalizations and mortality in older adults **MIKEL GARCÍA AGUIRRE**
5	**10:15 h**	Voluntary isometric contractions at maximal shortening as a method of neuromuscular reeducation in healthy subjects **JULIO ARTEMI HERNÁNDEZ TRUJILLO**
10:30 - 12:00 h		Mesa redonda: LÍMITES Y TRANSFERENCIAS DE LA FORMACIÓN UNIVERSITARIA AL CAMPO PROFESIONAL EN LAS CIENCIAS DE LA ACTIVIDAD FÍSICA Y DEL DEPORTE **FERNANDO DEL VILLAR ÁLVAREZ, MÓNICA AZNAR CEBAMANOS, ROSA DE TAPIA ORTEGA, JOSÉ ANTONIO SEVILLA, JOSUÉ TARI MADARIAGA Y ALBERTO ARMERO SOTILLO**
12:00 - 12:30 h		**DESCANSO / BREAK** **PRESENTACIÓN PÓSTERES / POSTER PRESENTATION**

PROGRAMA AMPLIADO / EXTENDED PROGRAM

Horario/Time		DÍA 1 / DAY 1 13/12/2024
15:00 h		**MICROCONCIERTO DE PIANO DE MIGUEL GARRIDO ROMANOS**
15:30 - 17:30 h		**ACTO DE APERTURA / OPEN CEREMONY**
		EJERCICIO Y SEÑALIZACIÓN CELULAR. IMPLICACIONES EN EL ENVEJECIMIENTO MUSCULAR
		Mª CARMEN GÓMEZ CABRERA
17:30 - 18:00 h		**Comunicaciones orales 2 / Oral presentation 2**
6	**17:30 h**	Current strenght-based cardiometabolic risk in children and adolescents from Aragon: 1995-2000 to 2020-2025 **DANIEL DOMINGO DEL VAL**
7	**17:45 h**	Impact of rapid weight loss on body composition and physical function after bariatric surery **SUSANA ARA GIMENO**
18:00 - 18:30 h		**DESCANSO / BREAK** **PRESENTACIÓN PÓSTERES / POSTER PRESENTATION**
18:30 - 19:30 h		LA ADAPTACIÓN METABÓLICA EN OBESIDAD: ROL DE LA ACTIVIDAD FÍSICA Y LA NUTRICIÓN
		CLOTILDE VÁZQUEZ MARTÍNEZ
19:30 - 20:30 h		NOVEDADES METODOLÓGICAS DEL ENTRENAMIENTO DE FUERZA EN CICLISMO
		JESÚS GARCÍA PALLARÉS

PROGRAMA AMPLIADO / EXTENDED PROGRAM

Horario/Time		DÍA 2 / DAY 2	
8:00 - 9:00 h		**Reunión Red EXERNET / EXERNET Network Meeting**	**Acreditación / Registration**
9:00 - 10:00 h		**Comunicaciones orales 3 / Oral presentation 3**	
8	**9:00 h**	Intensity and intra-set fatigue could be identically programmed in both hemispheres of breast cancer survivors **FRANCISCO FRANCO LÓPEZ**	
9	**9:15 h**	Cross-education effects after submaximal and supramaximal accentuated eccentric loading on mass and function in women **ADRIANA PÉREZ GUERRERO**	
10	**9:30 h**	Does vitamin D status and risk of malnutrition affect the improvement of body composition and fitness in older people during a 6-month multicomponent training? **SERGIO CASTILLO BERNAD**	
11	**9:45 h**	A short duration strength training intervention improves frailty and functionality in old women **SILVANA SOTO RODRÍGUEZ**	
10:00 - 11:30 h		Mesa redonda EXERNET: ENTRENAMIENTO DE FUERZA COMO ESTRATEGIA TERAPÉUTICA **LUIS GRACIA MARCO, MIRIAM MARTÍNEZ CANTÓN Y MARCELA GONZÁLEZ GROSS**	
11:30 - 12:00 h		**DESCANSO / BREAK** **PRESENTACIÓN PÓSTERES / POSTER PRESENTATION**	
12:00 - 13:00 h		OPTIMIZACIÓN DE LAS ADAPTACIONES AL EJERCICIO AERÓBICO: ¿CUÁL ES LA INTENSIDAD ADECUADA? **JUAN MANUEL MURIAS**	
13:00 - 14:00 h		OVARIAN HORMONE PROFILING - HOW DOES IT WORK IN PRACTICE? **KIRSTY ELLIOTT-SALE**	
14:00 - 15:30 h		**WORKSHOP 2: VALORACIÓN NEUROMUSCULAR, PLATAFORMAS Y EMG** **ALEJANDRO SAN JUAN, JAVIER RUEDA OJEDA Y GONZALO GARRIDO LÓPEZ**	

PROGRAMA AMPLIADO / EXTENDED PROGRAM

Horario/Time	DÍA 2 / DAY 2
	14/12/2024
15:30 - 16:30 h	RETURN TO PLAY - THE PARADOX OF INJURY AND MUSCLE DISUSE
	RADO PISOT
16:30 - 18:00 h	EL USO DE BACTERIAS INTESTINALES PARA LA MEJORA DE LA FUERZA MUSCULAR
	BORJA MARTÍNEZ TÉLLEZ
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 EXERNET: COSTE-EFECTIVIDAD Y EFICACIA DE DIFERENTES INTERVENCIONES DE EJERCICIO FÍSICO Y ENTRENAMIENTO DE FUERZA
	NARCÍS GUSI FUERTES, IGNACIO ARA ROYO Y JON IRAZUSTA ASTIAZARAN

PONENTES / KEYNOTE SPEAKERS

SATURDAY, DECEMBER 13, 2024 **15:30 - 17:30 H**

MARI CARMEN GÓMEZ CABRERA, PHD

UNIVERSIDAD DE VALENCIA, ESPAÑA - COL. 66089

Ejercicio y señalización muscular: Implicaciones en el envejecimiento muscular

Mari Carmen Gómez Cabrera es una destacada investigadora española, especializada en el campo de la fisiología del ejercicio. Es catedrática de la Universidad de Valencia y forma parte del equipo de investigación del CIBER de Fragilidad y Envejecimiento Saludable (CIBERFES). Su investigación se centra principalmente en los efectos del ejercicio físico sobre la salud y el envejecimiento, con especial interés en los mecanismos moleculares que subyacen a los beneficios del ejercicio. Ha publicado numerosos estudios científicos que exploran cómo el ejercicio puede influir en procesos como el estrés oxidativo, la función mitocondrial y la longevidad, lo que ha contribuido a una mayor comprensión de cómo la actividad física puede prevenir el envejecimiento prematuro y mejorar la calidad de vida. Entre las aplicaciones prácticas más importantes cabe destacar su trabajo resaltando la importancia del equilibrio entre el ejercicio físico y los antioxidantes, concluyendo que el exceso de suplementación con antioxidantes puede contrarrestar los beneficios del ejercicio.

Mari Carmen Gómez Cabrera is a distinguished Spanish researcher, specializing in the field of exercise physiology. She is a professor at the Universidad de Valencia and a member of the research team at the CIBER for Frailty and Healthy Aging (CIBERFES). Her research primarily focuses on the effects of physical exercise on health and aging, with a special interest in the molecular mechanisms underlying the benefits of exercise. She has published numerous scientific studies exploring how exercise can influence processes such as oxidative stress, mitochondrial function, and longevity, contributing to a greater understanding of how physical activity can prevent premature aging and improve quality of life. Among the most important practical applications of her work is highlighting the importance of balancing physical exercise with antioxidants, concluding that excessive antioxidant supplementation can counteract the benefits of exercise.

KIRSTY ELLIOTT-SALE, PHD

MANCHESTER METROPOLITAN UNIVERSITY, REINO UNIDO

Ovarian hornone profiling - How does it work in practice?

Kirsty J. Elliott-Sale es profesora de Endocrinología Femenina y Fisiología del Ejercicio en el Instituto del Deporte en la Manchester Metropolitan University. Su destacada carrera como investigadora la sitúa como una de las referentes en la fisiología de la mujer deportista, incluyendo investigaciones sobre ciclo menstrual, anticonceptivos hormonales y la menopausia. Además, Kirsty colabora con muchas organizaciones, como el Instituto del Deporte del Reino Unido, la Asociación de Fútbol, la UEFA, la Asociación Europea de Clubes, el equipo de fútbol femenino del Arsenal y el Manchester Thunder.

Kirsty J. Elliott-Sale is a Female Endocrinology and Exercise Physiology Professor at the Institute of Sport, Manchester Metropolitan University. Her distinguished research career places her as a leading expert on the physiology of the female athlete, including research on the menstrual cycle, hormonal contraceptives and the menopause. Kirsty also collaborates with many organizations, including the UK Institute of Sport, the Football Association, UEFA, the European Club Association, Arsenal Women's football team and Manchester Thunder.

RADO PIŠOT, PHD
UNIVERSITY OF PRIMORSKA IN KORPER, SLOVENIA

Return to play - The paradox of injury and muscle disuse

Dr. Pišot ocupa el cargo de director del Centro de Ciencia e Investigación de la University of Primorska en Koper, Eslovenia, y desde 2017 es director del ZRS Koper. Fue uno de los proponentes de la creación de la University of Primorska (UP) y el primer decano de la Facultad de Educación de esta universidad en Koper (2003–2007). Sus principales áreas de investigación incluyen el desarrollo y aprendizaje motor humano, y los mecanismos de adaptación del sistema motor y capacidades funcionales en contextos de desarrollo, ambientales y específicos de vida. Lidera varios proyectos internacionales y nacionales y ha recibido premios como el Premio Bloudek al desarrollo de la kinesiología. Rado Pišot ha publicado numerosos artículos científicos, sumando más de 700 publicaciones y ha recibido importantes reconocimientos por su contribución al desarrollo del deporte en Eslovenia.

Dr Pišot is the Director of the Science and Research Centre at the University of Primorska in Koper, Slovenia, and since 2017 he has been the Director of ZRS Koper. He was one of the proponents of the establishment of the University of Primorska (UP) and the first dean of the Faculty of Education at the University of Primorska in Koper (2003-2007). His main areas of research include human motor development and learning, and the mechanisms of motor system adaptation and functional abilities in developmental, environmental and life-specific contexts. He leads several international and national projects and has received awards such as the Bloudek Prize for the development of kinesiology. Rado Pišot has published numerous scientific articles, totalling more than 700 publications, and has received important awards for his contribution to the development of sport in Slovenia.

BORJA MARTÍNEZ TÉLLEZ, PHD
UNIVERSIDAD DE ALMERÍA, ESPAÑA - COL. 64246

El uso de bacterias intestinales para mejorar la fuerza muscular

Borja Martínez Téllez es investigador Ramón y Cajal en la Universidad de Almería y cofundador de Methub. Estudió Ciencias del Deporte en la Universidad de Granada y obtuvo su doctorado en Biomedicina en 2018. Al terminar la tesis, realizó un postdoctorado en el Hospital Universitario de Leiden, profundizando en la relación entre el ejercicio y la composición de las bacterias intestinales. Esta serie de proyectos acabaron en diferentes proyectos de investigación, premios y una patente internacional. Actualmente, Borja y su equipo lidera una línea de proyectos que buscan desarrollar productos nutraceúticos para la mejora de la fuerza muscular.

Borja Martínez Téllez is a Ramón y Cajal researcher at the University of Almería and co-founder of Methub. He studied Sports Science at the University of Granada and obtained his PhD in Biomedicine in 2018. After completing his thesis, he completed a postdoc at Leiden University Hospital, delving deeper into the relationship between exercise and the composition of intestinal bacteria. This series of projects resulted in different research projects, awards and an international patent. Currently, Borja and his team are leading a line of projects that seek to develop nutraceutical products to improve muscle strength.

CLOTILDE VÁZQUEZ MARTÍNEZ, PHD
FUNDACIÓN JIMÉNEZ DÍAZ Y HOSPITALES INFANTA ELENAA, GENERAL DE VILLALBA Y REY JUAN CARLOS, MADRID, ESPAÑA

Ejercicio y farmacología para el tratamiento de la obesidad

La Dra. Clotilde, natural de Alicante, es especialista en Endocrinología y Nutrición y doctora en Medicina por la Universidad Autónoma de Madrid. Actualmente ejerce como jefa Corporativa de Endocrinología y Nutrición de la Fundación Jiménez Díaz y los Hospitales Infanta Elena, General de Villalba y Rey Juan Carlos en Madrid. Su trayectoria profesional aúna la dedicación asistencial con la colaboración activa en instituciones públicas, la docencia y la investigación. Es autora de numerosas publicaciones científicas y varios libros. En 2019 fue designada la mejor endocrina de España según el ranking de El Español, y está entre los cien mejores médicos de España según la lista Forbes.

Dr. Clotilde, a native of Alicante, is a specialist in Endocrinology and Nutrition and has a PhD in Medicine from the Univerdidad Autónoma de Madrid. She is currently the Corporate Head of Endocrinology and Nutrition at the Fundación Jiménez Díaz and the Infanta Elena, General de Villalba and Rey Juan Carlos Hospitals in Madrid. Her professional career combines her dedication to healthcare with active collaboration in public institutions, teaching and research. She is the author of numerous scientific publications and several books. In 2019 she was named the best endocrinologist in Spain according to the ranking of El Español, and she is among the top 100 doctors in Spain according to the Forbes list.

JESÚS GARCÍA PALLARÉS
UNIVERSIDAD DE MURCIA, ESPAÑA - COL. 13480

Unidades metodológicas del entrenamiento de fuerza en ciclismo

Jesús García Pallarés es Doctor por la Universidad de Murcia en Fisiología del Ejercicio y recientemente consiguió ser Catedrático de la Universidad de Murcia en la materia de Entrenamiento Deportivo. Jesús dirige el grupo de investigación de Human Performance & Sports Sciences (Universidad de Murcia). Su carrera investigadora es muy fructífera formando parte de numerosas publicaciones en revistas internacionales sobre valoración, periodización y programación del entrenamiento de fuerza y resistencia, ayudas ergogénicas y biorritmos. Más allá del plano académico, es responsable de la Salud y el Rendimiento del CAR Murcia, preparador de ciclistas Élite y Profesionales y anteriormente preparador del Equipo Nacional de Ciclismo en Pista y del Equipo Nacional de Piragüismo.

Jesús García Pallarés holds a PhD from the Universidad de Murcia in Exercise Physiology and recently became a Professor at the Universidad de Murcia in the subject of Sports Training. Jesús leads the Human Performance & Sports Sciences research group (Universidad de Murcia). His research career is very successful having been part of numerous publications in international journals on assessment, periodisation and programming of strength and endurance training, ergogenic aids and biorhythms. Beyond the academic field, Jesús is responsible for Health and Performance at CAR Murcia, trainer of Elite and Professional cyclists and previously trainer of the National Track Cycling Team and the National Canoeing Team.

JUAN MANUEL MURIAS
UNIVERSIDAD HAMAD BIN KHALIFA
DE DOHA, QATAR - COL. 58024

Optimización de las adaptaciones al ejercicio aeróbico ¿Cuál es la intensidad adecuada?

El Dr. Juan Manuel Murias cuenta con una sólida formación en fisiología del ejercicio. Después de trabajar 10 años como profesor en la University of Calgary (Calgary, Canadá), comenzó una nueva etapa académica trabajando para el "College of Health and Life Sciences" en la Universidad Hamad Bin Khalifa en Doha, Qatar. Sus principales líneas de investigación son: ajustes y adaptaciones cardiovasculares y neuromusculares al ejercicio de resistencia y prescripción de ejercicio como medicina para mejorar la función cardiovascular. Juan Manuel ha publicado más de 170 artículos en revistas científicas de alto impacto en su área de investigación. Esto ha resultado en más de 6,400 referencias a su trabajo y un índice de impacto (H-Index) de 47.

Dr. Juan Manuel Murias has a strong background in exercise physiology. After working 10 years as a professor at the University of Calgary (Calgary, Canada), he started a new academic stage working for the College of Health and Life Sciences at Hamad Bin Khalifa University in Doha, Qatar. His main research interests are: cardiovascular and neuromuscular adjustments and adaptations to resistance exercise and exercise prescription as a medicine to improve cardiovascular function. Juan Manuel has published more than 170 articles in high impact scientific journals in his area of research. This has resulted in more than 6,400 references to his work and an impact index (H-Index) of 47.

LUIS GRACIA MARCO, PHD

UNIVERSIDAD DE GRANADA, ESPAÑA - COL. 65816

Mesa redonda EXERNET: Entrenamiento de fuerza como estrategia terapéutica

Luis Andrés Gracia Marco es Profesor Titular en el Departamento de Educación Física y Deportiva de la Universidad de Granada y Vicedecano de Prácticas y Empleabilidad en la Facultad de Ciencias del Deporte. Su trayectoria académica incluye formación en Educación Física y Ciencias del Deporte y un doctorado en Medicina de la Educación Física y el Deporte. Sus investigaciones se enfocan en los efectos del ejercicio sobre la salud ósea, especialmente en jóvenes y pacientes oncológicos, y en la promoción de la actividad física en estos grupos. Además de su labor investigadora, participa en la enseñanza de programas de grado y máster, con asignaturas sobre salud y evaluación nutricional.

Luis Andrés Gracia Marco is Senior Lecturer in the Department of Physical and Sports Education at the Universidad de Granada and Vice-Dean of Internships and Employability in the Facultad de Ciencias del Deporte. His academic background includes training in Physical Education and Sport Sciences and a PhD in Physical Education and Sport Medicine. Her research focuses on the effects of exercise on bone health, especially in young people and cancer patients, and on the promotion of physical activity in these groups. In addition to her research work, she is involved in teaching undergraduate and master's degree programmes, with subjects on health and nutritional assessment.

MIRIAM MARTÍNEZ CANTÓN
UNIVERSIDAD DE LAS PALMAS DE GRAN CANARIA, ESPAÑA

Mesa redonda EXERNET: Entrenamiento de fuerza como estrategia terapéutica

Miriam Martínez Cantón es investigadora en la Universidad de Las Palmas de Gran Canaria (ULPGC), en el grupo de Rendimiento Humano, Ejercicio Físico y Salud. Su investigación se centra en los efectos moleculares y fisiológicos de la actividad física, destacando su estudio sobre la proteína sarcolipina y su potencial en la adaptación muscular, el control energético y su relevancia para combatir la obesidad y ciertas distrofias musculares. Además, ha trabajado en los efectos de los polifenoles, como el extracto de hoja de mango, en el rendimiento físico, lo cual le ha valido premios en congresos internacionales y en la Cátedra Telefónica de la ULPGC.

Miriam Martínez Cantón is a researcher at the Universidad de Las Palmas de Gran Canaria (ULPGC), in the Human Performance, Physical Exercise and Health group. Her research focuses on the molecular and physiological effects of physical activity, highlighting her study on the protein sarcolipin and its potential in muscle adaptation, energy control and its relevance in combating obesity and certain muscular dystrophies. He has also worked on the effects of polyphenols, such as mango leaf extract, on physical performance, which has earned him awards at international conferences and in the Telefónica Chair of the ULPGC.

MARCELA GONZÁLEZ-GROSS, PHD
UNIVERSIDAD POLITÉCNICA DE MADRID, ESPAÑA

Mesa redonda EXERNET: Entrenamiento de fuerza como estrategia terapéutica

Marcela González Gross es una destacada catedrática en la Universidad Politécnica de Madrid (UPM) en la Facultad de Ciencias de la Actividad Física y del Deporte. Dirige el grupo de investigación ImFINE, especializado en nutrición, ejercicio y estilos de vida saludables, donde explora temas como la obesidad, sarcopenia, y la salud en poblaciones de diferentes edades. Sus estudios se centran en la relación entre la actividad física y la nutrición, incluyendo la influencia de factores dietéticos y el ejercicio en el envejecimiento saludable y la prevención de enfermedades crónicas. También ha analizado el impacto de los hábitos nutricionales en el rendimiento físico y es una voz influyente en salud pública, promoviendo pautas dietéticas y de actividad física que mejoren la calidad de vida en poblaciones activas y sedentarias.

Marcela González Gross is a leading professor at the Universidad Politécnica de Madrid (UPM) in the Facultad de Ciencias de la Actividad Física y del Deporte. She directs the ImFINE research group, specialising in nutrition, exercise and healthy lifestyles, where she explores topics such as obesity, sarcopenia, and health in populations of different ages. His studies focus on the relationship between physical activity and nutrition, including the influence of dietary factors and exercise on healthy ageing and the prevention of chronic diseases. She has also analysed the impact of nutritional habits on physical performance and is an influential voice in public health, promoting dietary and physical activity guidelines that improve quality of life in active and sedentary populations.

NARCÍS GUSI FUERTES

UNIVERSIDAD DE EXTREMADURA, ESPAÑA. - COL. 6959

Mesa redonda EXERNET: Coste-Efectividad y eficacia de diferentes intervenciones de ejercicio físico y entrenamiento de fuerza

Narcis Gusi es catedrático en la Universidad de Extremadura, con un doctorado en Fisiología del Ejercicio y Ciencias del Deporte por la Universitat de Barcelona. También cuenta con formación en economía de la salud, psicología deportiva y estadística aplicada. Su experiencia incluye haber sido profesor visitante e investigador en la Universidad de Sídney y gestor sénior de servicios para el Gobierno de Extremadura, donde dirigió un innovador programa de actividad física para la salud, atendiendo a miles de pacientes semanalmente y generando alianzas intersectoriales. Sus áreas clave incluyen investigación y docencia.

Narcis Gusi is a professor at the Universidad de Extremadura, with a PhD in Exercise Physiology and Sport Sciences from the Universidad de Barcelona. He also has a background in health economics, sports psychology and applied statistics. His experience includes being a visiting lecturer and researcher at the University of Sydney and senior service manager for the Government of Extremadura, where he led an innovative physical activity for health program, serving thousands of patients weekly and generating cross-sectoral partnerships. His key areas of focus include research and teaching.

IGNACIO ARA ROYO, PHD

UNIVERSIDAD DE CASTILLA-LA MANCHA, ESPAÑA. COL. 12975

Mesa redonda EXERNET: Coste-Efectividad y eficacia de diferentes intervenciones de ejercicio físico y entrenamiento de fuerza

Ignacio Ara Royo es catedrático en el área de Educación Física y Deportiva y posee un Doctorado Europeo en Ciencias de la Actividad Física y del Deporte por la Universidad de Las Palmas de Gran Canaria. Ha sido investigador visitante en el Departamento de Ciencias Biomédicas de la Universidad de Copenhague y es miembro del comité científico del European College of Sports Sciences (ECSS). Actualmente, co dirige el Grupo de Investigación GENUD Toledo en la Universidad de Castilla-La Mancha, un equipo destacado por su excelencia en investigación aplicada. Además, colabora con el Centro de Investigación Biomédica en Red de Fragilidad y Envejecimiento Saludable (CIBERFES) y la Red EXERNET.

Ignacio Ara Royo is a professor in the area of Physical and Sports Education and holds a European PhD in Physical Activity and Sports Sciences from the Universidad de Las Palmas de Gran Canaria. He has been a visiting researcher at the Department of Biomedical Sciences of the University of Copenhagen and is a member of the scientific committee of the European College of Sports Sciences (ECSS). Currently, he co-directs the GENUD Toledo Research Group at the Universidad de Castilla-La Mancha, a team noted for its excellence in applied research. In addition, he collaborates with the Center for Biomedical Research Network on Fragility and Healthy Aging (CIBERFES) and the EXERNET Network.

JON IRAZUSTA ASTIAZARAN, PHD
UNIVERSIDAD DEL PAÍS VASCO, ESPAÑA

Mesa redonda EXERNET: Coste-Efectividad y eficacia de diferentes intervenciones de ejercicio físico y entrenamiento de fuerza

Catedrático de Fisiología en la UPV/EHU, codirige un grupo de investigación enfocado en el ejercicio físico, salud y calidad de vida en colectivos vulnerables. Su trabajo se centra en la fisiología, analizando parámetros fisiológicos y biomarcadores sanguíneos. Ha estudiado, entre otros, los efectos del ejercicio físico en la salud física, cognitiva y emocional de personas mayores en residencias y de cuidadores de dependientes. Ha publicado 182 artículos en revistas especializadas y dirigido 30 tesis doctorales. Como Investigador Principal, ha liderado 34 proyectos competitivos, incluyendo colaboraciones con Centros Tecnológicos y Biosanitarios y proyectos financiados por el Gobierno Vasco y el Ministerio de Innovación.

Professor of Physiology at the UPV/EHU, he co-directs a research group focused on physical exercise, health and quality of life in vulnerable groups. His work focuses on physiology, analyzing physiological parameters and blood biomarkers. She has studied, among others, the effects of physical exercise on the physical, cognitive and emotional health of elderly people in nursing homes and caregivers of dependents. He has published 182 articles in specialized journals and supervised 30 doctoral theses. As Principal Investigator, he has led 34 competitive projects, including collaborations with Technological and Biosanitary Centers and projects funded by the Basque Government and the Ministry of Innovation.

MARÍA MEDRANO ECHEVARRÍA, PHD
UNIVERSIDAD PÚBLICA DE NAVARRA, ESPAÑA - COL. 5777

Mesa redonda EXERNET: Evaluación y entrenamiento de fuerza en personas con obesidad

María Medrano Echeverría es graduada en Ciencias de la Actividad Física y el Deporte por la Universidad del País Vasco, donde también ha cursado el máster en Nutrición y Salud y posteriormente su Tesis Doctoral sobre los efectos de un programa de ejercicio físico en la condición cardiorrespiratoria y el riesgo cardiovascular en niños con sobrepeso. Ha ejercido la profesión tanto como entrenadora personal como entrenadora de atletismo. Actualmente, es investigadora en la Universidad Pública de Navarra.

María Medrano Echeverría has a degree in Physical Activity and Sport Sciences from the Universidad del País Vasco, where she has also completed a Master's Degree in Nutrition and Health and later her Doctoral Thesis on the effects of a physical exercise program on cardiorespiratory fitness and cardiovascular risk in overweight children. She has worked as a personal trainer and athletic trainer. She is currently a researcher at the Universidad Pública de Navarra.

JOSÉ CASTRO PIÑERO, PHD
UNIVERSIDAD DE CÁDIZ, ESPAÑA - COL. 57258

Mesa redonda EXERNET: Evaluación y entrenamiento de fuerza en personas con obesidad

José Castro Piñero es licenciado en Educación Física por la Universidad de Granada con Master en Medicina y Ciencias Aplicadas al Deporte por la Universidad de Cádiz, donde también realizó su tesis doctoral sobre valoración de la condición física en niños de 6 a 17 años. Actualmente es profesor titular de la Universidad de Cádiz en el departamento de Didáctica de la Educación Física, Plástica y Musical del área de Educación Física y Deportiva. Además, forma parte del grupo de investigación Galeno.

José Castro Piñero has a degree in Physical Education from the Universidad de Granada with a Master in Medicine and Applied Sports Sciences from the Universidad de Cadiz, where he also completed his doctoral thesis on the assessment of physical fitness in children aged 6 to 17 years. He is currently a professor at the Universidad de Cadiz in the Department of Didactics of Physical, Plastic and Musical Education in the area of Physical and Sports Education. He is also a member of the Galeno research group.

ENRIQUE GARCÍA ARTERO, PHD
UNIVERSIDAD DE ALMERÍA, ESPAÑA - COL. 57001

Mesa redonda EXERNET: Evaluación y entrenamiento de fuerza en personas con obesidad

Enrique García Artero es licenciado en Ciencias de la Actividad Física y el Deporte por la Universidad de Granada, donde también estudió el Máster Oficial en Nutrición Humana y realizó su Tesis Doctoral en el departamento de Fisiología de la Facultad de Medicina. Permitiéndole esto conseguir una beca postdoctoral Ramón y Cajal. Actualmente es profesor titular en la Universidad de Almería donde pertenece al Sport Research Group.

Enrique García Artero has a degree in Physical Activity and Sport Sciences from the Universidad de Granada, where he also studied the Official Master's Degree in Human Nutrition and completed his Doctoral Thesis in the Physiology Department of the Faculty of Medicine. This allowed him to obtain a Ramón y Cajal postdoctoral fellowship. He is currently a full time professor at the Universidad de Almeria where he belongs to the Sport Research Group.

ALBERTO ARMERO SOTILLO, PHD
UNIVERSIDAD POLIÉCNICA DE MADRID, ESPAÑA - COL. 70692

Mesa redonda EXERNET: Evaluación y entrenamiento de fuerza en personas con obesidad

Alberto Armero Sotillo es graduado en Ciencias de la Actividad Física y el Deporte por la Universidad Politécnica de Madrid, donde actualmente cursa el Máster Universitario en Ciencias de la Actividad Física y el Deporte. Además, es miembro del grupo de investigación del Laboratorio de Fisiología del Esfuerzo (LFE) de la Facultad de Ciencias de la Actividad Física y el Deporte. Junto con su carrera académica, también desempeña su labor profesional como entrenador superior de baloncesto, donde cuenta con el título de entrenador nacional de la Federación Española de Baloncesto.

Alberto Armero Sotillo has a degree in Physical Activity and Sport Sciences from the Universidad Politécnica de Madrid, where he is currently studying the Master's Degree in Physical Activity and Sport Sciences. In addition, he is a member of the LFE research group of the Facultad de Ciencias de la Actividad Física y el Deporte. Along with his academic career, he also performs his professional work as a basketball coach, where he holds the title of national coach of the Spanish Basketball Federation.

JOSUÉ TARÍ MADARIAGA

PREPARADOR FÍSICO ESPECIALISTA EN ENTRENAMIENTO DE FUERZA Y ALTO RENDIMIENTO - COL. 55723

Mesa redonda: Límites y transferencias de la formación universitaria al campo profesional en las ciencias de la actividad física y del deporte

Jouse Tarí Madariaga es licenciado en Ciencias de la Actividad Física y el Deporte por la Universidad Politécnica de Madrid. Además, tiene un Máster en Prescripción de Ejercicio Físico en Patologías por la Universidad Isabel I de Castilla. Actualmente es preparador físico de atletas de diversas disciplinas, tales como: boxeo, gimnasia artística, pádel y motociclismo. A su vez, es presidente de su propio club deportivo Exito28Madrid y creador de la marca Másfuertesqueayer.

Jouse Tarí Madariaga has a degree in Physical Activity and Sport Sciences from the Universidad Politecnica de Madrid. In addition, he has a Master in Physical Exercise Prescription in Pathologies by the Universidad Isabel I de Castilla. He is currently physical trainer of athletes in various disciplines, such as boxing, artistic gymnastics, paddle tennis and motorcycling. He is also president of his own sports club Exito28Madrid and creator of the brand Másfuertesqueayer.

FERNANDO DEL VILLAR ÁLVAREZ, PHD

CONFERENCIA ESPAÑOLA DE DECANOS DE CIENCIAS DEL DEPORTE, ESPAÑA - COL. 58769

Mesa redonda: Límites y transferencias de la formación universitaria al campo profesional en las ciencias de la actividad física y del deporte

Fernando del Villar Álvarez es licenciado en Educación Física por la Universidad de Granada donde posteriormente desarrolló su tesis doctoral. Ha sido fundador y decano de la Facultad de Ciencias del Deporte de la Universidad de Extremadura y actualmente es decano de la Facultad de Ciencias de la Educación y del Deporte y Estudios Interdisciplinares de la Universidad Rey Juan Carlos donde además es catedrático. Desde 2022 es el presidente de la Conferencia Española de Decanos de Ciencias del Deporte.

Fernando del Villar Álvarez has a degree in Physical Education from the Universidad de Granada where he later developed his doctoral thesis. He has been founder and dean of the Faculty of Sports Sciences at the Universidad de Extremadura and is currently dean of the Faculty of Education and Sports Sciences and Interdisciplinary Studies at the Universidad Rey Juan Carlos where he is also a professor. Since 2022 he is the president of the Conferencia Española de Decanos de Ciencias del Deporte.

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MÓNICA AZNAR CEBAMANOS, PHD

VICEPRESIDENTA DEL CONSEJO COLEF - COL. 7493

Mesa redonda: Límites y transferencias de la formación universitaria al campo profesional en las ciencias de la actividad física y del deporte

Mónica Aznar Cebamanos es licenciada en Educación Física por el INEFC de Lleida, Doctora en Dirección y Administración de empresas por la Universidad Pablo de Olavide y posee dos postgrados en Dirección de Centros Fitness y en Dirección de Instalaciones Deportivas, junto con un Máster en Dirección y Gestión de Instalaciones Deportivas. Su desempeño profesional es en la Facultad de Educación de la Universidad de Zaragoza (UNIZAR). Es actualmente Decana del Colegio de Educadoras y Educadores Físico Deportivos de Aragón (COLEFA) y Vicepresidenta del Consejo General de la Educación física y Deportiva de España (Consejo-COLEF).

Mónica Aznar Cebamanos has a degree in Physical Education from the INEFC de Lleida, a PhD in Management and Business Administration from the Universidad Pablo de Olavide and has two postgraduate degrees in Fitness Center Management and Sports Facilities Management, along with a Master in Management and Management of Sports Facilities. She works at the Faculty of Education of the Universidad de Zaragoza (UNIZAR). She is currently Dean of the College of Physical and Sports Educators of Aragon (COLEFA) and Vice President of the General Council of Physical and Sports Education of Spain (COLEF-Council).

ROSA DE TAPIA ORTEGA

PRESIDENTA DEL COPLEF DE MADRID - COL. 12828

Mesa redonda: Límites y transferencias de la formación universitaria al campo profesional en las ciencias de la actividad física y del deporte

Rosa de Tapia Ortega es licenciada en Ciencias de la Actividad Física y el Deporte por la Universidad Politécnica de Madrid. Además, tiene postgrados en gestión deportiva, protocolo deportivo y seguridad de instalaciones y actividades deportivas. Ejerce en el Ayuntamiento de Leganés desde 1992 en diversos puestos de la delegación de deportes. A su vez es presidenta del COPLEF de Madrid.

Rosa de Tapia Ortega has a degree in Physical Activity and Sports Sciences from the Universidad Politécnica de Madrid. She also has postgraduate degrees in sports management, sports protocol and security of sports facilities and activities. She has worked in the City Council of Leganes since 1992 in various positions in the sports delegation. She is also president of COPLEF of Madrid.

JOSE ANTONIO SEVILLA TORRECILLA

SOCIO CONSEJERO Y CEO DE ALTAFIT - COL. 65288

Mesa redonda: Límites y transferencias de la formación universitaria al campo profesional en las ciencias de la actividad física y del deporte

Jose Antonio Sevilla es licenciado en Ciencias de la Actividad Física y el Deporte en el INEF de Madrid, Máster en Gestión de Instalaciones Deportivas y Marketing Digital. Actualmente dirige grandes complejos deportivos en el modelo de las concesiones administrativas y es cofundador de AltaFit, desarrollando su trabajo con el cargo de Socio Consejero y Director General.

Alterna su actividad principal en la Dirección de AltaFit, con colaboraciones en diferentes organizaciones empresariales del sector y la industria del fitness y el deporte en España. Una parte importante de su tiempo libre la dedica a divulgar los beneficios que el ejercicio físico tiene en las personas, con el objetivo de ayudar a que se incrementen los niveles de práctica. También, y desde hace más de 15 años, forma parte del cuadro de docentes de diferentes másteres, cursos de postgrado y también participa habitualmente en seminarios y cursos relacionados con la industria tanto en España. Ha sido ponente en Congresos en EEUU (IHRSA) y Argentina (MERCADOFITNESS)

Jose Antonio Sevilla holds a degree in Physical Activity and Sports Sciences from INEF in Madrid, and a Master's in Sports Facility Management and Digital Marketing. He currently manages large sports complexes under the administrative concession model and is a co-founder of AltaFit, where he works as a Partner Advisor and General Manager.

He combines his main activity at AltaFit with collaborations in various business organizations within the fitness and sports industry in Spain. A significant part of his free time is dedicated to promoting the benefits of physical exercise, aiming to help increase participation levels. Additionally, for over 15 years, he has been part of the teaching staff for various master's programs and postgraduate courses, and he regularly participates in seminars and courses related to the industry in Spain. He has been a speaker at conferences in the USA (IHRSA) and Argentina (MERCADOFITNESS).

ALEJANDRO HERNÁNDEZ BELMONTE, PHD
UNIVERSIDAD DE MURCIA, ESPAÑA - COL. 66178

Uso de la ecografía para la evaluación de la estructura musculoesquelética

El Dr. Hernández-Belmonte, investigador en la Universidad de Murcia, se especializa en entrenamiento de resistencia y ecografía. Ha liderado estudios clave que cuestionan la eficacia superior del peso libre frente a las máquinas, además de contribuir a investigaciones de alta calidad en entrenamiento de resistencia. En ecografía, fue pionero en validar esta técnica para medir el área transversal del pectoral y examinar sus aspectos metodológicos, aplicándola para observar cambios musculares derivados del entrenamiento. Su carrera incluye colaboraciones internacionales en instituciones como la Universidad de Jyväskylä, Universidad Europea de Madrid y Universidad de Las Palmas. Recientemente, recibió una beca Juan de la Cierva para un proyecto sobre cáncer con el Profesor Alejandro Lucía.

Dr. Hernández-Belmonte, a researcher at the Universidad de Murcia, focuses on resistance training and ultrasonography. He led key studies challenging the belief that free weights are more effective than machines and contributed to high-quality research on resistance training. In ultrasonography, he pioneered studies validating the technique for measuring pectoralis cross-sectional area and examining its methodological aspects, applying it to observe muscle changes from training. His career includes collaborations at international institutions like the University of Jyväskylä, Universidad Europea de Madrid, and Universidad de Las Palmas. Recently, he received a Juan de la Cierva fellowship for a cancer-related project with Professor Alejandro Lucia.

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Valoración neuromuscular, plataformas y EGM

Alejandro San Juan Ferrer es profesor e investigador en la Universidad Politécnica de Madrid (UPM), específicamente en el Departamento de Salud y Rendimiento Humano de la Facultad de Ciencias de la Actividad Física y del Deporte (INEF). Su trabajo se enfoca en la biomecánica y el análisis del rendimiento físico, siendo miembro del Laboratorio de Biomecánica del Deporte. Es licenciado y doctor en Ciencias de la Actividad Física y del Deporte y cuenta también con una formación en fisioterapia. San Juan Ferrer ha realizado investigaciones relevantes sobre los efectos de la fatiga muscular en el rendimiento de actividades deportivas, especialmente en ejercicios como la sentadilla, utilizando herramientas avanzadas de electromiografía para analizar la activación muscular en contextos de alta exigencia física.

Alejandro San Juan Ferrer is a lecturer and researcher at Universidad Politécnica de Madrid (UPM), specifically in the Department of Health and Human Performance of the Facultad de Ciencias de la Actividad Física y del Deporte (INEF). His work focuses on biomechanics and physical performance analysis, being a member of the Biomechanics of Sport Laboratory. He holds a degree and doctorate in Physical Activity and Sport Sciences and also has a background in physiotherapy. San Juan Ferrer has carried out relevant research on the effects of muscle fatigue on the performance of sports activities, especially in exercises such as the squat, using advanced electromyography tools to analyse muscle activation in contexts of high physical demand.

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Valoración neuromuscular, plataformas y EGM

Javier Rueda Ojeda es un académico e investigador español especializado en Ciencias de la Actividad Física y del Deporte, con un doctorado en la misma área por la Facultad de Ciencias de la Actividad Física y del Deporte (INEF) de la Universidad Politécnica de Madrid (UPM). Es profesor en la Facultad de Ciencias de la Actividad Física y del Deporte en la UPM, donde también forma parte del Grupo de Análisis Biomecánico y colabora en el Laboratorio de Biomecánica Deportiva. Además, Rueda Ojeda imparte cursos relacionados con la biomecánica y la optimización de técnicas deportivas, siendo también Entrenador Nacional de Atletismo acreditado por la Real Federación Española de Atletismo.

Javier Rueda Ojeda is a Spanish academic and researcher specializing in Sports and Physical Activity Sciences, holding a PhD in the field from the Facultad de Ciencias de la Actividad Física y del Deporte (INEF) at the Universidad Politécnica de Madrid (UPM). He teaches at UPM's Facultad de Ciencias de la Actividad Física y del Deporte, where he is also a member of the Biomechanical Analysis Group and collaborates with the university's Sports Biomechanics Laboratory. Additionally, Rueda Ojeda offers courses on biomechanics and athletic performance optimization and is a certified National Athletics Coach through the Federación Española de Atletismo.

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Valoración neuromuscular, plataformas y EGM

Gonzalo Garrido López es un doctorando en la Universidad Politécnica de Madrid, especializado en Ciencias de la Actividad Física y del Deporte. Actualmente, colabora en el Departamento de Salud y Rendimiento Humano y está afiliado al Grupo de Análisis Biomecánico, donde trabaja en proyectos que abordan la biomecánica del rendimiento deportivo y el análisis de movimientos humanos. Ha participado en investigaciones relacionadas con el estudio de la ejecución técnica en el fútbol sala, en particular, el análisis biomecánico de gestos como el golpeo de balón.

Gonzalo Garrido López is a PhD student at the Universidad Politécnica de Madrid, specialising in physical activity and sport sciences. He currently collaborates in the Department of Health and Human Performance and is affiliated to the Biomechanical Analysis Group, where he works on projects dealing with the biomechanics of sports performance and the analysis of human movements. He has participated in research related to the study of technical performance in futsal, in particular, the biomechanical analysis of gestures such as ball striking.

COMUNICACIONES ORALES / ORAL PRESENTATION

FRIDAY, DECEMBER 13, 2024

9:15 - 10:30 H

Comunicaciones orales 1 / Oral presentation 1

09:15 - 09:30 h

IMPACT OF HANDGRIP STRENGTH ASYMMETRY AND WEAKNESS ON DISABILITY AND QUALITY OF LIFE IN SENIORS

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INTRODUCTION: Handgrip strength (HGS) is a key physical strength indicator linked to age-related health issues like functional disability and reduced health-related quality of life (HRQoL). Asymmetric limb strength is associated with reduced functionality, so both HGS asymmetry and weakness may contribute to disability. However, knowledge of their combined impact on functional disability and HRQoL in older Spanish adults is limited. This study examined the individual and combined associations of HGS asymmetry and weakness with functional disability and HRQoL among independently living older adults.

METHOD: 1636 participants (≥65 years; 24% men) from the EXERNET study cohort were analyzed. Weakness was defined as HGS <27 kg for men and <16 kg for women (1). HGS symmetry was an HGS ratio of 0.9–1.1, with asymmetry outside that range (2). HRQoL was assessed using the EuroQol-5 Dimension (3), with all dimensions collapsed into a health functional index via time-trade-off values (TTO). Functional capacity included balance, strength, agility, walking speed, and endurance. Functional limitations were defined as performance below the 20th percentile based on Spanish reference values (4). Logistic regression models assessed associations between HGS, functional disability, and HRQoL.

RESULTS: Compared to those with symmetric HGS and no weakness, individuals with both weakness and HGS asymmetry showed significantly impaired HRQoL in most dimensions, except anxiety/depression, including TTO values (odds ratio (OR)=2.92; 95% confidence interval (CI)=1.48–5.74). This group also had a higher risk for functional limitations across all capacities assessed (balance: OR=2.21; leg strength: OR=4.85; arm strength: OR=10.48; agility: OR=12.12; walking speed: OR=5.26; endurance: OR=2.62). However, those with only asymmetry or weakness showed increased functional disability only in some capacities (asymmetry: balance, arm strength, agility; weakness: arm strength).

CONCLUSIONS: Our study's findings suggest that HGS asymmetry and weakness can be early indicators of functional disability and impaired HRQoL. This insight opens the door for early interventions, offering hope for improved quality of life for older adults.

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COULD INDIVIDUALIZED RESISTANCE TRAINING IMPROVE PSYCHOLOGICAL SYMPTOMS IN ANOREXIA NERVOSA?

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INTRODUCTION: Anorexia nervosa (AN) is a severe eating disorders (ED) with the second highest mortality rate among all mental disorders1. With a growing prevalence in younger and more diverse populations over the last decade, AN is most common in adolescent females. AN patients often engage in compensatory behaviors (e.g. laxatives, vomiting, excessive exercise) to maintain a low body weight. Despite the negative role of exercise, supervised exercise has shown to be positive. Further, resistance exercise programs (REP) have led to significant physical health and quality of life improvements in AN2. Nevertheless, no studies have analyzed the impact of REP on AN symptoms. Consequently, aim of this study was to analyze de effects of an REP on the psychological symptoms of AN patients under day hospital care.

METHODS: Following the Declaration of Helsinki and after giving written consent, a total 16 healthy controls (HC) and 32 patients (n= 16 INT and n=16 ANC) participated in the study (1 male on each group). Mean age was 21.1 years (± 4.1 HC, ±7.4 INT; 10.3 ANC). Psychopathological symptoms [ED examination (EDE) questionnaire, Brief symptom inventory (BSI), and exercise dependence scale (EDS)], muscular fitness [handgrip strength (HGS) test and five times sit-to-stand test (STS)], and body composition [bioimpedance analysis (BIA), and anthropometry] were assessed. Intervention consisted of 10-week, 3 days/week, individualized REP involving major muscle groups, with a target intensity of 6-7 based on the 0-10 OMNI-Resistance Exercise Scale3. Nonparametric analyses were performed on females' data.

RESULTS: At baseline, HC showed significantly different psychological symptoms and physical fitness values compared to AN groups. After the intervention, the INT group showed improvements at EDE subscales [Shape concern (p=0.021), Weight concern (p=0.015)], BSI scores [Anxiety (p=0.025) and global score (p=0.05)], and muscular fitness [STS average time (p=0.047)] compared to ANC. Significant differences between HC and AN groups remained at the end of the program.

CONCLUSIONS: This is the first study to show that individualized REP has a positive impact on both psychological and physical health in AN. These findings highlight the potential value of individualized REP as complementary tool for AN patients under hospital day care.

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TIME-RESTRICTED EATING AND RESISTANCE TRAINING EFFECTS ON SKELETAL MUSCLE FUNCTION IN POSTMENOPAUSAL WOMEN WITH OBESITY

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INTRODUCTION: Time-restricted eating (TRE) shows promise for weight loss and improving health, but its effects on skeletal muscle function (SMF) in postmenopausal women are unknown [1,2]. This study investigates the effects of three weight loss interventions on SMF in postmenopausal women.

METHODS: 72 sedentary postmenopausal women (57.7±3.9 years, 79.3±9.8 kg, 45.6±3.4% fat) with overweight/obesity were randomly assigned to TRE, TRE+Resistance Training (RT), or caloric restriction (CR)+RT for 12-weeks. TRE groups reduced their eating window to 8-hours, while CR+RT followed an individualized hypocaloric diet (-500 kcal/day). RT groups performed supervised machine-based RT 3-times/week (8-12 repetitions, 65-80% 1RM). To evaluate SMF a load-velocity relationship in the leg press (LP) and barbell bench press (BP) exercises was established pre- and post-intervention, which was used to calculate maximal force (L0), velocity (v0), and power (Aline) capacities [3]. Lean mass (LM) was measured by dual-X-ray absorptiometry to normalize L0 and Aline. Analysis of covariance (age adjusted) for repeated measures were performed to analyze intra and inter-group changes (%) at the end of the intervention (%).

RESULTS: In both LP and BP, L0/LM significantly increased in the TRE+RT (12.6±11.5%, p=0.049 and 9.1±10.7%, p<0.001, respectively) and CR+RT (16.6±22.6%, p=0.003 and 6.4±9.1%, p=0.005) groups compared to TRE (-0.7±14.6% and -3.1±9.1%), while v0 showed no differences (p>0.05). Aline/LM changes of both LP and BP were significantly higher in the TRE+RT (8.6±8.2%, p=002. and 11.1±13.0%, p<0.001, respectively) and CR+RT (10.3±17.9%, p<0.001 and 8.6±7.8%, p<0.001, respectively) groups than in TRE (-5.5±9.0% and -4.8±7.4%). Interestingly, only L0/LM and Aline/LM showed a significant time*group interaction (p<0.05) for the LP and BP, demonstrating improvements in both TRE+RT (LP and BP p<0.001) and CR+RT (LP and BP p<0.001) groups. TRE did not show changes for L0/LM (LP and BP p>0.05); however, Aline/LM significantly decreased in the TRE group (LP, p=0.033; BP, p=0.015).

CONCLUSIONS: TRE negatively affects SMF in postmenopausal women with overweight/obesity by reducing skeletal muscle power. RT is an effective strategy not only to prevent, but also to improve SMF during TRE. Moreover, TRE+RT seems to be as effective as CR+RT, so both strategies are recommended for this population. Lastly, when implementing TRE, at least power-oriented RT should be performed to prevent its deleterious effects on SMF.

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IMPACT OF LOW RELATIVE SIT-TO-STAND POWER ON FALLS, FRACTURES, HOSPITALIZATIONS AND MORTALITY IN OLDER ADULTS

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INTRODUCCIÓN: Muscle power has recently been suggested as a biomarker of healthy aging (1). It is closely associated with physical function, frailty, and independence in activities of daily living (2), and can be easily and affordably assessed through the sit-to-stand test (STS) using the Alcazar equation (3). However, the relationship between STS power and other adverse events remains unclear. Therefore, the aim of this study was to evaluate the impact of low relative STS power on falls, fractures, hospitalizations, and all-cause mortality in older adults.

METHODS: A total of 1662 participants (732 men and 930 women; mean age = 75.4±6.1 years) from the Toledo Study for Healthy Aging were included. Relative STS power was assessed using the 30-s STS test (4)and defined as low if <2.53 W/kg in men and <2.01 W/kg in women. The number of falls and fractures in the previous year were recorded, while hospitalizations and all-cause mortality were recorded after 9.7±3.5 years and 6.8±3.1 years of follow-up, respectively. Binary logistic regression analyses and Cox proportional hazard regression models adjusted by age, educational level and comorbidities were performed.

RESULTS: There was a significant association between low relative STS power and falls (OR [95%CI] = 1.73 [1.08 – 2.75]; p=0.022) and all-types of fractures (OR [95%CI] = 1.86 [1.21 – 2.84]; p=0.004) in men. In women there was a significant association between low relative STS power and hip fractures (OR [95%CI] = 3.25 [1.07 – 9.86]; p=0.012) but not with falls (OR [95%CI] = 1.38 [0.98 – 1.95]; p=0.065). An increased risk of hospitalization was found in older women with low relative STS power (HR [95%CI] = 1.29 [1.06 – 1.58]; p=0.012) but not in older men with low relative STS power (HR [95%CI] = 1.14 [0.93 – 1.39]; p=0.209). Low relative STS power increased all-cause mortality in both older women (HR [95%CI] = 2.04 [1.51 – 2.74]; p<0.001) and men (HR [95%CI] = 1.57 [1.26 – 1.97]; p<0.001).

CONCLUSIONS: Low relative STS power was associated with an increased likelihood of falls and fractures in men, and specifically to hip fractures in older women. Both men and women with low STS power showed a higher risk of all-cause mortality, while only women experienced a higher risk of hospitalization.

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VOLUNTARY ISOMETRIC CONTRACTIONS AT MAXIMAL SHORTENING AS A METHOD OF NEUROMUSCULAR REEDUCATION IN HEALTHY SUBJECTS

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INTRODUCTION: Neuromuscular reeducation (NR) established its principles in the mid-20th century (1) and has since focused on improving motor activities in patients with pathologies by retraining the nervous system (2). However, its effects on healthy individuals are unknown. Voluntary isometric contractions at maximal muscle shortening (VICAMS) is a new technique that has been shown to acutely improve performance (3) following NR principles. This study aims to analyze their chronic effects on range of motion, strength, and vertical jump, and to compare them with traditional ballistic stretching (BS).

METHODS: Sixty healthy, recreationally active participants (mean age: 46.4 ± 5.5 years), were randomly distributed into three groups that received different workouts twice a week for eight weeks: VICAMS; BS; and the control group (CG) that did not undergo any intervention. In both training, hip exercises (flexion, extension, abduction, and adduction) and knee exercises (flexion and extension) were applied. To assess chronic effects, active range of motion (AROM), maximal voluntary isometric force (MVIF), and countermovement jump height (CMJ) were determined before and after the intervention.

RESULTS: ANOVA with the Bonferroni post hoc test was used to evaluate the difference between groups, finding main time effects and time*group interactions for all variables ($p<0.001$). Between-group differences were observed in the VICAMS group after the intervention, with higher AROM and MVIF values compared to the other groups. Intra-group differences were observed in the VICAMS and BS groups, as values for all variables increased from baseline.

CONCLUSIONS: The chronic effects of VICAMS have shown it to be an effective system for improving active flexibility, strength, and jump height, as they have been significantly better than BS. These results suggest that NR using VICAMS in healthy subjects may be useful for trainers due to its effectiveness, speed, and low cost for its application.

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FRIDAY, DECEMBER 13, 2024

17:30 - 18:00 H

Comunicaciones orales 2 / Oral presentation 2

17:30 - 17:45 h

CURRENT STRENGTH-BASED CARDIOMETABOLIC RISK IN CHILDREN AND ADOLESCENTS FROM ARAGON: 1995-2000 TO 2020-2025

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INTRODUCTION: Physical fitness has been shown to be a powerful marker of health in childhood and adolescence (1). In particular, low muscle strength may serve as a marker of increased cardiometabolic risk (CMR) in children and adolescents (2,3). This study aimed to compare the prevalence of children and adolescents at CMR using the cut-off points developed for the handgrip (HG) and standing long jump (SLJ) tests (2,3) in two time samples of children and adolescents in Aragon: 1995-2000 and 2020-2025.

METHODS: The sample size was 2109 participants in 1995-2000 period (48.93% female), and 607 in 2020-2025 (46.79% female), from different locations in Aragon. The first sample was derived from two previous studies conducted (4,5). Both samples performed HG, for upper body strength, and SLJ for lower body strength. The cut-off points for HG (adjusted for body mass) and SLJ developed by Castro-Piñero et al. (2) were used in children (6-10 years) while the cut-off points from the HELENA study (3) were used in adolescents (13-16 years), to identify participants with elevated CMR.

RESULTS: In 2020-2025, the proportion of boys (6-10 years) at CMR was reduced compared to 1995-2000 using the SLJ cut-off points (OR=0.39, $\chi2(1)=10.19$, $p<.001$). In contrast, the prevalence in male adolescents (13-16 years) at CMR, increased from 20.10%, in 1995-2000, to 29.10%, in 2020-2025, using the HG cut-off points (OR=1.63, $\chi2(1)=5.76$, $p=.016$). Furthermore, boys (6-10 years) had higher SLJ values (+10.35%, d=0.56, $p<.001$) while girls (6-10 years) demonstrated higher HG and SLJ values (+7.66%, d=0.28, $p=.004$; +12.71%, d=0.66, $p<.001$; respectively) than their counterparts in 1995-2000. In 2020-2025, male adolescents (13-16 years) also had lower SLJ levels than in 1995-2000 (-4.40%, d=-0.22, $p=0.032$), although the proportion of participants at CMR as assessed by this test, did not change significantly.

CONCLUSION: The most concerning finding is the significant increase in the prevalence of CMR among male adolescents, with odds rising by 1.63 times to a prevalence of nearly 1 in 3. Political, health and educational institutions must intensify their efforts to promote physical activity, exercise and sport during this crucial period of growth.

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IMPACT OF RAPID WEIGHT LOSS ON BODY COMPOSITION AND PHYSICAL FUNCTION AFTER BARIATRIC SURGERY

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INTRODUCTION: Weight loss (WL) induced by bariatric surgery (BS) affects both fat mass (FM) and fat-free mass (FFM) (1), leading to unintended muscle loss, which could impact muscle strength and physical function (PF) (2). Scientific evidence strongly links resting metabolic rate (RMR) to FFM (3), suggesting that a decrease in FFM after BS could further slowdown RMR, potentially hindering WL and increasing the risk of weight regain (4). While there is a broad agreement that BS improves clinical outcomes (1), its effects on muscle strength and PF remain controversial. This study aims to; 1) describe the short-term effects of BS on body composition, PF and RMR, and 2) to evaluate the association between changes in PF, lean tissue mass (LTM) and RMR.

METHODS: The presented data is part of an ongoing RCT (5). Nineteen participants (11 women) completed two assessments (one week pre- and 7 weeks post-sleeve gastrectomy surgery). Body composition (DXA), RMR (indirect calorimetry) and PF (5 times sit-to-stand (STS), gait speed 6m, hand grip and timed up and go test) were assessed in each assessment. Absolute changes and percentages were calculated. Paired t-tests were performed to assess the changes and Pearson correlations were used to evaluate the associations between them.

RESULTS: Participants presented an initial BMI of 46.57± 4.57 and 40.11 ± 9.32 years. Seven weeks post-BS significant reductions were observed in body weight, adipose tissue (AT), LTM and RMR (all $p< 0.001$). The change in RMR was strongly correlated with WL ($R2=0.582$; $p=0.009$), while a tendency between and LTM and RMR changes ($R2=0.440$; $p=0.059$) was found. PF improved, measured with the STS improve significantly ($p=0.002$). No associations were found between changes in PF and changes in RMR or LTM (all $p>0.05$).

CONCLUSION: Bariatric surgery led to significant reductions in AT, LTM, and RMR. WL was strongly correlated with changes in RMR. Additionally, early improvements in PF, as shown by the STS test, highlight the functional benefits of surgery.

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SATURDAY, DECEMBER 14, 2024

9:00 - 9:45 H

Comunicaciones orales 3 / Oral presentation 3

09:00 - 09:15 h

INTENSITY AND INTRA-SET FATIGUE COULD BE IDENTICALLY PROGRAMMED IN BOTH HEMISPHERES OF BREAST CANCER SURVIVORS

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INTRODUCTION: Unilateral resistance training is an effective method to maximize strength and muscle mass in breast cancer (BC) survivors (1, 2). However, it is unknown whether the surgery and adjuvant therapy associated with this disease could influence the stimulus individually received by the operated and non-operated hemispheres. Knowing this information would be key to determining whether the intensity and intra-set fatigue should be differently programmed for each hemisphere. On this matter, we elaborated a within-subject design using the unilateral bench press (UBP) to examine the effect of BC surgery and adjuvant therapy on i) the load-velocity relationship of this exercise and ii) the intra-set fatigue incurred when performing a set of repetitions.

METHODS: Twelve women BC survivors (age=51.2±10 yr) completed two loading tests up to the one-repetition maximum in the UBP (one with each hemisphere) using a lightweight carbon bar (3). The general (including all the women) and individual (for each woman) load-velocity relationship was studied using second-order polynomials. The velocity attained at each intensity (%1RM) was analyzed and compared between hemispheres (repeated-measures t-test). The UBP load-velocity relationship of each hemisphere was also used to program two sets of repetition against 60 and 80% 1RM (randomized order) until reaching 40% velocity loss (VL). The association between the repetitions completed and VL reached was examined using 5% thresholds (i.e., 10%-15% VL, etc.) and compared between hemispheres (repeated-measures t-test).

RESULTS: Regressions showed very close general load-velocity relationships for the operated (R2=0.946) and non-operated (R2=0.950) hemispheres. These adjustments were even stronger for individual relationships (R2≥0.984 for both hemispheres). Between-hemisphere differences in velocity attained to each %1RM were small (≤0.01 m·s-1) and not significant (p≥0.553). Between-hemisphere differences in the repetitions completed at each VL threshold were < 1 repetition (VL thresholds ≤30%, p≥0.351), ~2 repetitions at 35% VL (p=0.133), and ~3 repetitions at 40% VL (p=0.072).

CONCLUSION: Practitioners working with BC survivors could use the same velocity as a reference to prescribe the intensity in the UBP for the operated and non-operated hemispheres. Similarly, they could program the same number of repetitions to be completed in both hemispheres to generate a similar fatigue level, especially when planning VL ≤ 30.

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CROSS-EDUCATION EFFECTS AFTER SUBMAXIMAL AND SUPRAMAXIMAL ACCENTUATED ECCENTRIC LOADING ON MASS AND FUNCTION IN WOMEN

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INTRODUCTION: Unilateral resistance training affects both the trained and non-trained contralateral limb, known as cross-education effect (CE). Notably, resistance training involving accentuated eccentric loading have been shown to induce greater CE than traditional concentric-eccentric training. However, this effect has predominantly been studied in men, and its presence in women remains unknown. Thus, we investigated the effects of submaximal and supramaximal (i.e., eccentric loads above 100% of the one-repetition maximum [1-RM]) accentuated eccentric training on changes in lean mass and muscle function of trained (TL) and contralateral non-trained (NTL) legs in well-trained women.

METHODS: Thirty physically active female university students were randomly assigned of two training groups or a control group (n=10/group). Participants in the training groups performed dominant leg isotonic training twice a week for 10 weeks (four sets of eight repetitions). Isotonic resistance was generated by an electric-motor device at two different percentages of 1-RM for the eccentric phase; 90% submaximal load, SUB group) and 120% (supramaximal load, SUPRA group). Concentric load was the same for both groups (30% of 1-RM). Changes in total thigh lean mass (TTLM), unilateral leg-press 1-RM, local muscle endurance (XRM), muscle power at 40 (P40), 60 (P60) and 80% (P80) of the 1-RM, and countermovement unilateral vertical jump height (CMJ) before and after training were compared between the groups and between TL and NTL.

RESULTS: NTL 1-RM (11.2 and 14.2%) and P40 (9.6 and 12.7%) increased significantly ($p<0.01$) in both SUB and SUPRA groups, respectively; without significant differences between groups. In addition, the SUPRA group showed significant ($p<0.05$) increases in TTLM (1.7%) and P60 (14.8%) in the NTL. With significant correlations between TL and NTL changes for 1-RM, CMJ and TTLM. However, significant differences ($p<0.05$) between TL and NTL changes were observed for 1-RM (CE: 53.2%) and P40 (CE: 55.1%) in the SUB group, and for TTLM (CE: 18.0%) in the SUPRA group. No changes in any variable were found for the control group.

CONCLUSION: Unilateral accentuated eccentric loading promoted significant changes in strength and mechanical power in the NTL in women. Both submaximal and supramaximal protocols produced similar neuromuscular adaptations in both the TL and NTL, suggesting that strong CE effects were induced by eccentric-overload training. Supramaximal loading significantly increased mechanical power with moderate loads and increased TTLM in both legs.

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DOES VITAMIN D STATUS AND RISK OF MALNUTRITION AFFECT THE IMPROVEMENT OF BODY COMPOSITION AND FITNESS IN OLDER PEOPLE DURING A 6-MONTH MULTICOMPONENT TRAINING?

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INTRODUCTION: Ageing is associated with the impairment of health and functional capacity driving frailty, while exercise and nutritional interventions seem to be effective for preventing and managing frailty status. Thus, the main aim of our study was to analyse whether physical fitness and body composition respond differently in older people with altered vitamin D and nutritional status during a 6-month multicomponent exercise training (MCT).

METHODS: The sample consisted of 32 old adults (mean age: 81.8 ± 6.3 years old; 23 women) who underwent 6 months of supervised MCT, including strength, endurance, balance, coordination and flexibility exercises, at 3 days a week. Participants were divided into those who had sufficient serum 25(OH)D levels (≥30 ng/mL) and were well nourished (Mini Nutritional Assessment (MNA) >23.5 points)(VitD group; n=11), and those who were at risk of malnutrition (MnR) (MNA 17–23.5 points) and had deficient/insufficient 25(OH)D levels (<30 ng/mL)(LowVitD+MnR group; n=21). Malnutrition was assessed using the MNA questionnaire and vitamin D levels were measured using fasting blood samples. Physical fitness was measured by the following tests: 2.45 m up-and-go test, the chair stand test, the arm curl test, handgrip strength and the 30-m walk test. Fat-free mass was assessed using a portable bioelectrical impedance analyzer. Three assessments were made: at baseline, after 3 months of training and at the end of the MCT (6 months).

RESULTS: Both groups showed significant differences over time in the 2.45 m up-and-go test, the chair stand test, the arm curl test, and the 30-m walk test ($p<0.05$; r ranged from 0.37 to 0.62). In addition, only VitD group showed a significant increase in fat-free mass (kg) from baseline 40.5(37.3-59.5) to the end of MCT 43.7(39.4-63.6) ($P<0.05$; r was 0.57). There were no significant differences between groups in any of the variable studied ($p>0.05$; r ranged from 0.01 to 0.27).

CONCLUSION: These results are consistent with the study performed by Bell et al. (1), in which participants who trained and took micronutrient and macronutrient supplements showed greater improvements in body composition assessments. In conclusion, being well nourished and having adequate levels of serum 25(OH)D could help to achieve greater improvements in body composition with MCT training.

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A SHORT DURATION STRENGTH TRAINING INTERVENTION IMPROVES FRAILTY AND FUNCTIONALITY IN OLD WOMEN

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INTRODUCTION: Frailty in older adults entails a high personal and healthcare cost due to its association with dependency, hospitalization, and mortality1,3. Skeletal muscle is a fundamental pillar for maintaining physical function and autonomy1,2,3. We aimed to implement a short-duration strength training program to improve functional parameters and delay frailty in community dwelling old individuals.

METHODS: This study involved 15 adult female patients over 65 years of age (72.8 ± 4.3 y). The training program lasted six weeks (twice a week) and included two lower limb exercises (leg press and knee extension). The Comitte on Ethics in Reseach from INCLIVA granted ethical approval. A battery of baseline (n=15) and post-intervention (n=6) assessments was performed, including body composition (bioimpedance, ultrasound, DEXA), muscle strength, local muscular endurance, and functionality (frailty, FallSkip, 6-minute walk test). Statistical analysis was conducted using a paired t-test to compare means before and after the intervention.

RESULTS: Our intervention improved lean mass measured by multifrequency bioimpedance (19,7±2,1 baseline vs 20,3±2 kg, post-intervention, p=0,033), 2/3 of the quadriceps ecography (1,64±0,2 vs 2,1±0,3 cm, p=0,022), leg press strength (163,4 ± 72,5 vs 270,4± 122,3% relative to body weight, p=0,04), and knee extension strength (49,8± 15,4 vs 73,1± 22% relative to body weight, p=0,02). Among the patients who completed the intervention (n=6), highlights the following: according to the self-reported FRAIL questionnaire, two of the three pre-frail patients improved to a robust state. According to Linda Fried's frailty phenotype, two out of two frail individuals improved to a pre-frail state, and one out of one pre-frail individual improved to a robust condition. According to the SPPB test, one of three pre-frail individuals improved to a robust state. From the FallSkip test, the only patient with a high risk of falls, reverted to a moderate risk condition.

CONCLUSION: We believe that this study and its continuation are essential for further strengthening the foundations of exercise as a specific and effective tool in the fight against frailty and physical dependency in women, with or without comorbidities.

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PRESENTACIÓN DE PÓSTERES / POSTER PRESENTATION

FRIDAY, DECEMBER 13, 2024

12:00 - 12:30 H

Presentación de pósteres 1 / Poster presentation 1 - PP01

PP01 - FISIOLOGÍA DEL EJERCICIO I / EXERCISE PHYSIOLOGY I **12:00 - 12:30 h**

RELATIONSHIP BETWEEN LACTATE CLEARANCE RATE AND VENTILATORY THRESHOLDS AFTER A WINGATE TEST

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INTRODUCTION: The ability to maintain performance in fatigue conditions is a determinant factor in endurance sports. Power output at the moderate-to-heavy intensity transition decreased after moderate-intensity cycling (1,2). It is known that high-intensity efforts induce a greater fatigue (3). However, the magnitude of exercise thresholds decline with acute fatigue is less studied. Blood lactate concentration [La] after a maximal 30-sec Wingate Test remains elevated (4) making difficult to determine lactate thresholds in a subsequent Graded Exercise Test (GTX). The purpose of this study is to determine a new lactate thresholds determination technique in a GXT when prior [La] is high.

METHODS: 13 participants performed a 30-sec Wingate test and a GXT followed by 10 minutes. GXT was performed in a cycle ergometer (Phantom 5, CycleOps, Madison, Wisconsin, USA). The GXT started with a 2-min warm-up at 100 W, followed by step increases of 25 W every 2 minutes until exhaustion. During the GXT, [La] at the end of every step and VO2 were measured. Blood lactate removal index (BLRI) during GXT was calculated according to the formula:

$$BLRI(\%\times min\text{-}1)=([La]StepB-[La]StepA/[La]StepA\times 100\%)\div \Delta T$$

First ventilatory threshold (VT1) and second ventilatory threshold (VT2) were determined using the criteria of the first and second increase in ventilatory equivalent of oxygen (VE/VO2), respectively. First lactate threshold (LT1) was determined by two assessments: 1) [La]Min: lower lactate concentration and 2) BLRIMax: higher BLRI, during GXT. Second lactate threshold (LT2) was assessed as the power where BLRI changes its tendency from lactate removal to appearance (BLRIinflexion)

RESULTS: BLRIMax presents a significant positive moderate correlation with VT2 and ($r=0.654;p<0.05$). No significant correlation was found between [La]Min and VT2 ($r=0,552;p>0.05$). BLRIinflexion presents a significant positive strong correlation ($r=0.849;p<0.001$) with VT2. The mean bias for VT2 predicted from BLRIinflexion was 0.306 W/kg (95%LOA:−0.187 to -0.799).

CONCLUSION: BLRIinflexion is a good predictor of VT2 during a GXT with high prior lactate concentration. However, VT1 is more difficulty determined by [La] measurements in these conditions.

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Abstracts were prepared by the authors and printed as submitted.

THE GENETIC OF MUSCULAR STRUCTURE IS RELATED TO PERFORMANCE IN SPANISH MOUNTAINEERING SKIERS

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INTRODUCTION: Ski mountaineering (Skimo) has its origin in the 10th century in Norway, where it was used as a means of travel in harsh winters. The discipline consists of climbing mountains on skis or carrying them and then descending on skis. Competitive Skimo are timed racing events that follow an established trail through challenging alpine terrain while passing through a series of checkpoints. The recent evolution of this sport has generated an increase in scientific interest with the aim of determining the best performance factors (1). The high training load in combination with exposure to challenging competition conditions makes us consider it important for performance in this sport to study the factors associated with muscular structure and muscular health of the athletes, in particular, the genetic aspects. Therefore, the purpose of this study was to analyse whether a genetic profile related to muscle structure, muscle repair, and the surrounding extracellular muscle matrix can have an impact on the level of performance (sporting status) of Skimo athletes from the Madrid selection.

METHODS: 19 skiers from the Madrid Mountaineering Federation were evaluated. The sporting status score was determined by the sum of the four races of the Spanish Cup 2024 (two vertical and two individual). Points were awarded based on the race finishing position (i.e. 100 points: 1st place; 90 points: 2nd place; 81 points: 3rd place...). The muscle structure-related genetic profile that included ACTN3 rs1815739, DCN rs516115, GEFT rs11613457, MMP3 rs679620, COLA51 rs12722 and IL6 rs1800795 variants was studied by PCR-Q with predesigned Taqman™ Genotyping Assays. A total genotype score (TGS) was calculated attributing a value of 2 to the most favorable genotype for endurance according to the literature, a value of 1 for the intermediate genotype and a value of 0 for the least favorable genotype.

RESULTS: The TGS was significantly positively correlated with the sporting status score (Spearman's Rho = 0.647 [high correlation]; p = 0.002). Interestingly, the sporting status score was not correlated with the number of years of practice (p = 0.830) nor with the hours of training per week (p = 0.364).

CONCLUSION: Our results showed that genetic polymorphisms related to muscle structure could represent an important factor in performance in Skimo athletes and could be more important than practice experience or training load in this population.

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INCIDENCE, TYPE, AND LOCATION OF INJURIES IN SOCCER REFEREES: A SYSTEMATIC REVIEW WITH META-ANALYSIS

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INTRODUCTION: Referees play a crucial role in ensuring the proper conduct during football competitions. Despite their critical role, referees are subjected to significant physical and psychological stress (1), making them susceptible to injuries (2,3). However, there is a lack of systematic reviews with meta-analyses that have examined the incidence, types, and locations of injuries among football referees. OBJECTIVE: This systematic review and meta-analysis was to determine the incidence of injuries, the most common type of injury and anatomical locations in male football referees and assistant referees during training and matches.

METHODS: A literature search was conducted through three different databases: SPORTDiscus, Medline and Web of Science were searched to September, 2024. Eligible studies were required to report either the incidence rate or injury prevalence among the surveyed referees or provide sufficient data to calculate these variables using standardized equations. Observational studies, both retrospective and prospective, as well as controlled trials were selected. The PRISMA framework was used to formulate eligibility criteria.

RESULTS: The database search yielded 1603 search entries and finally six studies were included in both the systematic review and the meta-analysis. A higher incidence of injuries was observed in main referees compared to assistant referees with 5.02 (95% CI: 3.09 – 8.17) in main referees and 3.49 (95% CI: 1.90 – 6.39) in assistant referees during matches. A higher incidence of injuries was observed in tournaments compared to regular league matches (6.01 (95% CI: 3.45 – 10.48) for main referees and 4.14 (95% CI: 2.22 – 7.71) for assistant referees). Additionally, muscle injuries were the most common type for both groups, being 2.01 injuries/1000 hours of match exposure (95% CI: 1.11–3.62), followed by tendon and ligament injuries (1.37 (95% CI: 0.62 – 3.01) and 0.93 (95% CI: 0.55 – 1.59) respectively). Most of injuries were located in the legs (1.82 injuries/1000 hours (95% CI: 0.97–3.42), ankle (0.85 (95% CI: 0.44 – 1.67) and thigh (0.56 (95% CI: 0.29 – 1.08)).

CONCLUSION: Football referees, especially main referees, face notably high injury rates, particularly muscle, tendon and ligament injuries. The higher injury rates in main referees compared to assistant referees may be due to greater physical demands. Practical applications include designing customized training regimens that emphasize strengthening muscle groups in the lower limbs.

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IMPROVEMENTS IN OXYGEN CONSUMPTION AT VENTILATORY THRESHOLDS ARE LIMITED BY ITS PROXIMITY TO VO2MAX

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INTRODUCTION: It is traditionally assumed that in order to conduct high-intensity sessions, it is necessary to develop an "aerobic base" (1). However, this statement does not appear to be supported by scientific evidence. In fact, the best approach to obtain the maximum development of the oxygen consumption at the ventilatory thresholds 1 (VO2VT1) and 2 (VO2VT2), and maximum oxygen uptake (VO2max) remain poorly understood. The purpose was to determine whether the threshold position [VO2VT1 and VO2VT2 relative to VO2max (%VO2maxVT1 and %VO2maxVT2, respectively)] before training was associated with the improvement with training in VO2VT1 and VO2VT2 (ΔVO2VT1 and ΔVO2VT2). Additionally, to determine whether VO2VT1 and VO2VT2 before training was associated with the improvement with training in VO2VT1 and VO2VT2 (ΔVO2VT1 and ΔVO2VT2).

METHODS: Fourteen males (20±1.9years; 68.6±1.9kg; 70.9±5.5ml/kg/min) performed an incremental test before and after the first three-month mesocycle of the season. The test started with 1 min at rest, followed by 3 min warm up at 50 W. Consequently, the load increased 5 W every 12 s until task failure. Expired gases were measured using a gas exchange analyser (Jaeger Oxycon Pro, Germany). VT1 and VT2 were determined as previously described (2). The following variables were measured: VO2VT1, VO2VT2, VO2max, %VO2maxVT1 and %VO2maxVT2. The difference in VO2VT1, VO2VT2, %VO2maxVT1 and %VO2maxVT2 before and after the training program (ΔVO2VT1, ΔVO2VT2, Δ%VO2maxVT1 and Δ%VO2maxVT2, respectively) was calculated.

RESULTS: ΔVO2VT1 was inversely correlated with %VO2maxVT1 before training (r=0.584; p=0.028) and ΔVO2VT2 with %VO2maxVT2 before training (r=0.54; p=0.046). In contrast, ΔVO2VT1 was not correlated with VO2VT1 before training (r=-0.497; p=0.071) nor ΔVO2VT2 with VO2VT2 before training (r=-0.091; p=0.758).

CONCLUSION: The key finding is the inverse relationship between %VO2maxVT1 and %VO2maxVT2 before training with the improvements with training in VO2VT1 and VO2VT2, respectively. That is, those individuals with a lower threshold position before training, suffered a greater improvement with training in oxygen uptake at thresholds, regardless VO2VT1 and VO2VT2 before training. It seems that VO2max limits the improvements in VO2VT1 and VO2VT2 in those individuals with a higher %VO2maxVT1 and %VO2maxVT2 before training (ceiling effect of VO2max on VO2VT1 and VO2VT2). As a practical application, we can say that the threshold with a lower position (i.e., lower %VO2maxVT1 or %VO2maxVT2) should be prioritized, independently of the oxygen consumption at thresholds (VO2VT1 or VO2VT2).

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ANTHROPOMETRIC AND NEUROMUSCULAR CHARACTERISTICS DIFFER BETWEEN ELITE, SUB-ELITE, AND AMATEUR FEMALE VOLLEYBALL PLAYERS

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INTRODUCTION: Volleyball is a court-based team sport characterized by high-intensity, short-duration explosive movements like jumps and blocks that are repeatedly executed during offensive and defensive actions in training/matches (1). Furthermore, anthropometric (2) and neuromuscular characteristics (3) play a significant role in determining volleyball performance, with limited evidence available for female volleyball players. The aim of this study was to compare anthropometric and neuromuscular characteristics across different competitive levels (i.e., elite, sub-elite, and amateur) among female volleyball players.

METHODS: Sixty-one female players (22.9 ± 5.4 years) participating in the First (elite), Second (sub-elite), and Third (amateur) Spanish Volleyball Divisions took part in this study. Participants underwent anthropometric assessment and a neuromuscular testing battery consisting of standing spike, jumping spike, countermovement jump, squat jump, maximal spike jump, isometric handgrip test, modified agility t-test, and star excursion balance tests.

RESULTS: In terms of anthropometric measurements, elite female volleyball players were significantly heavier compared to sub-elite female players ($p = 0.033$; $\eta p^2 = 0.11$) and taller than sub-elite and amateur female players ($p < 0.001$; $\eta p^2 = 0.31$). Regarding neuromuscular performance, elite female volleyball players had faster standing and jumping spike velocities than sub-elite and amateur counterparts (p= <0.001; ηp2= 0.31-0.36), maximal spike jump (i.e., vertical jump) than amateur (p= <0.001; ηp2 = 0.31), had greater isometric handgrip strength than sub-elite (both sides) and amateur (only non-dominant side) (p = <0.001-0.005, ηp2= = 0.17-0.23), while sub-elite had quicker modified agility t-test performance than amateur (p = <0.001, ηp2= = 0.21). Finally, referring to dynamic balance significant differences were reported between elite versus sub-elite and amateur female players in posteromedial and posterolateral values (dominant and non-dominant sides) (p = <0.001, ηp2= = 0.26-0.31), while differences in anterior values (dominant/non-dominant) were reported in sub-elite comparing amateur female volleyball players (p = 0.004, ηp2= = 0.15-0.17).

CONCLUSIONS: Anthropometric measurements and neuromuscular aspects such as hitting velocity and jump height while spiking, handgrip strength, and dynamic balance were key characteristics that distinguished elite players from sub-elite and amateur female volleyball players.

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EFFECTS OF THE RESISTANCE TRAINING MODALITY ON MUSCLE ACTIVATION

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INTRODUCTION: Traditional studies comparing free weights and machine-based training highlight greater acute muscle activation with free weights (1). These studies have limitations, such as using the same absolute weight instead of relative weight, lack of control over the range of motion, and insufficient information on variables like repetition speed and joint positioning. Therefore, a more rigorous methodological design is needed to draw clear conclusions about the differences between both modalities.

METHODS: Five trained males completed an experimental design composed by 10 sessions. During the first sessions, subjects completed a loading incremental test in the free-weight and machine-based modalities. The individual load-velocity relationship resulting from these tests allowed us to identify the target velocity for performing sets to muscular failure (nRM) at 65%, 75% and 85% 1RM. Throughout the nRM tests, concentric phase muscle activity was recorded in 8 muscles of the upper body (for BP) and 10 of the lower body and trunk (for SQ). To examine the effect of intraset fatigue on such muscle activation, the repetitions completed in each nRM test were divided into 3 thirds: 1st third (low fatigue), 2nd third (medium fatigue) and 3rd third (high fatigue).

RESULTS: For SQ, significant differences were found in favor of SQFree for the tibialis anterior (6/9 conditions, ES = 1.41 to 3.74) and biceps femoris (4/9 conditions, ES = 1.34 to 2.34), as well as in favor of SQMachine for the gastrocnemius (1/9 conditions, ES = -1.56).In the BP, significant differences in favor of the BPFree were observed for the medial (3/9 conditions, ES = 1.36 - 2.36) and lateral (1/9 conditions, ES = 2.62) triceps heads.

CONCLUSION: Our results are in line with Escamilla et al. (2), who reported greater hamstring activity during SQFree. However, they differ with Clark et al. (3), who found higher activity in the rectus abdominis between SQFree and SQMachine (ES ≥ 0.42), although these authors also found a clear superiority of SQFree in maximizing the activation of the spinal erectors (ES ≥ 0.50). Aside from biceps brachii, our findings agree with McCaw et al. (4), who reported greater activity during the concentric phase of BPFree compared to BPMachine. In conclusion, these findings suggest that the modality of resistance training meaningfully influences muscle activation, especially at high intensities and levels of fatigue.

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IMPACT OF THE FLIPPED CLASSROOM MODEL ON ACADEMIC PERFORMANCE AND MOTIVATION IN THE PRACTICAL CONTENT OF THE SUBJECT "MUSCULACIÓN, MÉTODOS DE ENTRENAMIENTO EN SALA DE PESAS"

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INTRODUCTION: The Flipped Classroom (FC) model focuses on pre-class tasks and guided discussions during in-person sessions. Its implementation has been shown to enhance autonomy, critical thinking, and digital skills, as well as foster collaborative work, contingent on student and teacher engagement(1). By allowing students to acquire foundational knowledge beforehand, this approach optimizes classroom time for problem-solving(2). Previous applications of this methodology in subjects such as Biomechanics have improved academic performance compared to traditional methods by strengthening learning dimensions (knowing, understanding, applying, and analyzing)(3). The aim of this study was to analyze the impact of the FC method compared to traditional approaches in practical topics related to the subject "Musculación, Métodos de Entrenamiento en Sala de Pesas" and its effect on students' academic performance and motivation.

METHODS: The FC model was implemented during the 2nd semester (2S) of the 2023-2024 academic year of the Physical Activity and Sport Sciences Degree of the Universidad Politécnica de Madrid (UPM), where videos were created for the most complex practical lessons, to be watched prior to in-class activities. This model was compared with the traditional teaching method used in the 1st semester (1S). A total of 58 students (18%females; 22.5±1.8 years) participated in the project (G1=31 for 1S and G2=27 for S2). Academic performance in practical content was assessed through the same exam in both semesters, while motivation was measured in G2 students using an ad hoc questionnaire administered at the end of the intervention.

RESULTS: Academic performance was similar in both groups (G1:7.9±1.3; G2: 8.1±1.5 points, p=0.245). Regarding the interest in the approach, 92.3% of students found it interesting or very interesting, 61.5% felt it significantly or very significantly improved their learning, and 66.7% believed they learned faster and more actively compared to traditional methods. Additionally, 84.6% of students felt that this methodology adapted to their learning pace, expressing a stronger affinity for the FC model. Moreover, 61.5% reported feeling motivated or very motivated with this type of methodology.

CONCLUSIONS: The results suggest that the FC model can foster high levels of motivation and interest among UPM students while maintaining similar academic performance to traditional methods. This teaching approach may serve as an effective alternative in practical university subjects like "Musculación, Métodos de Entrenamiento en Sala de Pesas," providing students with an engaging and adaptable learning experience without compromising their academic outcomes.

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PREFERENTIAL LEARNING STYLES AMONG STUDENTS OF THE BACHELOR IN PHYSICAL ACTIVITY AND SPORT SCIENCES. AI-A PROJECT

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INTRODUCCIÓN: During the teaching-learning process, the way of presenting the contents can be more or less attractive to the student depending on their preferred learning style (PLS), influencing their motivation to study1,3. The AI-A project seeks to explore the effect of adapting the contents to the PLS of each student to prepare flipped-classroom classes. The aim is to identify and analyze the PLSs among the students of the Bachelor in Physical Activity and Sports Sciences (PASS) at the Universidad Politécnica de Madrid (UPM).

METHODS: The VARK questionnaire with license for research purposes was used to determine the students' PLS. The four core learning styles in this questionnaire include visual (V), aural (A), read/write (R), and kinesthetic (K)2. All volunteers signed an informed consent before completing the questionnaire in the first class sessions of each subject. The project was implemented in several subjects taught by the Department of Health and Human Performance in all academic years, providing a global representation of the Bachelor's Degree.

RESULTS: Responses were collected from 592 students (29.7% female). Most participants showed a bimodal PLS (57.1%), with AK (70.4%) and VK (19.5%) being the most frequent, while 39.2% showed a monomodal preference, being K the predominant style (94.1%). Similar results were obtained when analyzing the data by sex. In all cases, the percentage of students with no K-component was under 10%, while students with an R-component were less than 7%. The number of respondents varied depending on the subject, being Human Anatomy (33.4%), Human Physiology (23.3%) and Exercise Physiology (26.9%) those with the highest representation. Despite this, the distribution of students did not show differences in terms of distribution by sex or PLS

CONCLUSIONS: Among the students of the Bachelor in PASS at the UPM, the predominant PLS are bimodal AK and K. Teachers might consider the AK PLS in the preparation of classes and complementary materials, emphasizing oral communication and the design of their slides during their lectures. As for the high prevalence of PLS K, it would be necessary to emphasize practical activities throughout the mentioned Bachelor´s Degree to increase students' motivation to study. Providing text-heavy materials does not seem to be the best option to reinforce the learning process.

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EMPLOYMENT AND SPORTS SITUATION OF STUDENTS OF THE DEGREE IN PHYSICAL ACTIVITY AND SPORTS SCIENCES

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INTRODUCTION: The level of absenteeism and lack of commitment (1-3) of the students that is being experienced currently at the University is worrying the professors of the Department of Health and Human Performance, of the Universidad Politécnica de Madrid (UPM), who teach in the Bachelor's Degree in Physical Activity and Sports Sciences. Therefore, the objective of this work was to find out, within the AI-A project (Flipped Classroom Adapted to Learning Styles), an educational innovation project (IE24.1102) submitted to the 2023-2024 call for "Educational innovation and teaching quality improvement projects" of the UPM, about possible factors which are affecting the learning process of university students.

METHODS: 586 students (29.9% women) of the Bachelor's Degree in Physical Activity and Sports Sciences (first course n=187, second course n=177, third course n=143 and fourth course n=79), enrolled in subjects taught by the Department of Health and Human Performance of the UPM, were asked about their High School Certificate, current sport practice and if they combine their studies with a paid employment, by means of an online questionnaire. A descriptive analysis was carried out.

RESULTS: 45.6% studied the Science and Technology Baccalaureate, 42.2% the Humanities and Social Sciences Baccalaureate, 5.8% the General Baccalaureate, 5.5% other types of Baccalaureates and the remaining 1% the Arts Baccalaureate. Furthermore, 37% of them come from a vocational training degree. 55.5% combine their university studies with an employment. The main reasons for working were: "To expand my training" (31.1%), "I like it" (29%), "Economic reasons" (23.7%), "I already worked previously" (21%), "I want to set up my own company" (6%) and "other reasons" (1.2%). Furthermore, 60.9% train within a sport club or federation.

CONCLUSION: UPM students of the Bacherlor's Degree in Physical Activity and Sports Sciences show a diverse knowledge background according to the Baccalaureate they obtained at High School. More than half are employed, which probably influences the level of commitment they can achieve, in terms of time availability. As a practical application, this valuable information can be decisive for the organization of teaching by professors and those responsible for coordinating the training provided in this Bachelor's Degree, with the aim of ensuring the adequate acquisition of the skills determined by the Study Plan.

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A SCOPING REVIEW OF THE RELATIONSHIP BETWEEN NEUROCOGNITION AND THE RISK OF ACL INJURIES IN ATHLETES

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INTRODUCTION: ACL injuries could be considered through a neurocognitive lens, not only as a neuromuscular or biomechanical deficit (1,2), so that neurocognitive deficits may contribute to injury risk (3). This scoping review aims to summarize and map existing evidence about neurocognitive principles in the injury risk of ACL injuries in athletes.

METHODS: Six databases were searched and studies were included when containing participants who take part in any sport and investigated cognition principles or approaches associated or correlated with ACL injury risk. Author and year, characteristics of participants, objectives, measured variables and results were summarized.

RESULTS: A total of 9 articles were scoped. The majority of studies are based on mixed assessment (cognitive and biomechanical measures) (n=7) and higher-level cognitive functions, specifically inhibitory control and working memory, appear to be the main cognitive domains that are usually assessed (n=5 and n=4, respectively).

CONCLUSION: Emerging evidence about neurocognitive principles is appearing in the injury risk of ACL injury in sports. This factors should begin to be introduced by practitioners into their daily practice. It could represent valuable information for physiotherapists, rehab fitness coaches and strength and conditioning coaches, who may begin to adapt their strategies to reduce the risk of this type of injuries and preventive programs in athletes.

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ACUTE EFFECTS OF MECHANICAL PROPERTIES OF THE QUADRICEPS AFTER A HIGH INTENSITY STRENGTH

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INTRODUCTION: Maintaining an upright body position involves multiple sensory inputs: gravity, body segment interrelations, surface support, and environmental objects (Gurfinkel et al., 2006). Muscle tone, influenced by non-neural and neural factors, is crucial for postural control (Ganguly et al., 2021). Tools like mechanomyography and elastography now measure muscle tone changes objectively (Roch et al., 2020). This study compares muscle mechanical properties before and after high-intensity exercise bout and examines their recovery over time.

METHODS: Sixteen physically active male volunteers (age 24.6 ± 6.37 years; height 1.75 ± 0.05 m; weight 70.5 ± 7.28 kg and BMI 23.1 ± 1.23kg/m2) performed 18 maximal voluntary contractions in 10-second isometry, with 5 seconds of rest between each repetition. Following the 18 contractions, the mechanical properties of the Vastus Medialis, Vastus Laterallis and Rectus Femoris were measured through MyotonPro to evaluate muscle tone, stiffness, elasticity, relaxation time and creep. Within-subjects analysis was evaluated using a linear mixed effects model to evaluate changes in muscle properties over time (significance set at $p<0.05$).

RESULTS: In relation to force, there was a significant decrease in the peak maximum force 479±99,2N vs. 215±77,9N; ($p<0.001$) and RFD 150-300ms 961±365N/s vs. 407±188N/s; ($p=0.002$), without observing significant differences in Impulse and RFD 0-150ms. Muscle tone, stiffness ($p<0,05$) and elasticity ($p<0,001$) increased significantly, whereas relaxation time ($p<0,001$) and creep ($p<0,001$) decreased after the protocol, indicating an internal restructuration over time.

CONCLUSION: The acute response showed a decrease in peak maximum force and RFD 150-300ms and an increase in muscle tone. These findings suggest that a bout of high-intensity strength exercise enhanced the mechanical properties of the quadriceps. Thus, high intensity strength exercise can be beneficial for people who have muscular hypotonicity and detrimental for people who have muscular hypertonicity.

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PROPOSITION OF OPTIMIZATION OF THE PROTOCOL TO MEASURE THE MAXIMUM STRENGTH OF THE LOWER LIMB WITH THE TAKEI DYNAMOMETER IN CHILDREN WITH PATHOLOGY

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INTRODUCTION: Muscle health is a critical issue in patients with pulmonary disease, especially in children, so it is recommended that lower limb strength be assessed as part of routine medical consultations. Nevertheless, reference protocols for measuring maximum lower limb strength are based on very expensive, heavy, voluminous and complicated equipment, making them difficult to use in a routine consultation. The Takei-5002 analogue dynamometer is a portable and inexpensive alternative to standard equipment. However, traditional measurement protocols involve biomechanically complex and difficult movements for most people, especially children (1), and the need for some knowledge of strength-training. This can lead to incorrect measurements and risk of injury if not performed correctly. OBJECTIVES: For these reasons, our objective in this work was to propose an adaptation of traditional protocols by adding a climbing-harness to the Takei Takei-5002 dynamometer in order to optimise the measurement of maximal lower limb muscle strength using a biomechanically- simple movement. We hypothesise that this movement could allow children with pulmonary disease to reach their maximum strength more efficiently, in safer and better adapted to quick routine medical consultation conditions.

METHODS: 35 evaluations of maximum strength (kg) were performed on the Takei-5002 analogue dynamometer using traditional and harness-adapted protocols in children with CF aged between 6 and 18 years. The harness used was a Mammut Ophir Fast-Adjust®. The harness adaptation consisted of attaching the harness to the dynamometer chain, which transfers the force to the subject's waist. This simplifies movement by isolating recruitment to the hip and knee joints, and releasing stress on the shoulder and spine joints. Measurement was repeated twice for each protocol with 2 min of rest between measurement; the best result of the two attempts was considered.

RESULTS: We observed differences between the two protocols, the harness-adapted protocol allowed subjects to achieve significantly higher strength results than with the traditional protocol (99.603±51.659 kg vs. 60.472±34.318 kg respectively, $p = 0.001$, $d = 0.908$, $n = 290$).

CONCLUSIONS: The proposed adaptation by adding a climbing harness to the Takei-5002 dynamometer allows the participants to obtain significantly higher results of the lower limbs strength. Thus, this adaptation permits more accurate measurement of maximum strength and may facilitates the assessment of lower limb muscles health during routine medical consultation, especially for children with pulmonary disease.

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EFFECTS OF STRENGTH TRAINING DURING PREGNANCY ON MATERNAL WELL-BEING: A SCOPING REVIEW

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I**NTRODUCTION:** Physical activity is known to improve both physical and psychological outcomes in pregnant women (PW), playing a crucial role in managing pregnancy-related symptoms such as low back pain, weight gain, anxiety, and stress. While aerobic exercise (AE) is often emphasized in exercise guidelines for PW owing to its cardiovascular benefits, emerging research suggests that strength training (ST) offers unique advantages, such as increased muscle strength and volume, which may surpass those provided by AE alone. This review aimed to systematically explore the effects and characteristics of ST interventions on the health-related quality of life (HRQoL) of PW, with the aim of providing more comprehensive and specific exercise guidelines.

METHODS: A systematic literature search was conducted using PubMed, Web of Science, and EBSCO Host databases without time restrictions. The inclusion criteria were strictly applied, resulting in a review of nine randomized controlled trials involving a total of 1,395 participants (617 [44.2%] performed a ST program, while 778 [55.8%] received standard care and served as controls).

RESULTS: ST had a significant influence on various physiological and psychological parameters during pregnancy. The primary outcomes included the regulation of gestational weight gain, the prevention of excessive weight gain, and weight retention, both of which were associated with complications such as gestational diabetes, hypertension, and an increased likelihood of cesarean delivery (1). Additionally, ST contributed to overall maternal well-being by reducing the symptoms of low back pain and sciatica (2). Secondary outcomes positively affected by ST include enhanced physical functionality, improved energy levels, emotional stability, mood regulation, pain management, social functioning, sleep quality, and blood pressure control (3).

CONCLUSION: ST programs lasting more than 12 weeks, with 1-2 sessions per week, focusing on exercises that target the muscles of the lower limbs, upper limbs, core, and pelvic floor, performed at moderate-to-vigorous intensity levels, have been shown to significantly improve both primary and secondary outcomes related to the well-being and HRQoL of PW. Despite these promising results, this review highlights the necessity for future research to adopt standardized methodologies and ensure more comprehensive and detailed reporting to strengthen the evidence base.

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PREDICTORS OF GLYCAEMIC AND CARDIORESPIRATORY EXERCISE-INDUCED ADAPTATIONS IN TYPE 2 DIABETES

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INTRODUCTION: Exercise can improve glycaemic control and overall health in individuals with type 2 diabetes mellitus (T2DM) (1). However, the existence of T2DM individuals who do not achieve significant improvements despite exercising, classified as non-responders (2), highlights the need for a deeper understanding of potential predictors of exercise-induced improvements. This study aimed to identify predictors of improved glycosylated haemoglobin (HbA1c) and cardiorespiratory fitness (VO2max) among T2DM participants following a structured exercise programme.

METHODS: Eighty-eight prediabetic/T2DM (HbA1c ≥5.7%), overweight/obese (body mass index 25-35 kg/m2), sedentary adults (35-64 years) were randomly assigned to high-intensity interval training (HIIT, n=47, 22 women) or moderate-intensity continuous training (MICT, n=41, 21 women) with three sessions per week during 12 weeks. HIIT consisted of 10×1-minute cycling intervals at 90% peak power output, while MICT involved continuous cycling at 10% above the first ventilatory threshold for 50 minutes. HbA1c was measured using high-performance liquid chromatography (ADAMS-A1c-HA-8180V, Arkray). Using an open-gas circuit analyser, VO2max was assessed via an incremental cycling test until voluntary exhaustion. Potential baseline predictors, including age, sex, body mass, body fat (measured by bioimpedance), and blood biochemical parameters (Alinity CI system, Abbott Laboratories), were evaluated. Participants were classified as responders if they achieved >5% improvement in HbA1c (3) (n=21, 45%, for HIIT, n=15, 37%, for MICT) and >20% improvement in VO2max (n=17, 36%, for HIIT; n=9, 22%, for MICT) (4) after the intervention. Multivariate logistic regressions were employed to identify significant predictors of response (0=non-responder, 1=responder).

RESULTS: In the HIIT group, homocysteine (OR:0.028, 95%CI:0.002–0.337, p=0.005) and thyroid-stimulating hormone (TSH) (OR:0.118, 95%CI:0.027–0.527, p=0.005) were significant predictors of HbA1c changes, while low-density lipoprotein (LDL) (OR:1.026, 95%CI:1.002–1.052, p=0.035) predicted improvements in VO2max. In the MICT group, albumin (OR:0.004, 95%CI:0.000–0.153, p=0.003) and urea (OR:0.889, 95%CI:0.803–0.986, p=0.025) were significant predictors of HbA1c changes, whereas triglycerides (OR: 1.014, 95%CI: 1.001–1.027, p=0.035) predicted improvements in VO2max.

CONCLUSION: In prediabetic/T2DM obese adults, elevated levels of homocysteine and TSH may reduce the beneficial effects of HIIT on HbA1c, while higher levels of albumin and urea appear to decrease the effectiveness of MICT on HbA1c. Meanwhile, prediabetic/ T2DM obese adults with elevated triglycerides may experience greater improvements in VO2max with HIIT, whereas individuals with higher LDL levels might benefit more from MICT.

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PREDICTIVE VALUE OF THE ELBOW FLEXION ISOKINETIC STRENGTH FROM FUNCTIONAL FITNESS TESTS IN ELDERLY

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INTRODUCTION: Elbow flexion strength can improve functional performance in older adults, especially in daily activities (1), allowing for correct prescription of the training programs. Isokinetic dynamometry allows for the precise measurement of muscle strength (2). However, its high cost has led to an increased reliance on functional fitness tests instead (3). Therefore, this study aims to investigate the predictive value of functional fitness tests for elbow flexion isokinetic strength at different angular velocities in elderly.

METHODS: The sample size of this cross-sectional study consisted of 320 participants (241 females and 76 males; age: 69.26±5.62 years). Participants attended the laboratory once. Isokinetic strength was measured using a calibrated Biodex® Multi-Joint System V.4X isokinetic dynamometer. Peak torque (N·m) was recorded for seated-elbow flexion at angular velocities of 180º/s and 60º/s. In line with the study objectives, four of the seven tests of the Senior Fitness Test battery, designed by Riki & Jones, were selected. The tests were performed in the same order and strictly adhered to the guidelines of the Senior Fitness Test manual (4). The tests performed were the following: (I) Up-and-Go Test (UGT); (II) 30-Second Arm Curl Test (30AC); (III) 30-Second Chair Stand Test (30CST); and (IV) 6-Minute Walk Test (6MWT).

RESULTS: Small yet significant correlations were found between all functional tests and isokinetic elbow flexion strength. The strongest correlations were observed between the 30AC and elbow flexion at 180º/s (r=0,29; p<0,01), and the 6MWT at 180º/s (r=0,27; p<0,01) and at 60º/s (r=0,26; p<0,01). There was a significant negative correlation between isokinetic elbow flexion and UGT at 180º/s and at 60º/s (r=-0,19, and r=-0,15, respectively). Significant regression equations including the 30AC, the 30CST, age and sex were found for isokinetic elbow flexion, with similar values for elbow flexion at 180º/s and at 60º/s (R2=0,55 and R2=0,54, respectively).

CONCLUSION: The present study revealed significant, small correlations between elbow flexion isokinetic strength and functional fitness in older adults. An inverse relationship between agility and dynamic balance, as measured by the UGT, and elbow flexion isokinetic strength suggests that higher agility does not correspond to greater elbow flexion isokinetic strength. Additionally, positive correlations between 30AC and 6MWT indicate that these tests may serve as accessible tools for assessing elbow flexion isokinetic strength in older adults when isokinetic devices are unavailable.

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PHYSICAL ACTIVITY LEVEL AS A PREDICTOR OF ATRIAL FIBRILLATION ABLATION SUCCESS. PRELIMINARY RESULTS

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I**NTRODUCTION:** Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia in adults worldwide, with a prevalence of 2-4% and is predicted to increase by 2.3% (1). Catheter ablation of AF is considered its primary treatment, with a 60-80% success rate (2). AF patients who engage in regular moderate or vigorous physical activity (MVPA) have a better prognosis (3). However, there is a lack of evidence regarding the success of catheter ablation depending on regular physical activity (PA) levels.

METHODS: 108 patients (29.6% women) were recruited after undergoing AF catheter ablation. An insertable cardiac monitor was implanted in all patients at the end of the catheter ablation to continuously record the cardiac rhythm and the AF episodes occurring within the first year following the intervention. The PA level after 3 months of the procedure was measured for 2 weeks with an Axivity AX6 triaxial accelerometer.

RESULTS: After a mean follow up of 11±2.5 months, 32 patients (29.6%) suffered AF recurrence with an AF burden (percentage of time in AF) of 8.5±14.9%. Non-AF recurrence patients presented a non-significant trend towards higher levels of MVPA in relative (minutes per day) and absolute (mean acceleration) terms compared to those with AF recurrence (34.8±41.0 vs 26.6.2±25.9 min/day; p=0.564 and 29.4±10.7 vs 26.3±8.9 mG/day; p=0.107). Consistent with previous results, the MX metric (X most active minutes of the day) reflected higher intensity in the non-AF recurrence group (4), than in the AF recurrence group at all computed time periods (2, 5, 10, 15, 30, 60, 120, 480 minutes/day), although differences were not statistically significant (p>0.05).

CONCLUSIONS: Although regular PA appears to be beneficial in preventing recurrence after AF ablation, no significant differences were found between patients who suffered AF recurrence and those who did not. A larger follow-up time would be warranted to determine the potentially significant effect of PA on AF ablation success.

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HANDGRIP STRENGTH DEVELOPMENT AND DIETARY PATTERNS IN CHILDREN: INSIGHTS FROM THE LONGITUDINAL ASOMAD STUDY

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INTRODUCTION: The development of muscular strength during childhood is essential for health. Adherence to the Mediterranean diet (MDA) may influence this process(1). This study examines the relationship between handgrip strength (HGS) and MDA in school children in Madrid over three years following the COVID-19 lockdown.

METHODS: An exploratory descriptive study was conducted using multi-stage random sampling of children aged 7.5 to 12.5 years across three winter seasons (2020-21, 2021-22, 2022-23). HGS (kg) was measured with an analog dynamometer (Takei TKK 5001, GRIP-A, Tokio, Japan). Low strength risk (LSR) was defined as values below the 25th percentile(2). The KIDMED questionnairewas used to classify MDA into three groups: Low (≤ 4), Moderate (< 8), and High (≥ 8). Data were analyzed using Chi-square tests ($p \leq 0.05$) with IBM SPSS Statistics (Version 29.0).

RESULTS: The sample sizes were 384 (year1), 385 (year 3). Data were categorized by sex and age into 4 groups (G1:7.5-9y; G2:9-10y; G3:10-11y; G4:11-12.5y). LSR in boys increased with age, peaking in G4 with 27.5% in year 1, 23.1% in year 2, and 21.9% in year 3 ($p<0.05$). In girls, LSR also increased with age in all samples (NS). Boys in G1 show a reduction in LSR in year 3 compared to years 2 and 1, with no boy risk in year 3, whereas in the other age groups LSR is stable. On the contrary, G1 girls nearly triplicate LSR from year 1 to year 3. Poor MDA (Low+Moderate) was consistently high across most groups. In year 3, boys in G1 had poor MDA rate (76.9%, $x 2=15.413$; $p<0.05$), while girls in G1 had 61.9% ($x 2=8.161$, $p<0.05$). Poor MDA was associated with higher LSR, especially in younger groups (NS). There were no significant changes in LSR over the three years, but MDA showed significant changes over time ($x2=9.617$; $p<0.05$).

CONCLUSION: Although no significant changes were observed in LSR over time, the significant variation in MDA could indicate that higher MDA is associated with higher HGS. Older boys show higher LSR and lower MDA. Girls, while exhibiting lower LSR than boys, showed poor MDA at younger ages, which may impact their long-term strength development. Data indicate the importance of analysing data by sex and age group, even at younger ages.

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PP02 - FISIOLOGÍA DEL EJERCICIO II / EXERCISE PHYSIOLOGY II **18:00 - 18:30 h**

RELATIONSHIP BETWEEN ISOMETRIC AND DYNAMIC STRENGTH IN HANDBALL PLAYERS: ARE THERE DIFFERENCES BETWEEN THE SEXES?

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INTRODUCTION: Previous research has showed the importance of both isometric and dynamic strength in a variety of athletic populations [1, 2]. However, limited research examining the relationship between isometric and dynamic strength in handball. Thus, the aim of this study was to determine the associations between isometric and dynamic strength in handball players.

METHODS: Seventeen male (age: 21.5 ± 3.16 years; height: 183.8 ± 4.55 cm; body mass: 84.9 ± 10.3 kg) and eighteen females (age: 20.8 ± 3.0 years; height: 168.3 ± 6.1 cm; body mass: 68.5 ± 8.5 kg) participated voluntarily in this study. Each player performed 3 trials of the countermovement jump (CMJ) and isometric mid-thigh pull (IMTP) on a previously validated portable force plate [3]. Normality of data was confirmed using the Shapiro–Wilk test. Pearson's r correlation coefficients were used to determine the associations between isometric (e.g., IMTP peak force and peak relative force) and dynamic strength (e.g., CMJ jump height, CMJ peak propulsive force, mRSI, jump momentum) for all players and males and females separately. Pearson's r correlational values were assigned descriptors using the following thresholds: 0.00–0.10 = "very weak", 0.11–0.30 = "weak", 0.31–0.50 = "moderate", 0.51–0.70 = "strong", 0.71–0.90 = "very strong", and 0.91–1.00 = "nearly perfect" [4]. Statistical significance level was set as $p < 0.05$.

RESULTS: CMJ jump height and peak propulsive force showed significant ($p < 0.01$; $p < 0.001$, respectively) and strong to very strong correlations with IMTP peak relative force and peak force when all players were analyzed together ($r = 0.52$; $r = 0.71$, respectively). However, these metrics presented weak correlations when males and females were analyzed separately ($r = 0.34$–0.38; $r = 0.15$–0.33, respectively). Additionally, the jump momentum displayed significant ($p < 0.001$) and very strong correlation with IMTP peak force for all players ($r = 0.86$). The mRSI displayed significant ($p < 0.05$) and moderate correlations with IMTP peak force when males and females were analyzed separately ($r = 0.49$; $r = 0.51$, respectively). In contrast, the CMJ peak propulsive force showed significant ($p < 0.05$) and moderate correlation with IMTP peak relative force only for female players ($r = 0.47$).

CONCLUSION: This study showed that IMTP provides a strong indication of dynamic performance in this population. Also, our results highlighted the importance of achieving high levels of isometric strength to increase performance in a dynamic task.

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A STRENGTH TRAINING MODEL DELAYS FRAILTY IN AGED MICE

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INTRODUCTION: Frailty is a geriatric syndrome that increases vulnerability to stressors and affects multiple physiological systems, including skeletal muscle (1). Resistance training has been shown to reverse muscle mass loss and reduce mortality and cardiovascular disease risk in humans (2). While most studies involving exercise focus on low-intensity, high-volume aerobic training, this study introduces a new strength training protocol for older mice, emphasizing low-volume and high-intensity (3). The aim of this study was to design an individualized strength training protocol adapted to old mice to prevent or delay the onset of frailty.

METHODS: This experimental study involved male C57BL/6 mice (n=7, age: 20.25 ± 0.14 months) undergoing a strength training program for 6 weeks, with sessions held twice a week. The training involved climbing a 180 cm-long, 80-degree inclined ladder with weights attached to their tails. Mice started with 4 sets in the first week and progressed to 9 sets by the last week, with a 5-minute rest between sets. The initial lifting weight was tailored to each mouse and increased based on performance. Functional tests assessing motor coordination, grip strength, maximum oxygen consumption, endurance, inverted strength, and ladder performance were conducted before and after the program. The first three tests, along with body weight loss, contributed to the Valencia Score (4).

RESULTS: There was an improvement in motor coordination (1.07 ± 0.54 vs 1.93 ± 0.77 min) and ladder performance, starting by lifting an average of 110.17 ± 23.99% of their body weight and finished lifting an average of 229.34 ± 24.10%. No significant differences were observed in the other tests. Regarding Valencia Score, there was a 34% of frail population in the beginning whereas at the end it was a 28%.

CONCLUSION: After 6 weeks of strength training, motor coordination and strength were improved, delaying frailty in the aged mice. Moreover, an individualized and adapted strength training protocol was successfully validated in this animal model.

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MUSCLE OXYGENATION RESPONSES DURING ISOMETRIC TESTING IN DIFFERENT LOCATIONS

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INTRODUCTION: Microvascular responses including muscle oxygen saturation (SmO2) are useful to assess internal loads during exercise (1). However, there is a lack of studies discussing SmO2 differences between exercised and non-exercised muscles and body regions (2). Such information has potential to help improve protocols for measurement. Our study aimed to investigate whether exercised muscles have SmO2 responses different of non-exercising homologous and non-exercised body regions during an isometric submaximal exercise.

METHODS: This study included 12 men (age: 25 ± 6 years old and height: 1.75 ± 0.07 m) who performed a unilateral exercise (10 knee extensions without load) as warm-up followed by 3 maximum voluntary contractions (MVC) and 1 isometric knee at 60º extension contraction lasting 45-s at 70% of MVC [IC70%] on a dynamometer (Biodex Multi-joint System Pro). SmO2 (%) was monitored in the exercised and non-exercised legs (non-preferred leg) using portable near-infrared spectroscopy technology devices (Moxy, Fortiori Design, Minneapolis, USA) placed over the muscle belly of both vastus lateralis (VL). SmO2 was also quantified in non-exercised regions by measuring over the triceps brachii (TB) muscle belly. The variation in SmO2 (ΔSmO2) was assessed during the IC70% considering a slide window of 10-s. Differences in SmO2 between exercised and non-exercised regions were verified using statistical parametric mapping applying a one-way repeated-measures ANOVA with paired t-test with Bonferroni post-hoc correction.

RESULTS: ΔSmO2 in the exercised VL (-32.1±14.3 %) consistently differed regarding ΔSmO2 in the other regions (-0.3±9.5 % in TB and 2.5 ±5.5% in non-exercised leg VL) ($p < 0.001$). While ΔSmO2 did not differ between TB and non-exercised VL during the IC70% ($p > 0.05$).

CONCLUSION: The exercise-dependent responses are supported by our results showing that IC70% elicited changes in microvascular responses in the exercised vastus lateralis compared to the non-exercised muscles.

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COL5A1 RS12722 POLYMORPHISM IS ASSOCIATED WITH THE INCIDENCE OF INJURY IN SKIMO ATHLETES. LES-5G STUDY

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INTRODUCTION: Ski mountaineering (skimo) is a winter sport that will be introduced into the 2026 Olympic Games in Milan. This discipline consists of climbing and descending skiing off-piste and requires high demands on physiological capacity (1,2). The increasing popularity of this sport may suggest an increased number of injuries in the future, thus, investigating the risk factors of these injuries could help prevent their appearance. Among the known risk factors for injuries, various genetic variations in genes related to muscle and external matrix structures were associated with an increased risk of injuries in other disciplines (3); however, to our knowledge, no study has been conducted with skimo athletes. Therefore, the objective of this study is to determine whether there is an association between polymorphisms in candidate genes and the incidence of non-contact injuries in Spanish skimo athletes.

METHODS: 19 Spanish skiers aged between 13 and 23 years were analysed. The incidence of non-contact injuries was collected by the medical staff of the Madrid Mountaineering Federation between September 2022 and April 2024. The genotypes of the polymorphisms ACTN3 rs1815739, COL5A1 rs12722, IL6 rs1800795, GEFT rs11613457, MMP3 rs679620 and DCN rs516115 were analysed using Taqman™ Genotyping Assays.

RESULTS: 16 injuries were collected. The median incidence is 0.59 [0.00 – 1.26] injuries per 1000h of practice. A significant difference was found for the polymorphism COL5A1 rs12722, the carriers of the TT genotype had a higher incidence of injury per 1000 h of practice: 2.29±0.97 vs 0,43±0.55 for the CC+CT genotypes carriers, p=0.009, rank-biserial correlation = 0,94 (large effect size). No significant differences were found for the other polymorphisms, nor using genotype score.

CONCLUSION: The TT genotype of the COL5A1 rs12722 polymorphism is associated with an increased risk of suffering musculoskeletal injuries in skimo athletes. This result is in agreement with the current literature. More research is needed to understand the weight of genetics in the risk of injury.

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BONE MINERAL DENSITY REFERENCE VALUES ACCORDING TO SPORT MODALITY. A SYSTEMATIC REVIEW

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INTRODUCTION: Bone mineral density (BMD) is mainly affected by the level of stress to which the bones are subjected. This stress can be in the form of traction by the muscles or in the form of impact (with the ground, with some implements, etc.) (1), following a relationship that the greater the stress, the greater the bone mineral density (without exceeding the threshold of maximum tolerable stress) (1). In addition, an inadequate diet is also associated with the loss of BMD (2). Athletes with low levels of BMD are more likely to have stress fractures and osteoporosis, showing a problem to which trainers should pay attention (3). However, differences in BMD according to sport modalities and sexes remain unclear. The objective of this work was to review the literature to obtain the BMD values according to the sport modality and sex.

METHODS: This systematic review followed the PRISMA methodology (4). A literature search was conducted in three different databases, Scopus, Web of Science and PubMed, by two different authors. The data were then processed using a bibliographic manager (EndNote) and Excel.

RESULTS: After reviewing 4711 registers found for our search query, just 111 publications met the criteria and were included in the systematic review. The results for men showed that bouldering (1,051±0,362gr/cm2), cycling (1,15±0,137gr/cm2) and horse riding(HR) (1,13±0,19 gr/cm2) were the sports with the worst results, while strongman (1,790±0,315 gr/cm2) and American football(AF) (1,575±0,056 gr/cm2) have the highest BMD. In turn, women´s results showed the worst BMD data for athletics (0,964±0,146 gr/cm2), bouldering (1±0,353 gr/cm2) and triathlon (1,05±0,218 gr/cm2). On the other hand, basketball (1,348±0,085 gr/cm2) and resistance training(RT) (1,3±0,198 gr/cm2) had the highest results in BMD.

CONCLUSION: Our results suggest that sports which do not involve impacts (bouldering, cycling, HR, triathlon, etc.), both in men and women, are more likely to have low values of BMD, therefore increasing stress fractures and osteoporosis chances. Further, food restrictions due to weight controls could also worsen the situation of disciplines such as HR (2). On the other hand, sports predominantly based on resistance training (strongman, RT, etc.) together with jumps, change of directions and physical contact (AF, basketball, etc.) show the best results. In conclusion, resistance training and impact training, such us plyometrics, seem to be an effective tool for improving BMD (5).

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GLUCOSA 6 FOSFATO DESHIDROGENASA EN LA FUERZA, ADAPTACIONES MITOCONDRIALES Y SU TRASLACIONALIDAD

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INTRODUCCIÓN: Una de las principales adaptaciones al entrenamiento cardiorrespiratorio en el músculo esquelético es la biogénesis mitocondrial. La mitocondria y su buen funcionamiento está asociado a una buena condición física y de salud. La enzima glucosa 6 fosfato deshidrogenasa es una enzima citosólica limitante en la ruta de las pentosas fosfato. Entre sus funciones destaca la protección frente al estrés oxidativo y la síntesis de diversas moléculas. La evidencia más reciente sugiere implicaciones amplias para la salud, incluido el síndrome geriátrico de la fragilidad y la reparación del daño muscular inducido por ejercicio.

MÉTODOS: Diecinueve mujeres adultas, sanas y jóvenes fueron reclutadas en el estudio. El entrenamiento de fuerza se dirigió exclusivamente a la musculara de las piernas usando, prensa de piernas y extensión de rodilla. Tuvo una duración de 6 semanas con 2 sesiones semanales. Para el análisis de la composición corporal utilizamos: bioimpedancia multifrecuencia, DEXA y la técnica de la ecografía. Para la fuerza muscular, se realizó el test directo del 1RM. Obtuvimos dos biopsias musculares y 2 muestras de sangre periférica antes y después del entrenamiento de fuerza. Utilizando la respirometría de alta resolución (Oxygraph-2k, Oroboros) analizamos la función mitocondrial en mitocondrias aisladas de músculo y en las células mononucleares aisladas de la muestra sanguínea. Por último, determinamos la actividad de la G6PD en los eritrocitos aislados de sangre periférica.

RESULTADOS: Nuestros resultados muestran un aumento muy significativo en la ganancia de fuerza del cuádriceps ($p<0,001$) sin un aumento de la masa muscular. La actividad G6PD sí que aumentó de forma muy significativa ($p<0,001$) tras la intervención con el programa de fuerza de corta duración. Por último, la respiración mitocondrial aumentó muy significativamente tras la intervención tanto en tejido muscular esquelético como en células mononucleares permeabilizadas procedentes de la sangre. Aumento de la respiración mitocondrial en reposo, como la respiración mitocondrial máxima.

CONCLUSIÓN: Nuestros resultados refuerzan la eficacia de la introducción del trabajo de fuerza en adultos jóvenes, pero potencialmente también en el envejecimiento. Este estudio consideramos que tiene un elevado potencial traslacional de cara a la prescripción de ejercicio físico en la población de adultos mayores, especialmente en el caso de individuos frágiles o sarcopénicos por la importancia que tiene el mantenimiento de la fuerza muscular y calidad de vida.

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DELAYING FRAILTY ONSET IN G6PD-TG MICE THROUGH HIGH-INTENSITY MULTICOMPONENT INTERVAL TRAINING

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INTRODUCTION: Frailty is an age-associated syndrome leading to disability, accompanied by a decrease in skeletal muscle mitochondrial function. Physical exercise improves frailty-related parameters including muscle mass and strength. Glucose-6-phosphate dehydrogenase (G6PD), the rate-limiting enzyme in the pentose phosphate pathway, reduces ROS-derived damage concomitant with extended life and health-span in mice (1). Mice overexpressing moderately G6PD (G6PD-Tg) show lower oxidative damage markers along with metabolic and functional improvements (2). This study aimed to assess whether a high-intensity multicomponent interval training (HIMIT) improves functional parameters in old G6PD-Tg mice, and the molecular mechanisms involved, with focus on mitochondrial and immunological pathways.

METHODS: Twenty-seven G6PD-Tg female mice (20-months-old) were randomized into two groups: rest (n=12) and HIMIT (n=15). Mice were trained 5 d/wk (22 m/day) for 10 weeks. All animals were assessed before and after intervention for motor coordination, grip strength, maximal carrying load, endurance, and frailty (3). Skeletal muscle and blood mitochondrial function and immune cell populations were analyzed by flow cytometry and high resolution respirometry (Oroboros Oxygraph-2k respirometer). Independent and paired t-tests were used for comparisons. A value of $p < 0.05$ was considered statistically significant.

RESULTS: We found a training-induced improvement in: (i) motor coordination, (ii) grip strength, (iii) maximal carrying load and (iv) endurance capacity. Furthermore, the percentage of frail mice decreased in the trained group when compared to the control ones. Mitochondrial function analysis revealed a higher activity of complexes I, I + II, maximal respiration and IV in the trained mice vs the resting group. While immune cell population percentages in muscle and blood remained unchanged, trained mice showed higher expression of blood PD-1 and TIM-3 checkpoint inhibitors in NK and NKT. Blood CD8+ displayed higher percentage of PD-1- TIM3- populations.

CONCLUSION: Our results show that our HIMIT protocol improves physical function and delays frailty in old G6PD-Tg mice, which already demonstrated healthspan improvements. This involves improvements in skeletal muscle mitochondrial function and the modulation of the blood immune checkpoint inhibitors PD-1 and TIM-3. A key potential translational finding is that HIMIT provides a robust intervention for frailty by inducing functional and molecular benefits with lower time commitments than other exercise regimens.

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ENTRENAMIENTO PLIOMÉTRICO DE LA FUERZA VS ENTRENAMIENTO DE FUERZA EN EL TREN INFERIOR SOBRE LA SALIDA Y EL VIRAJE DE CROL

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INTRODUCCIÓN: El Movimiento Ondulatorio Subacuático (MOS) está implicado en la fase de deslizamiento del viraje y de la salida en el estilo crol (Navarro-Valdivielso & Oca-Gaia, 2018). El no realizar este gesto, o hacerlo de manera poco eficaz, puede influir en perder una carrera de natación (Cala et al., 2015; Veiga et al., 2022; Yamakawa et al., 2022). Por tanto, el objetivo de este estudio fue analizar la aplicación del método pliométrico comparado con el de fuerza submáxima en la tercera y cuarta fase del viraje y en la fase de impulso y deslizamiento en la salida, en el estilo crol.

MÉTODOS: El presente estudio siguió un diseño pre-post de dos grupos asignados aleatoriamente a una intervención de 4 semanas enfocada exclusivamente en el trabajo de tren inferior: 1) grupo pliométrico, 2) grupo fuerza. Se incluyó un total de 30 nadadores competitivos con edad de 16,73 ± 1,11 años. Se realizó una prueba de 100m en las que se analizó: tiempo total, tiempo parcial, distancia donde el nadador saca la cabeza a la superficie y tiempo cuando la cabeza del deportista pasa por los 15. Para el análisis estadístico de estas variables, se utilizó el programa SPSS, empleando la prueba t para muestras independientes con un nivel de significación estadística de $p< 0,05$.

RESULTADOS: El grupo pliométrico realizó mayor número de movimiento del miembro inferior en el MOS en comparación con el grupo resistencia tanto en el parcial uno (5,33±1,35 vs 4,13±1,35; p=0,02), en el segundo parcial (4±1,41 vs 2,86±0,91; p=0,01), en el tercer parcial (3,20±2,33 vs 1,08±0,89; p=0,020) y en el último parcial (2,93±0,88 vs 1,80±1,26; p= 0.09). Asimismo, en cuanto a los metros de salida de cabeza, el grupo pliométrico es superior al grupo fuerza en el primer parcial (9,86 ± 2,43 vs 8,26 ± 1,86; p=0,05), en el segundo parcial (6,83 ± 1,08 vs 5,80 ± 0,95; p=0,01), en el tercer parcial (6,36 ± 1 vs 5,06 ± 0,59; p=0,00) y en el cuarto parcial (5,9 ± 0,98 vs 4,9 ± 1,03; p=0,01).

CONCLUSIÓN: Los presentes resultados sugieren que el entrenamiento pliométrico, en comparación con un entrenamiento fuerza-resistencia, consigue aumentar el número de MOS durante la salida y los virajes durante una intervención de cuatro semanas.

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FACTORES QUE AFECTAN AL AUMENTO DE MASA MUSCULAR INDUCIDO POR EL ENTRENAMIENTO CON CARGAS

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INTRODUCCIÓN: El entrenamiento con cargas en busca del aumento de la muscular ha demostrado ser clave más allá del fin estético, su relación con el aumento de la fuerza reduce la tasa de mortalidad en aquellos sujetos entrenados con una buena base de masa muscular (1). La masa muscular ha demostrado su implicación en la reducción del riesgo cardiaco (2), su acción como órgano endocrino (3) y cómo su mantenimiento a lo largo de la vida, evitando la sarcopenia, previene problemas asociados al envejecimiento (4). El entrenamiento con cargas ha demostrado ser el método más efectivo y eficiente para favorecer el aumento de masa muscular (5). Esto se debe a en el entrenamiento con cargas se produce una gran tensión mecánica sobre el músculo que es el principal mecanismo del entrenamiento para inducir hipertrofia (6).

MÉTODOS: la revisión narrativa llevaba a cabo busca analizar y sintetizar la evidencia existente sobre los diferentes aspectos que afectan al incremento de la masa muscular relacionado con el entrenamiento con cargas.

RESULTADOS: Los factores que afectan a la hipertrofia son categorizables en tres grandes grupos. Aquellos no modificables o dependientes del sujeto, como serían el sexo y la edad. Los factores nutricionales y de recuperación, relacionados con la alimentación, suplementación, descanso, etc. Por último, las variables de entrenamiento, destacando volumen e intensidad del entrenamiento. Afectado por todos estos factores encontramos al balance energético, factor clave para que se produzca un aumento de la masa muscular.

CONCLUSIÓN: Para un entrenador es indispensable conocer los factores que afectan a la hipertrofia muscular y cómo optimizarlos con cada uno de sus clientes. Conocer cómo afectan los factores no modificables y cómo modular los modificables en función del sujeto y objetivo es clave para poder establecer unas expectativas realistas y conseguir los objetivos planteados en cuanto al aumento de masa muscular se refiere.

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EFECTIVIDAD DE DIFERENTES ESTRATEGIAS DE RECUPERACIÓN NEUROMUSCULAR EN JÓVENES JUGADORAS DE FÚTBOL

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INTRODUCCIÓN: El fútbol es el deporte de equipo más practicado en mundo, con un aumento significativo de jugadoras en la última década (1). Este deporte se caracteriza por la alternancia de actividades realizadas a alta intensidad muy demandantes a nivel neuromuscular, lo que puede generar dolor muscular, disminuciones temporales en el rendimiento y mayor riesgo de lesiones, dificultando la recuperación muscular post-partido (1). Por ello, es crucial desarrollar estrategias de recuperación efectivas, especialmente durante competiciones con tiempos de recuperación limitados (24-48 h) (2). La recuperación activa se considera una vía eficaz para mitigar la fatiga neuromuscular y restaurar los niveles rendimiento (3). Este estudio tuvo como objetivo evaluar la efectividad de tres protocolos de recuperación activa (estiramientos estáticos, automasaje con foam roller y ejercicios de movilidad lumbo-pélvica) durante competiciones con tiempos de recuperación limitados en jóvenes jugadoras de fútbol.

MÉTODOS: Este estudio transversal incluyó 14 partidos oficiales de 90 minutos y 2 sesiones de familiarización. Participaron voluntariamente 22 jugadoras de fútbol sub-17 (16,2±0,6 años, 62,0±3,4 kg, y 166,0±8,2 cm). Se evaluó la altura del salto vertical Abalakov (CMJA) de las jugadoras que jugaron más de 50 minutos, asignándolas aleatoriamente a uno de los tres protocolos. En cada protocolo, se realizaron 3 series de 20 segundos por ejercicio. El CMJA se evaluó 10 minutos después del partido, inmediatamente después de la intervención y 5 horas post-intervención.

RESULTADOS: El análisis Post Hoc mostró mejoras significativas en la altura del CMJA tras los tres protocolos, inmediatamente después de la intervención (media, p valor, y tamaño del efecto [ES]; estiramientos: 0,22 cm, p=0,010, ES=0,63; foam roller: 0,75 cm, p<0,001, ES=1,34; movilidad: 0,89 cm, p<0,001, ES=2,96) y 5 horas después de la intervención (estiramientos: 0,40 cm, p<0,001, ES=0,85; foam roller: 1,38 cm, p<0,001, ES=2,23; movilidad: 1,58, p<0,001, ES=4,17), en comparación con las mediciones previas a la intervención. El protocolo de movilidad lumbo-pélvica mostró resultados superiores en el salto vertical 5 horas después de la intervención en comparación con los protocolos de estiramientos y foam roller (p<0.05).

CONCLUSIÓN: Las tres estrategias de recuperación mejoraron significativamente la altura de salto vertical en jóvenes jugadoras de fútbol. Entre los protocolos evaluados, los ejercicios de movilidad lumbo-pélvica demostraron ser más eficaces en la mejora de la altura del salto vertical y deberían ser priorizados en los tiempos de recuperación post-partido.

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EFFECTS OF AEROBIC EXERCISE, DIET AND MENOPAUSE ON APPETITE HORMONE OF TYPE 2 DIABETIC WOMEN

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INTRODUCTION: Exercise and diet are well-established interventions for type 2 diabetes (T2D) management (1). However, their specific impact on appetite-regulating hormones, such as leptin and ghrelin, in pre- and post-menopausal women with prediabetes and T2D remains poorly investigated (2,3). This study aimed to investigate the effect of two different aerobic exercise programs, a hypocaloric diet, and a combination of them on appetite-related hormone levels in pre- and post-menopausal women with T2D.

METHODS: This randomised controlled trial was conducted with 61 women (35-64 years), with pre-diabetes/T2D (≥5.7 % glycosylated hemoglobin), and overweight/obesity (Body Mass Index=33.39±5.63 kg/m2). Of these, 21 were pre-menopausal (ranging from less than 40 days since their last menstrual cycle to up to 2 years) and 40 were post-menopausal (>2 years since their last menstrual cycle). The 12-week intervention involved six groups with different combinations of exercise (3 days per week) and hypocaloric diet: high-intensity interval training (HIIT), HIIT-DIET, moderate-intensity continuous training (MICT), MICT-DIET, inactive (INACT), or INACT-DIET. HIIT included 1-minute cycling intervals at 90 % peak power output, MICT involved continuous cycling at 10 % above the first ventilatory threshold for 50 minutes, and INACT maintained their usual lifestyle. Diet groups received biweekly 20-minute counselling sessions with a nutritionist. Fasting blood plasma was collected pre- and post-intervention, and the concentration of ghrelin and leptin were measured using multiplex analysis (MILLIPLEX, Germany). To evaluate the changes in appetite-related hormone levels, a mixed factorial ANOVA was conducted to examine the interaction of time*exercise*diet*menopausal status (2x3x2x2) with Bonferroni post-hoc comparisons.

RESULTS: No interaction was found for ghrelin levels. There was a time*diet interaction ($F=14.113$; $p< 0.001$; $\eta p2=0.224$), showing a decrease in leptin from pre- to post-diet intervention within the diet group ($p<0.001$), while the control group increased their leptin levels ($p=0.03$). A time*menopause status*diet interaction ($F=4.432$; $p=0.040$; $\eta p2=0.083$) revealed that leptin levels in premenopausal women following the diet intervention decreased by 52% ($p<0.001$), while in postmenopausal women, leptin levels decreased by 36%, showing a trend towards significance ($p=0.054$).

CONCLUSION: The hypocaloric diet in our study decreased leptin levels in pre-and post-menopausal women with T2D. This suggests that the diet appears to be effective in reducing leptin levels in adult women. This leptin reduction is important as it can enhance insulin resistance, which aids in managing body weight, glucose levels, and cardiovascular risks.

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EFFECTS OF BARIATRIC SURGERY AND WHOLE-BODY VIBRATION ON CARDIORESPIRATORY FITNESS: PRELIMINARY RESULTS OF THE CIR-BAR STUDY

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INTRODUCTION: Cardiorespiratory fitness is regarded as a key indicator of overall health, given its predictive value in terms of both morbidity and mortality. Reducing body weight in people with severe obesity through bariatric surgery could lead to an improvement in peak oxygen uptake (VO2 peak). The aims of the present study were: 1) To determine the effects of bariatric surgery and a whole-body vibration (WBV) intervention on VO2peak, and 2) To ascertain whether similar outcomes are observed when VO2 peak values are expressed in absolute terms, relative to body mass and relative to lean tissue mass (LM).

METHODS: A total of 14 participants (6 males) underwent post-sleeve gastrectomy surgery. They were randomly assigned to complete three WBV training sessions per week for 16 weeks or continue with regular treatment (CG). All participants were required to complete three assessments at our laboratory: one week before the surgery (pre-surgery), 7 weeks post-surgery (post-surgery) and 42 weeks post-surgery (post-WBV). VO2peak was assessed with the Adapted Bruce Protocol on a treadmill. LM was obtained from a Dual energy X-ray whole body scan. Repeated measures ANOVA were performed to evaluate the effects of the surgery and the exercise intervention.

RESULTS: Participants presented an initial BMI of 47.5±4.98 Kg/m2 and were 39.2±10.39 years. No significant differences were found between groups for baseline values (20.5±2.12mL/Kg/min WBV vs. 22.6±2.99 mL/Kg/min CG). No changes were found from pre- to post-surgery when VO2peak values were expressed relative to body mass (0.917mL/Kg/min WBV and 0.525mL/Kg/min CG) or LM (0.038mL/KgLM/min WBV and 0.117mL/KgLM/min CG). Nonetheless, significant decreases were found when VO2peak values were expressed as absolute values (-253.7mL/min WBV and -331.7mL/min CG; both $p<0.05$). When assessing changes from post-surgery to post-WBV significant improvements were found in both groups (5.878mL/Kg/min WBV and 4.033mL/Kg/min CG; both $p<0.05$) when values were expressed in regards to body weight. Nevertheless, these improvements were only maintained in the intervention group when results were expressed as absolute values (178.1mL/min WBV $p=0.05$ vs. -106.2mL/min CG $p=0.304$) or in regards to LM (4.375mL/KgLM/min WBV $p<0.05$ vs. 2.428mL/KgLM/min CG $p=0.116$). Group by time interactions were only found for absolute values.

CONCLUSIONS: A 16-week WBV training program seems to be effective in improving VO2peak in patients that undergo bariatric surgery. However, caution should be exercised when expressing VO2peak in studies involving patients who have experienced significant weight loss, as the selection of different methods to represent VO2peak could yield different results.

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CONFIABILIDAD DE MEDICIONES PERIMÉTRICAS PARA SEGURIDAD EN ENTRENAMIENTO DE FUERZA EN SOBREVIVIENTES DE CÁNCER DE MAMA

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INTRODUCCIÓN: El linfedema en las sobrevivientes de cáncer de mama es una de las complicaciones más estresantes dentro de estas mujeres [1]. Afectando en ámbitos físicos, psicológicos y sociales, disminuyendo la calidad de vida [2]. Transformándose en una barrera para el entrenamiento de fuerza en mujeres con mastectomía, debido al temor de que pueda afectar el brazo en tratamiento [3,4]. Por esta razón, es crucial monitorizar la asimetría entre ambas extremidades, facilitar el diagnóstico y brindar tranquilidad respecto a la implementación del programa de entrenamiento, objetivando además, los posibles beneficios[4].En este contexto, con el fin de garantizar que el programa de entrenamiento de fuerza no afecte la aparición o agravamiento del linfedema en un grupo de mujeres sobrevivientes de cáncer de mama, se llevó a cabo este trabajo. Con el objetivo de evaluar la confiabilidad de las mediciones de perímetros y volúmenes de ambas extremidades para asegurar la fiabilidad de la herramienta en la detección de cambios en el volumen del brazo. Buscando además, confirmar la repetitividad de estas mediciones y establecer la correlación entre los resultados obtenidos mediante volumetría segmentaria y absorciometría de rayos X.

MÉTODOS: Se midió la asimetría de las extremidades superiores en 41 mujeres sobrevivientes de cáncer de mama, con una edad promedio de 62,8±10,9 años, utilizando tres métodos: medición de perímetros (en cuatro oportunidades) y el cálculo del volumen de la extremidad por el método del cono truncado (volumetría segmentaria); análisis de Biompedancia segmentaria (BIA) para evaluar el agua intra y extracelular entre ambos brazos, y se determinó la masa grasa, ósea y muscular de las mismas mediante la absorciometría de rayos X de energía dual (DXA), para luego evaluar fiabilidad y correlación de los métodos de medición.

RESULTADOS: Se observaron valores de ICC altos (0,98-0,997) entre las 4 mediciones de perímetros realizados con cinta métrica y de los volúmenes calculados, así como una alta correlación entre los volúmenes de las extremidades calculados y el agua determinada por BIA. Pero entre las mujeres con linfedema, fue mayor la correlación entre datos entregados por DXA y volumetría segmentaria.

CONCLUSIÓN: Existe buena repetitividad en las mediciones de los perímetros y volumetría segmentaria, junto con mayor correlación entre los resultados dados por la volumetría segmentaria y la absorciometría de rayos X de las mujeres con linfedema.

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ACUTE AND RESIDUAL LOSS OF HAMSTRINGS FORCE-GENERATING CAPACITY AFTER A FLYWHEEL RUSSIAN BELT DEADLIFT EXERCISE

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INTRODUCTION: The Flywheel Russian belt Deadlift exercise has been recently designed to produce active eccentric lengthening contractions, with high loads and long musculotendon lengths. Specifically, it has been proven to trigger a greater activation to the lateral positioning hamstring muscles, i.e., biceps femoris, compared to the medial positioning hamstring muscles, e.g., semitendinosus (1). However, the acute and residual response of hamstrings force-generating capacity after a training session is unknown. Therefore, the purpose was to monitor the acute and residual fatigue to the hamstring muscles after a Flywheel Russian belt Deadlift training session, in both females and males.

METHODS: Healthy and physically active females (n = 15, age = 21.5 ± 3.4 years [mean ± SD]) and males (n = 15, age = 21.4 ± 1.9 years) [mean ± SD]) completed 5 sets of 10 repetitions (2) of the Flywheel Russian belt Deadlift exercise, with a 3-minute rest period between sets (1). The inertia load was set at 0.159 kg·m² (3). The maximal voluntary isometric contraction (MVIC) of the hamstring muscles was evaluated by both, a hip-dominant test (90ºhip:20ºknee test), and a knee-dominant test (prone leg curl), at baseline (Pre), immediately after (post) and post-24 hours (+24h), post-48 hours (+48h) and post-72 hours (+72h), through a repeated measures design.

RESULTS: Average eccentric overload during the training session was 18.3 ± 3.2%. Moderate acute fatigue was detected as a reduction in MVIC torque of the hamstring muscles, both through 90ºhip:20ºknee test [MD = -18.0% (-9.9% to -26.6%), $p < 0.001$] and prone leg curl [MD = -27.5% (-12.4% to -44.9%), $p < 0.001$]. Likewise, residual fatigue during the 72-hour recovery period was confirmed by a decrease in hamstrings MVIC, in both females and males, through 90ºhip:20ºknee test [$F(4,116) = 28.280$, $p < 0.001$, $np2 = 0.494$] and prone leg curl [$F(4,116) = 25.153$, $p < 0.001$, $np2 = 0.464$].

CONCLUSION: The Flywheel Russian belt Deadlift exercise triggered acute and residual fatigue to the hamstring muscles during 72 hours after the training session, marked by a moderate reduction in force-generating capacity. Therefore, the Flywheel Russian belt Deadlift exercise targets the hamstrings in both females and males, and might be a promising hamstrings-strengthening exercise for training optimization or injury prevention programs.

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RELACIÓN FUERZA-VELOCIDAD DE SALTO CMJ EN CORREDORES DE BMX INTERNACIONALES

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INTRODUCTION: El rendimiento neuromuscular del salto CMJ (1), así como la potencia máxima del perfil fuerza-velocidad (2) está asociado a un mayor rendimiento en BMX sobre la pista. La optimización del rendimiento en salto podría suponer mejoras en el rendimiento en las carreras de BMX.

MÉTODOS: La investigación se realizó tres días después de una competición internacional. Se estudió la relación entre la fuerza y la velocidad en el salto con contramovimiento (CMJ) en base al método descrito por Samozino y colaboradores (3). Se evaluó el salto CMJ sin carga y con tres cargas adicionales (20, 40 y 60 kg) en 11 corredores (8 Junior y 3 élite) masculinos de ciclismo BMX europeos (Edad=20±4, IMC=22±2). Todos los saltos se registraron mediante el dispositivo OptoGait® light-barrier system (Microgate, Bolzano, Italy). Los valores de fuerza, velocidad y potencia fueron calculados con las hojas propuestas por Samozino y colaboradores (4).

RESULTADOS: Los corredores mostraron un CMJ de 49,05±6,7 cm de altura. El rango de la relación entre fuerza y velocidad (R)estudiado en los deportistas fue de 0,87-0,99. El desequilibrio medio en la relación fuerza-velocidad en comparación al perfil óptimo de los corredores fue de 0,49+-0,2 (F0= 2.514±264, V0=4,98±1,02, PMax= 3.107±588 y Sfv= -531,75±159).

CONCLUSIÓN: El análisis de la relación entre fuerza y velocidad en el salto CMJ mostró un déficit de fuerza en todos los corredores de BMX internacionales de categoría junior y élite sobre la relación óptima teórica.

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IMPLICACIÓN DEL TRABAJO DE FUERZA A NIVEL MITOCONDRIAL EN RATONES MAYORES

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En el proceso de envejecimiento, se produce una pérdida de masa muscular, funcionalidad, fuerza y capacidad de tolerancia al ejercicio físico, proceso conocido como sarcopenia, dicha condición reduce la calidad de vida de las personas mayores. Además, está implicada en el incremento de la mortalidad, y la reducción la esperanza de vida. Esto ha desembocado a que en los últimos años uno de los problemas más importantes de salud sea este, y las enfermedades que surgen de esta condición. En la actualidad todavía hay mucho desconocimiento sobre el proceso molecular de esta enfermedad. Las mitocondrias juegan un papel muy importante en este proceso, por lo que las intervenciones de ejercicio físico en personas mayores o modelos animales se están centrando en fomentar la capacidad de este orgánulo celular. Nuestra intervención consistió en un modelo animal de envejecimiento en ratonas viejas y jóvenes, para poder observar posibles diferentes procesos adaptativos al ejercicio tras un entrenamiento de 6 semanas únicamente de fuerza. Fueron medidos tantos parámetros de función física, de hipertrofia, y de función mitocondrial. Los resultados principales obtenidos fueron, como dos poblaciones distintas en edad mejoran su capacidad mitocondrial de diferente forma, además de la importancia que supuso para las ratonas viejas el entrenamiento, ya que su musculatura mejoró a nivel de funcionalidad y fuerza. Este trabajo presenta las ventajas que tiene un entrenamiento de fuerza en la población envejecida, ya que no solo fomenta el mantenimiento de la funcionalidad de esta población, sino que puede llegar a mejorarlo, además, de la mejora mitocondrial y antioxidante que produce, sin ser un ejercicio aeróbico

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NICOTINAMIDE RIBOSIDE SUPPLEMENTATION ENHANCES STRENGTH AND FUNCTIONAL PERFORMANCE IN AGED MICE

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INTRODUCTION: Muscle mass loss, known as sarcopenia, and its consequent functional deterioration are phenomena associated with aging. From a molecular perspective, increased oxidative stress, mitochondrial dysfunction, and decreased levels of nicotinamide adenine dinucleotide (NAD) are characteristics of aging that significantly affect muscle function. Both NAD(H) and NADP(H) play a crucial role in maintaining antioxidant defense systems and in metabolic reactions, functions that are impaired by the decline of NAD with age. One of the strategies developed to prevent this decline or to increase its levels is supplementation with NAD precursors, such as nicotinamide riboside (NR).

METHODS: In this study, a cohort of aged male mice (19 months), equivalent to the age of an elderly human, was employed. The mice were divided into two groups: a control group and a group supplemented with 400 mg/kg body weight/day of nicotinamide riboside (NR) in their drinking water for 14 weeks. A series of functional tests were conducted, including assessments of aerobic endurance, motor coordination, and grip strength. Additionally, molecular determinations were performed on liver and muscle tissues, which included quantification of NAD(H) and NADP(H) levels, parameters of oxidative stress and damage, markers of content and mitochondrial biogenesis, as well as respirometry analyses to evaluate mitochondrial function.

RESULTS: After the intervention, improvements were observed in motor coordination, as well as increased grip strength with all four paws and a greater capacity to lift weight relative to body mass (relative maximum repetition). In molecular assessments, supplemented mice showed elevated levels of NAD, NADH, NADP, and NADPH in the liver. Additionally, lower markers of oxidative damage were recorded in the supplemented group compared to the control. However, metabolomic analysis and mitochondrial function did not show significant differences between the groups.

CONCLUSIONS: Supplementation with nicotinamide riboside improved strength and motor coordination parameters in aged mice, along with reducing age-related oxidative damage.

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COULD RESVERATROL BE USED AS AN ERGOGENIC AID?

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INTRODUCTION: In nature and specifically in foods we consume we can find compounds with pharmacological activities. One of these compounds is resveratrol, a polyphenol present in numerous plants and fruits, such as blueberries, nuts, grapes, and red wine (1). In previous studies performed by our laboratory we have shown that resveratrol can increase lipid catabolism and lower the respiratory quotient in aged healthy mice (2). We were therefore interested in studying the mechanism behind this shift in metabolism at nutritionally relevant doses.

METHODS: To characterize the signaling pathway of resveratrol we treated murine skeletal muscle C2C12 cells with 10 nM resveratrol for 24 hours before analyzing the effects on lipid catabolism through qPCR of Ampk, Cpt1, and Ech1 as well as p-AMPK through western blot. We then analyzed mitochondrial respiration using Seahorse XF by measuring ATP production, maximal respiration, spare capacity, and proton leak. Finally, to determine the redox state of the cells we measured antioxidant enzymes through qPCR, carbonylated proteins through western blot, H2O2 levels through fluorimeter, and MDA levels as a parameter for lipid peroxidation through UPLC.

RESULTS: Resveratrol increased the expression of Ampk, Cpt1, and Ech1 as well as p-AMPK protein levels, indicating it has the ability to induce fatty acid oxidation. We also found increased basal respiration, maximal respiration, and spare capacity and a decrease in proton leak in the cells treated with resveratrol. Spare capacity is a parameter to measure the fitness of the cells, while proton leak is used to measure mitochondrial dysfunction. An improvement of these parameters indicates that resveratrol not only activates the mitochondria, but also makes it work more efficiently. This activation of the mitochondria was accompanied by a decrease in H2O2 levels and overexpression of the antioxidant enzyme GPx, although we found no significant differences in the levels of catalase, MnSOD or carbonylated proteins.

CONCLUSIONS: Our results show that resveratrol nutritionally relevant doses could be used as an ergogenic aid as it induces mitochondrial respiration, activates lipid catabolism, and improves parameters of oxidative stress.

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ACUTE FATIGUE DETECTION IN FEMALE VOLLEYBALL: COMPARING DISCRETE VARIABLES AND NON-PARAMETRIC STATISTICAL MAPPING

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INTRODUCTION: The countermovement jump (CMJ) is a reliable, easy-to-execute, non-invasive tool that provides a wealth of information for monitoring and optimizing strength training (1). When performing the CMJ on force platforms, we can obtain discrete variables that correspond to kinetics, jump outcomes, and jump strategy for the different phases of the jump, however statistical non-parametric mapping (SNPM) allows for the normalization of Force-Time curves while preserving their nature, enabling the comparison of the whole F-T curves (2). Therefore, the objective of this research was to explore the acute changes in discrete variables and Force, Power, Impulse, Displacement-Time curves in the CMJ following a volleyball training.

METHODS: Nine semi-professional volleyball players performed two CMJ attempts on force platforms on two occasions: before training (Pre) and 24 hours after (Post). The analyzed discrete variables were Jump Height and modified RSI (outcomes), concentric impulse (kinetics), contraction time, and time to peak power (strategy) (3). For the SNPM analysis, force, impulse, velocity, height, acceleration and power curves were analyzed. A paired T-Test comparison was made for SNPM and discrete variable analysis.

RESULTS: Twenty-four hours after training, the comparison of discrete variables showed no significant differences for jump height, RSImod, concentric impulse, contraction time and time to peak power (All p values >0.05). SPM analysis revealed significant differences only for force, suggesting changes (not relevant) in force production in the very first and last parts of the contact phase.

CONCLUSION: Neither analysis appears to be sensitive to acute fatigue in volleyball. In the analysis of discrete variables, no changes were observed in the jump strategy, contradicting the findings of Bishop (3). Moreover, although the force curve analyzed with SNPM showed signs of variations in the jump strategy, the changes are not clinically relevant. The high specificity in adaptations due to ballistic training (fast contractions) and the long intrinsic recovery periods in volleyball may prevent rapid force production from being affected, allowing for greater recruitment of muscle fibers, resulting in minimal changes in CMJ metrics (4).

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BONE AND FAT PARAMETERS ARE NOT ASSOCIATED WITH LOW TESTOSTERONE SYMPTOMS OR FEMALE ATHLETE TRIAD RISK

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INTRODUCTION: Low body fat and low bone mineral density (BMD) levels have been hypothesized to increase the risk of low testosterone symptoms in male athletes and the Female Athlete Triad (Triad) in female athletes. This study aimed to examine the relationship between fat and bone outcomes with low testosterone symptoms in male athletes, and the risk of the Triad in female athletes

METHODS: This study was based on the cross-sectional PRECORED study. Eligible participants were young (18-35 years) elite or pre-elite Spanish male and female athletes from any sports discipline with at least two years of training experience. Fat mass, fat mass index (FMI), visceral adipose tissue (VAT), BMD, and BMD Z-score were assessed by a dual-energy X-ray absorptiometry scan. Low testosterone symptoms were assessed in male athletes using the validated Androgen Deficiency in the Aging Male Questionnaire (ADAM-Q) and the Triad risk was evaluated in female athletes using the validated Low Energy Availability in Females Questionnaire (LEAF-Q)

RESULTS: A total of 71 athletes (23 women; 24.9±6.0 years, 23.5±2.8 kg/m², 8.7±5.7 years of training) were included in the analysis. No significant correlations were found between fat outcomes (i.e., fat mass, FMI, and VAT) and ADAM-Q score in men (all P≥0.079) or LEAF-Q score in women (all P≥0.396). Similarly, no significant associations were observed between bone outcomes (i.e., BMD, and BMD Z-score) and ADAM-Q (all P≥0.759) or LEAF-Q score (all P≥0.665)

CONCLUSIONS: Fat and bone outcomes are not associated with low testosterone symptoms in male athletes or the risk for the Triad in female athletes. These findings suggest that factors extending beyond mere fat and bone parameters may play a more critical role in the etiology of these conditions.

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INFLUENCIA DEL CICLO MENSTRUAL EN EL NIVEL DE CONDICIÓN FÍSICA MANIFESTADO EN MUJERES DEPORTISTAS

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INTRODUCCIÓN: La investigación sobre cómo las fluctuaciones hormonales durante el ciclo menstrual afectan el rendimiento físico de las mujeres deportistas sigue siendo poco clara. Históricamente, los estudios se han basado en la fecha de la última menstruación para estimar las fases del ciclo, lo que ha generado resultados inconsistentes y debates sobre la influencia real de las hormonas sexuales femeninas en la condición física. Para mejorar la precisión, ahora se recomienda medir directamente los niveles hormonales, evitando errores al clasificar los ciclos menstruales y las fases correspondientes. Es crucial también definir el perfil de las mujeres deportistas incluidas en los estudios, ya que no es adecuado generalizar resultados sin considerar el nivel de entrenamiento. En esta investigación, el objetivo fue evaluar si las fluctuaciones hormonales del ciclo menstrual influyen en la condición física de mujeres deportistas clasificadas en los niveles 2 y 3 de la clasificación de McKay et al. (2022). Además, se estudió el impacto de la anticoncepción hormonal en estas deportistas.

MÉTODOS: El estudio incluyó dos grupos: mujeres con ciclo menstrual natural y mujeres usando anticoncepción hormonal. Se evaluaron en diferentes fases del ciclo tanto la composición corporal, fuerza, flexibilidad como capacidad cardiorrespiratoria (mediante consumo de oxígeno máximo indirecto). También se monitoreó la actividad física diaria mediante acelerometría.

RESULTADOS: Los resultados mostraron que el consumo máximo de oxígeno y el umbral de dolor eran significativamente menores en la fase I del ciclo natural, mientras que estos cambios no se observaron en el ciclo artificial. Las mujeres también quemaban menos calorías y tenían mayor masa corporal y porcentaje de grasa en la fase I del ciclo natural. La variación en la cantidad de hierro fue notable en el ciclo natural, pero no afectó la capacidad cardiorrespiratoria.

CONCLUSIÓN: las fluctuaciones hormonales del ciclo menstrual natural afectan la aptitud cardiorrespiratoria y otros parámetros físicos, mientras que en el ciclo menstrual artificial estas variaciones no son significativas. La cantidad de actividad física también fue menor en las fases iniciales del ciclo natural, lo que no se observó en el ciclo artificial.

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EFFECTIVENESS OF AN INDIVIDUALIZED MULTIDIRECTIONAL SPEED TRAINING ON SPEED PERFORMANCE IN BASKETBALL PLAYERS

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INTRODUCTION: Linear and changes of direction (COD) speed are considered key performance determinants in basketball. Thus, it is recommended that strength and conditioning coaches develop individualized and effective training programmes tailored to each athlete's speed needs to improve their ability to perform COD at maximum intensity in any direction in basketball players (1). The aim of this study was to test whether an individualized COD deficit-based training programme would improve all-directional movement efficiency and, in turn, enhance linear and multidirectional speed performance in basketball players. Additionally, the differences in physical performance between two time periods (four and eight weeks) with this training were analyzed.

METHODS: Thirty-six male basketball players (age, 21.4 ± 3.23 years; height, 1.87 ± 0.07 m; body mass, 83.6 ± 7.83 kg) were divided into an intervention group (INT, n = 18), who performed an individualized COD deficit-based training; and a control group (CON, n = 18), who underwent a non-individualized multidirectional repeated sprint training programme. Both groups performed the intervention two days per week. Baseline, four-week, and eight-week assessments included linear speed and COD tests.

RESULTS: An improvement in all-directional movement efficiency was observed from four weeks in INT group (ES ≥ 1.61, $p < 0.01$), with no change in the CON group. At eight-weeks, significant improvements were observed in the INT player's overall speed profile (–0.09, ES = 0.34, $p < 0.01$), with COD180º showing the greatest changes (≤–0.18, ES ≥ 0.44, $p < 0.01$).

CONCLUSIONS: An individualized COD deficit-based training program improved speed performance after eight weeks, with changes in all-directional movement efficiency after first four weeks. Given basketball's unpredictable and multidirectional nature, strength and conditioning coaches should seek the optimal trade-off between the linear and multidirectional speed demands on their players.

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DIFERENCIA DE LA FUERZA ISOMÉTRICA MÁXIMA DE LOS FLEXORES DE LOS DEDOS ENTRE ESCALADORES Y NO ESCALADORES: ANÁLISIS DE GÉNERO Y PRUEBAS ESPECÍFICAS

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INTRODUCCIÓN: La fuerza de agarre es un componente clave en el rendimiento de la escalada deportiva, ya que influye directamente en la capacidad de sostenerse y avanzar sobre diferentes presas [1, 2]. Métodos como la dinamometría, las pruebas de suspensión y los dinamómetros específicos en escalada se utilizan para medir esta fuerza [3]. Sin embargo, la variabilidad en las metodologías utilizadas puede generar resultados inconsistentes, y las diferencias en la fuerza de agarre entre escaladores y no escaladores, así como entre géneros, no están completamente clarificadas [4].

MÉTODOS: En este estudio se compara la fuerza de agarre entre escaladores y no escaladores, analizando también las diferencias relacionadas con el género, identificando las variaciones en la generación de fuerza. La fuerza máxima se evaluó mediante dinamometría manual y dos pruebas isométricas con el brazo fijado en una regleta de 20 mm de profundidad, utilizando un agarre de tres dedos en extensión y un agarre en semiarqueo.

RESULTADOS: Los escaladores mostraron una fuerza isométrica significativamente mayor que los no escaladores tanto en la posición de extensión con tres dedos (358.12 ± 109.9 vs. 260.3 ± 63.9) como en la de semiarqueo (409.17 ± 121.3 vs. 285.0 ± 74.9) ($p < 0.01$). Este patrón fue consistente tanto para hombres como para mujeres. Sin embargo, no se observaron diferencias significativas en la fuerza de agarre manual entre escaladores y no escaladores ($p = 0.16$). Realizando un análisis por género, las mujeres escaladoras mostraron una mayor fuerza de agarre en la dinamometría manual (35.00 ± 4.6) en comparación con las mujeres no escaladoras (30.9 ± 4.5) ($p < 0.05$), mientras que en los hombres los valores fueron similares. En todas las posiciones de agarre, los hombres exhibieron mayor fuerza que las mujeres.

CONCLUSIÓN: Este estudio confirma que los escaladores tienen una fuerza isométrica significativamente mayor que los no escaladores en las posiciones de extensión con tres dedos y semiarqueo, lo cual concuerda con investigaciones previas que sugieren que las pruebas específicas de escalada reflejan mejor el rendimiento en este deporte. Por otro lado, la dinamometría manual no discriminó entre escaladores y no escaladores, reforzando la necesidad de utilizar pruebas específicas de fuerza de dedos. Estas pruebas, que imitan posiciones y esfuerzos típicos de la escalada, ofrecen una evaluación más precisa del rendimiento. Los hallazgos subrayan la importancia de utilizar métodos más representativos del entorno de escalada para evaluar tanto los efectos del entrenamiento como el rendimiento deportivo.

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CERT-BASED EXERCISE PROTOCOL FOR THE ONCOFIT RANDOMIZED CONTROLLED TRIAL: PRELIMINAR DATA REGARDING RETENTION AND ADHERENCE

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INTRODUCTION: Colon cancer represents the fifth most common type of cancer worldwide. Exercise-based pre/re-habilitation programs are emerging as potential strategies for preventing postsurgical disturbances and enhancing health-related outcomes in colon cancer patients undergoing surgery. However, its specific effects remain poorly understood given the lack of accurate information about the exercise characteristics implemented. Hence, the aim of this work is to fully describe the pre/re-habilitation exercise intervention of the ONCOFIT project, based on the Consensus on Exercise Reporting Template (CERT) guidelines.

METHODS: This is a randomized controlled study, which presents a two-arm parallel design and includes 90 participants with nonmetastatic colon cancer undergoing a surgical procedure. The patients were randomly assigned to a multidisciplinary prehabilitation (4 weeks preoperatively) and rehabilitation (12 weeks postoperatively) program (i.e., supervised concurrent exercise, dietary behaviour changes and psychological support) or to a usual care group. The exercise program was strictly designed following the CERT guidelines and considering the most updated evidence that reports promising results in these patients for reducing postoperative complications. It was based on a concurrent training protocol. For aerobic training, a 4 x 4 high intensity interval training (HIIT; i.e., 4 intervals of 4 minutes at 85-95% maximum heart rate (mHR) interposed by 3 minutes at 65-75% mHR) using a treadmill was performed. Resistance HIIT was structured in two circuits of 8 exercises (i.e., 30 seconds work and 30 seconds rest) at 8-9 rate of perceived exertion (RPE), combining upper and lower body exercises, aimed at working the basic movements. Some adaptations were considered for the early-postoperative phase (i.e., 3 weeks postoperatively) which consisted of an adapted resistance training. No instructions about intensity were demanded during the first week, while 6-7 RPE and 7-8 RPE were fixed as the required intensity for the 2nd and 3rd week, respectively.

RESULTS: A total of 33 participants have currently done the intervention. The exercise program registered a total of 95% of retention (95%) and 88% of attendance rate, with 25 patients completing at least 80% of the proposed exercise sessions.

CONCLUSION: When exercise is prescribed as medicine for patients with colon cancer undergoing surgery, the CERT guidelines should be strictly followed to facilitate its replication and to personalize the provided stimulus.

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AGILITY: UNA PROPUESTA INNOVADORA DE ENTRENAMIENTO FUNCIONAL PARA PERSONAS CON LESIÓN CEREBRAL

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INTRODUCCIÓN: CLa lesión cerebral es una alteración del Sistema Nervioso Central desarrollado, siendo las más prevalentes el daño cerebral adquirido, la enfermedad de Parkinson, la esclerosis múltiple y la enfermedad de Alzheimer; todas ellas con secuelas comunes (1). El ejercicio físico puede mejorar la autonomía y calidad de vida de las personas (2). Agility es una metodología de entrenamiento grupal y distribuye a sus usuarios en cuatro perfiles según sus capacidades. En su parte principal, se realiza un circuito con cuatro estaciones con ejercicios de fuerza y coordinación, orientados a unos objetivos funcionales (2). El objetivo de este trabajo fue realizar una propuesta de ejercicios de Agility.

MÉTODOS: A partir de las recomendaciones de ejercicio y las pautas de Agility, se realizó una propuesta de ejercicios prácticos evaluados por un comité de expertos, con experiencia en el entrenamiento de personas con lesión cerebral, mediante un cuestionario.

RESULTADOS: Se diseñaron un total de 24 ejercicios, seis para cada una de las estaciones del circuito de Agility, con sus respectivas modificaciones para los perfiles y objetivos funcionales. En cada ejercicio aparece una descripción, variantes para su progresión, adaptaciones según las secuelas, consideraciones técnicas y un apoyo visual a través de fotografías y vídeos. Tras su evaluación por los expertos consultados, destacaron de forma positiva el uso de ayudas visuales, la atención a la heterogeneidad de los usuarios y la variedad de ejercicios con materiales accesibles.

CONCLUSIÓN: La propuesta de ejercicios diseñada actualizan la metodología de Agility siguiendo los parámetros pautados por las guías más actuales en entrenamiento en lesión cerebral (3). Además, aporta un nuevo sistema de entrenamiento con ejercicios específicos y adaptados a cada perfil dentro de la lesión cerebral. Oh S et al. en su intervención en el medio acuático encontraron mejoras con una misma intervención para distintas afectaciones neurológicas (4). Por otro lado, Úbeda-Colomer et al. realizaron una propuesta de ejercicios similar en personas con lesión medular (5). La propuesta de ejercicios para la actualización de Agility es original al centrarse en las capacidades y funcionalidad de las personas con lesión cerebral por encima de las patologías asociadas (2) y valorada positivamente con los expertos consultados. Sin embargo, se necesitan más estudios que proporcionen evidencias que fundamenten pautas específicas para el entrenamiento en esta población.

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HAND GRIP STRENGTH, PHYSICAL ACTIVITY AND BODY COMPOSITION IN IMMIGRANT CHILDREN IN MADRID. ASOMAD STUDY

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INTRODUCTION: Physical activity (PA) and health in children are closely linked. Low physical fitness (PF) can increase the risk of obesity (1). Hand grip strength (HGS) has been described as an independent health marker. This work aims to describe PF and body composition in immigrant children living in Madrid.

METHODS: A cross-sectional study was carried out between 2020 and 2023 in Madrid. 21 schools from the selected districts and school year were randomly sampled. Body composition (% fat mass (%FM), body mass index (BMI) (kg/m²)) was measured using Bioimpedance (TANITA, DC-240, MA, TOKYO, JAPAN). PA was measured using the PAU-7S questionnaire (2) for children, HGS (kg) was measured using the analog hand-held dynamometer (TKK 5001, GRIP-A, TOKYO, JAPAN). Overweight (OW) and obesity (OB) were calculated according to International Obesity Task Force (IOTF) guidelines (3), abdominal obesity was calculated by the waist to heigh ratio (WHtR). The origin of children was established by the country of origin of their parents. Statistical analysis was performed using IBM SPSS Statistics (Version 29.0), Student t-test was used, as well as Pearson correlation.

RESULTS: A total sample of 578 children participated in the study, comprising an average age of 9.54 ± 1.19 years and representing 54% of boys. The immigrant families constituted 33.2% of the overall sample, the largest proportion (56.8%) of these children were of Latin American origin. In relation to the prevalence of both general and abdominal obesity, immigrant children were significantly more OW and OB than their Spanish counterparts (24.5% vs 13.2%, 14.1% vs 4.7%, $p<0.001$). WHtR was higher in immigrants than natives (0.44±0.05 vs 0.47±0.06, respectively, $p<0.001$), both below the critical cardiovascular risk (CVR) threshold (<0.5). Immigrants were 18.35 min/week less active than natives ($p<0.001$) but showed higher HGS (16.77±4.15 vs 15.62± 3.63; $p<0.001$). A correlational analysis revealed a positive relationship between the % FM and the HGS ($r = 0.188$; $p<0.001$).

CONCLUSION: These values suggest a slightly more favorable profile in Spanish natives in terms of OW/OB and abdominal fat distribution, but higher HGS could have potentially a protective effect in immigrants. There is a need for further investigation into the complex relationship between these physiological parameters.

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FOURTEEN COMPENSATORY PROTECTIVE STEP STRATEGIES WERE ELABORATED AND CLARIFIED BY DIFFERENT HEALTH PROFESSIONAL EXPERTS

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INTRODUCTION: Older adults and people with motor pattern disturbances, such as Parkinson's, Alzheimer's, or fibromyalgia, experience a risk of falling. The gait of people with fibromyalgia tends to be slow and cautious in walking, like older adults. This type of gait may predict motor disability, mortality, and cognitive decline (1,2). Groups with motor pattern disturbance and older adults lose most of their independence during activities of daily living after suffering a fall. This can lead to fear of falling, alterations in gait patterns, decreased mobility, reduced social interactions, and impaired ability to perform various tasks (3,4). However, there are no standardized terminology and definitions for these strategies. In this sense, the aim was to establish a unified terminology for health professionals.

METHODS: This study adhered to the Conducting and Reporting of Delphi Studies (CREDES) guidelines and followed a chronological sequence: a) literature review, b) create an online quantitative and qualitative questionnaire to assess the wording (items=14), c) 14 experts from different professional backgrounds participated and d) using Aiken's coefficient to determine of content validity.

RESULTS: this study found high levels of validity (V≥0.68) for all definitions, following Aiken's V critical value.

CONCLUSION: 13 compensatory protective step strategies were elaborated and clarified, and the expert panel added 1. This new unified terminology is a useful guide for the development of fall-targeted exercise protocols or clinical tests.

Keywords: Delphi, step strategies, degree of agreement, experts and fall

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ESTILO DE VIDA Y FUNCIONES EJECUTIVAS EN CADETES DURANTE UNA ACTIVIDAD DE INSTRUCCIÓN MILITAR

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INTRODUCCIÓN: El rendimiento cognitivo es crucial en la profesión militar, ya que la capacidad para tomar decisiones rápidas es clave para el éxito de las misiones. La fatiga física de las actividades militares puede afectar esta agudeza mental, comprometiendo la concentración y la precisión en decisiones críticas[1]. Comprender estos cambios es fundamental, ya que una disminución en estas habilidades puede poner en riesgo la eficacia y seguridad de las operaciones. Este estudio evalúa las funciones ejecutivas de cadetes durante una instrucción militar para comprender su rendimiento cognitivo y su relación con el estilo de vida.

MÉTODOS: En el estudio participaron 28 alféreces de Infantería de la Academia General Militar (AGM, Zaragoza). La edad media fue de 23±2 años. Todos los participantes completaron un cuestionario general que incluía datos sobre consumo de alcohol, tabaco, hábitos de sueño y ejercicio físico, entre otros. Se les midieron las funciones ejecutivas antes y después de la realización de una marcha táctica militar mediante el Test de los Senderos (TESEN)[2]. En esta prueba se registra el tiempo requerido para completar 4 tareas, así como los errores cometidos, proporcionando una medida de la rapidez y eficiencia en la toma de decisiones y la ejecución de tareas complejas. Los datos fueron analizados mediante SPSS. Se realizaron ANOVA para determinar las diferencias significativas entre los grupos y ANOVA de medidas repetidas para ver los cambios producidos.

RESULTADOS: Los resultados indicaron que los cadetes que consumen alcohol presentan una velocidad de decisión significativamente menor en comparación con aquellos que no consumen ($p<0,05$), sugiriendo una ralentización en la toma de decisiones. No se encontraron diferencias significativas en relación con otras variables de estilo de vida, como el consumo de tabaco, hábitos de sueño y ejercicio físico ($p>0,05$).

CONCLUSIONES: El consumo de alcohol tiene un impacto negativo en la velocidad de toma de decisiones en los alumnos de la AGM. Estos hallazgos subrayan la importancia de considerar los hábitos de consumo de alcohol en la formación y evaluación de cadetes, ya que la velocidad de decisión es crucial en contextos de instrucción militar.

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