



XIV Simposio Internacional de Actualizaciones en Entrenamiento de la Fuerza

16 - 17 de diciembre de 2022

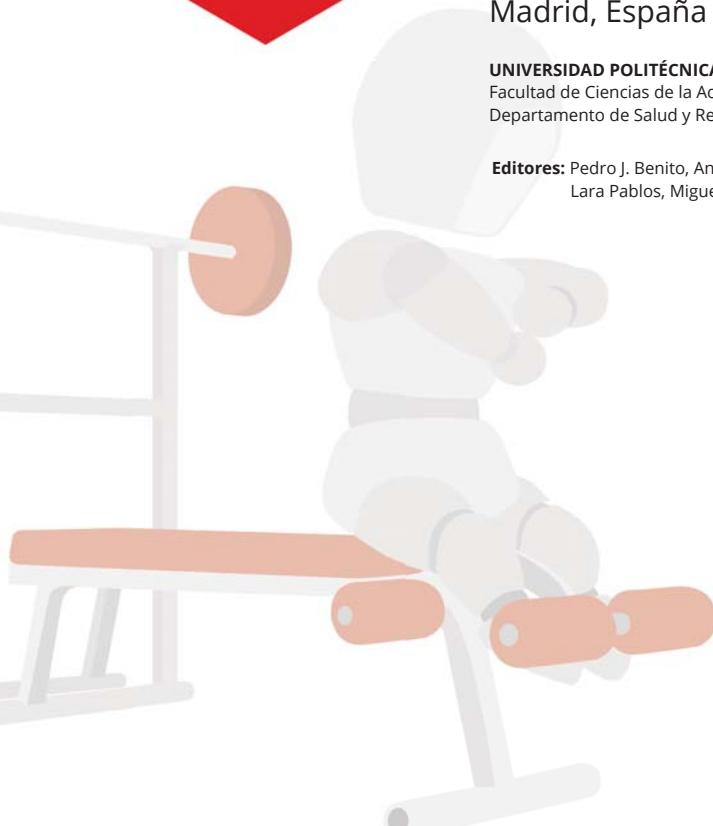
Madrid, España

UNIVERSIDAD POLITÉCNICA DE MADRID

Facultad de Ciencias de la Actividad Física y del Deporte (INEF)
Departamento de Salud y Rendimiento Humano

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

PROGRAMA
Y
LIBRO DE
RESÚMENES



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XIV International Symposium in Strength Training

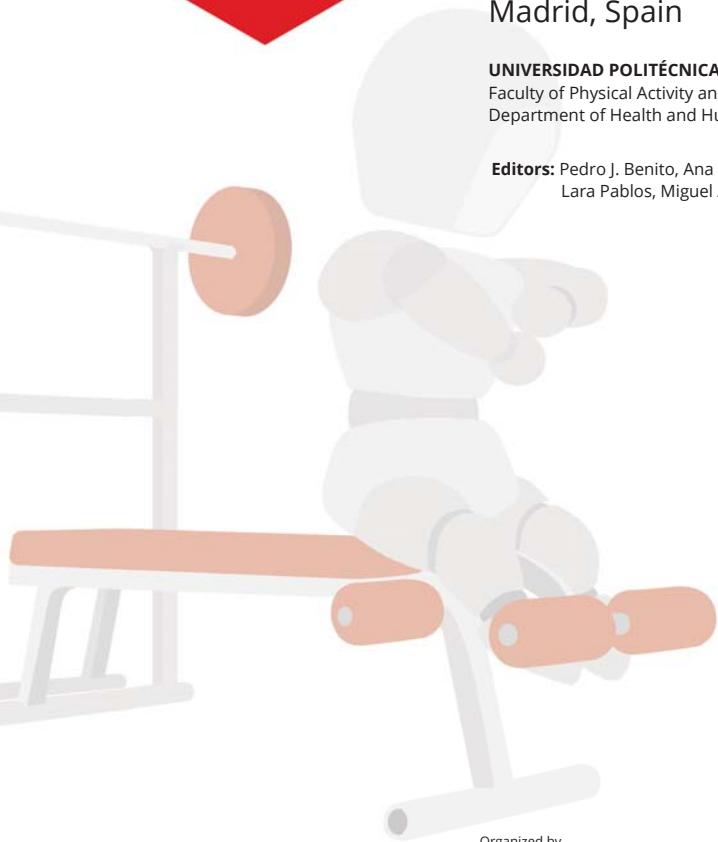
December 16 - 17, 2022

Madrid, Spain

UNIVERSIDAD POLITÉCNICA DE MADRID

Faculty of Physical Activity and Sport Sciences (INEF)
Department of Health and Human Performance

Editors: Pedro J. Benito, Ana B. Peinado, Rocío Cupeiro,
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A large, semi-transparent illustration of a person's lower body is positioned in the center-left of the page. The person is shown from the waist down, performing a leg press or similar seated leg extension exercise. They are wearing light-colored shorts and socks. The background behind the illustration is white, while the illustration itself is a light gray.

PROGRAM
&
BOOK OF
ABSTRACTS

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Actualizaciones en Entrenamiento
de la Fuerza**

16 - 17 diciembre 2022, Madrid - España

LIBRO DE RESÚMENES

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

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December 16-17, 2022 Madrid - Spain
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BIENVENIDOS

BIENVENIDOS AL XIV SIMPOSIO DE FUERZA

El XIV Simposio Internacional de Actualizaciones en Entrenamiento de la Fuerza (SDF) ya está aquí y nos recuerda la importancia de la constancia en todos los ámbitos de la vida. Se trata de una decisión fácil, empeñarse en sobrevivir o sucumbir ante las amenazas de nuestros días. Año a año construimos una realidad juntos, la de que las Ciencias del Deporte en general y el entrenamiento de fuerza en particular evolucionen para acercarnos un poco más al futuro.

No es fácil imaginar nuestro futuro, eso nos lo han confirmado hace bien poco, pero imaginarlo es el primer paso. No hay nadie más pobre que la persona sin sueños. Este año, otra vez, volveremos a estar en torno a la ciencia y la práctica, compartiendo un tiempo que no volverá, pero que quedará impreso en las paredes de nuestra memoria. Cuando lo fácil es ceder, arrinconarse y huir, este evento planta cara al devenir del tiempo, y deja a las instituciones que representa en el pabellón que merecen. Mantener el interés en la formación presencial en el presente mundo “virtualizado” es una hazaña, que indica una vocación ineludible de este evento por la formación presencial de calidad.

A nuestra habitual muestra de trabajos relacionados con la preparación física y el entrenamiento presentados por investigadores y profesionales de nuestro campo, se unen las dos mesas redondas que tendremos y las 8 conferencias nacionales e internacionales sobre muchos aspectos relacionados con los efectos terapéuticos y de mejora de la condición física, inherentes a la práctica del ejercicio físico. Temas como la manipulación de la carga en el entrenamiento de fuerza, el manejo de las variables de entrenamiento en deportes de equipo, la figura del científico del deporte, los efectos del ejercicio físico sobre el cáncer, la señal electromiográfica y la fatiga, y un largo etcétera, son el menú que nos espera en estas 48 h del SDF. Sin duda, el SDF es el evento decano de las Ciencias del Deporte en el entrenamiento de la fuerza.

El magnífico equipo humano y material que hace posible este evento, hace que me sea difícil expresar con palabras mi agradecimiento a todos los que formamos la gran familia del SDF, cada año renovada, más sólida y más unida que nunca.

Muchas gracias por venir y formar parte de esta familia.

Pedro J. Benito Peinado
Presidente del Simposio de Fuerza

WELCOME

WELCOME TO THE XIV INTERNATIONAL SYMPOSIUM IN STRENGTH TRAINING

The XIV Strength Symposium is here and reminds us of the importance of perseverance in all areas of life. It is an easy decision to make, to strive to survive or to succumb to the threats of daily life. Year after year, we build a reality together, the evolution of sports science in general and strength in particular, in order to bring us a little closer to the future.

It is not easy to imagine our future, which has been confirmed to us quite recently, but imagining it is the first step. As Myles Munroe said once "The poorest man in the world is a man without a dream." This year, once again, we will be surrounded by science and practice, sharing moments that will not return, but which will remain imprinted on the walls of our memory.

When the easy thing to do is to give in and run away, this event faces the passing of time, and leaves the institutions it represents in the position they deserve.

Maintaining interest in face-to-face training in today's virtualized world is a feat, which indicates an inescapable vocation of this event for quality training in person.

In addition to our usual sample of works related to physical preparation and training presented by researchers and experts of our fields, we will have two round tables and 8 other national and international conferences on different aspects related to the therapeutic effects and improvement of physical condition, both related to the practice of physical exercise. Topics such as the manipulation of the load in strength training, the management of training variables in team sports, the role of the sports scientist, cancer and exercise, electromyographic signal and fatigue, and much more, are the menu that awaits us in these 48 hours of the Symposium. Undoubtedly, the Strength Symposium is the dean event of the sports sciences in strength training.

The magnificent human team that makes this event possible, makes it difficult for me to express my gratitude to all those who make up the great family of the Symposium, each year renewed, stronger and more united than ever.
Thank you very much for coming and being part of this family.

Pedro J. Benito Peinado
Symposium President

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PROGRAMA CIENTÍFICO / SCIENTIFIC PROGRAM

DÍA 1 / DAY 1

Horario/Time	DÍA 1 / DAY 1
	16/12/2022
8:30 - 9:00 h	Acreditación / Registration
9:00 - 10:30 h	Comunicaciones orales 1/ Oral presentation 1 Efecto de la manipulación de los componentes de la carga durante el entrenamiento de fuerza FERNANDO PAREJA BLANCO
10:30 - 11:30 h	
11:30 - 12:00 h	DESCANSO / BREAK / POSTER PRESENTATION Demandas de juego y preparación física en deportes de arena: un caso real en vóley playa ANTONIO G. ALCARAZ
12:00 - 13:00 h	
13:00 - 14:00 h	Entrenamiento de fuerza en personas con movilidad reducida MIRIAM SALAS MONEDERO
14:00 - 15:30 h	COMIDA / LUNCH WORKSHOP 1: JESÚS OLIVÁN (Aplicaciones de la pliometría)
15:00 - 15:30 h	MICROCONCIERTO DE MIGUEL GARRIDO ROMANOS (pianista INEF)
	ACTO DE APERTURA/ OPEN CEREMONY
15:30 - 17:30 h	La figura del Sport Scientist en el alto rendimiento actual LORENA TORRES RONDA
17:30 - 18:00 h	Comunicaciones orales 2/ Oral presentation 2
18:00 - 18:30 h	DESCANSO / BREAK / POSTER PRESENTATION
18:30 - 19:45 h	Aprendiendo con los mejores metabolismos del mundo AITOR VIRIBAI MORALES
19:45 - 21:00 h	Gestión del volumen de entrenamiento en las ganancias de masa muscular ENEKO BAZ VALLE

PROGRAMA CIENTÍFICO / SCIENTIFIC PROGRAM

DÍA 2 / DAY 2

Horario/Time	DÍA 2 / DAY 2 17/12/2022
8:30 - 9:00 h	Acreditación / Registration
9:00 - 10:00 h	Comunicaciones orales 3/ Oral presentation 3
10:00 - 11:30 h	Cáncer y ejercicio PEDRO L. VALENZUELA TALLÓN, ADRIÁN CASTILLO GARCÍA, JAVIER S. MORALES ROJAS
11:30 - 12:00 h	DESCANSO / BREAK / POSTER PRESENTATION
12:00 - 13:00 h	Physiology of Sex Hormones: Female Athlete Considerations ANTHONY C. HACKNEY
13:00 - 14:00 h	Neuromuscular Electrical Stimulation for Training and Rehab NICOLA MAFFIULETTI
14:00 - 15:30 h	COMIDA / LUNCH WORKSHOP 2: DAVID BAUTISTA (Entrenamiento oclusivo)
15:30 - 17:00 h	MESA REDONDA / ROUND TABLE: EL PAPEL DE LA FUERZA EN LA DISFUNCIÓN MUSCULAR VERÓNICA SANZ SANTIAGO, LUIS SERRATOSA FERNÁNDEZ, HELIOS PAREJA GALEANO
17:00 - 18:00 h	La nueva generación del fútbol femenino: hormonas, composición corporal y proporcionalidad anatómica MIREIA PORTA OLIVA
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 - 21:00 h	MESA REDONDA / ROUND TABLE: ENTRENAMIENTO DE FUERZA Y PERFILES FUERZA-VELOCIDAD FERNANDO PAREJA BLANCO, PEDRO JIMÉNEZ REYES, VÍCTOR CUADRADO PEÑAFIEL

PROGRAMA AMPLIADO / EXTENDED PROGRAM

VIERNES, 16 DE DICIEMBRE		
PROGRAMA DE MAÑANA/ MORNING PROGRAM		
DESCRIPCIÓN / DESCRIPTION	HORA / TIME	LUGAR / VENUE
Apertura de acreditaciones / Registration open	08:30 - 09:00 h	Entrada / Hall
Comunicaciones orales 1 / Oral Presentation 1	9:00 - 10:30 h	
1 Energy substrates evolution around ventilatory thresholds in active older female adults Jordi Monferrer Marín	09:00 h	Auditorio/ Conference hall
2 Analysis of the load-velocity relationship in the decline bench press in trained men and women Agustín Valdés Álvarez	09:15 h	
3 The influence of menstrual cycle phase on neuromuscular performance Blanca Romero Moraleda	09:30 h	
4 Relationship between physical self-concept, exercise addiction and orthorexia in crossfit participants Alejandro Oliver López	09:45 h	
5 Decisive Factors for a Greater Performance in Linear-Multidirectional Speed in Basketball Players Based on Gender Francisco José Barrera Domínguez	10:00 h	
6 A comparison between heart rate and power output to prescribe exercise intensity José Antonio Benítez Muñoz	10:30 h	
EFFECTO DE LA MANIPULACIÓN DE LOS COMPONENTES DE LA CARGA DURANTE EL ENTRENAMIENTO DE FUERZA FERNANDO PAREJA BLANCO	10:30 - 11:30 h	
Descanso / Break/ Poster presentation 1	11:30 - 12:00 h	Entrada / Hall
DEMANDAS DE JUEGO Y PREPARACIÓN FÍSICA EN DEPORTES DE ARENA: UN CASO REAL EN VÓLEY PLAYA ANTONIO G. ALCARAZ	12:00 - 13:00 h	Auditorio/ Conference hall
ENTRENAMIENTO DE FUERZA EN PERSONAS CON MOVILIDAD REDUCIDA MIRIAM SALAS MONEDERO	13:00 - 14:00 h	
Comida / Lunch	14:00 - 15:30 h	
WORKSHOP 1: APLICACIONES DE LA PLIOMETRÍA JESÚS OLIVÁN MALLÉN	14:00 - 15:30 h	Sala centro deportivo

PROGRAMA AMPLIADO / EXTENDED PROGRAM

VIERNES, 16 DE DICIEMBRE		
PROGRAMA DE TARDE/ AFTERNOON PROGRAM		
DESCRIPCIÓN / DESCRIPTION	HORA / TIME	LUGAR / VENUE
MICRO CONCIERTO/MICROCONCERT MIGUEL GARRIDO ROMANOS	15:00 - 15:30 h	Auditorio/ Conference hall
CONFERENCIA INAUGURAL / OPENING CEREMONY	15:30 - 15:45 h	
LA FIGURA DEL SPORT SCIENTIST EN EL ALTO RENDIMIENTO ACTUAL	15:45 - 17:30 h	
LORENA TORRES RONDA		
Comunicaciones orales 2 / Oral Presentation 2	17:30 - 18:00 h	Entrada / Hall
Effect of oral contraceptives on bone (re)modelling marker concentrations in response to interval running in endurance-trained females Isabel Guisado Cuadrado	17:30:00 h	Auditorio/ Conference hall
Effects of Protein-Carbohydrate versus Carbohydrate alone Supplementation on Immune Inflammation Markers in Endurance Athletes Álvaro López Samanes	17:45:00 h	
Descanso / Break/ Poster presentation 2	18:00- 18:30 h	Entrada / Hall
APRENDIENDO CON LOS MEJORES METABOLISMOS DEL MUNDO	18:30 - 19:45 h	Auditorio/ Conference hall
AITOR VIRIBAY MORALES		
GESTIÓN DEL VOLUMEN DE ENTRENAMIENTO EN LAS GANANCIAS DE MASA MUSCULAR	19:45 - 21:00 h	
ENEKO BAZ VALLE		

PROGRAMA AMPLIADO / EXTENDED PROGRAM

SÁBADO, 17 DE DICIEMBRE		
PROGRAMA DE MAÑANA/ MORNING PROGRAM		
DESCRIPCIÓN / DESCRIPTION	HORA / TIME	LUGAR / VENUE
Apertura de acreditaciones / Registration open	08:30 - 09:00 h	Entrada / Hall
Comunicaciones orales 3 / Oral Presentation 3	9:00 - 10:00 h	
1 Effects of 12-week resistance exercise training in frail institutionalized centenarians Adrián Hernández Vicente	09:00 h	Auditorio/ Conference hall
2 Does skeletal muscle of cystic fibrosis adult patients respond to a strength training program? Alicia Sosa Pedreschi	09:15 h	
3 Análisis de la respuesta inmune inducida por el entrenamiento de fuerza en hipoxia moderada Sergio Pérez Regalado	09:30 h	
4 Velocity and load effects in mechanic work during eccentric phase in jump squat Miguel Ángel López Fernández	09:45 h	
CÁNCER Y EJERCICIO	10:00 - 11:30 h	
PEDRO L. VALENZUELA TALLÓN, ADRIÁN CASTILLO GARCÍA, JAVIER S. MORALES		
Descanso / Break/ Poster presentation 3	11:30 - 12:00 h	Entrada / Hall
PHYSIOLOGY OF SEX HORMONES: FEMALE ATHLETE CONSIDERATIONS	12:00 - 13:00 h	Auditorio/ Conference hall
ANTHONY C. HACKNEY		
NEUROMUSCULAR ELECTRICAL STIMULATION FOR TRAINING REHAB	13:00 - 14:00 h	
NICOLA MAFFIULETTI		
Comida / Lunch	14:00 - 15:30 h	
WORKSHOP 2: ENTRENAMIENTO OCCLUSIVO DAVID BAUTISTA MORENO	14:00 - 15:30 h	Sala centro deportivo

PROGRAMA AMPLIADO / EXTENDED PROGRAM

SÁBADO, 17 DE DICIEMBRE PROGRAMA DE TARDE/ AFTERNOON PROGRAM		
DESCRIPCIÓN / DESCRIPTION	HORA / TIME	LUGAR / VENUE
MESA REDONDA/ ROUND TABLE: El papel de la fuerza en la disfunción muscular VERÓNICA SANZ SANTIAGO, LUIS SERRATOSA FERNÁNDEZ, HELIOS PAREJA GALEANO	15:30 - 17:00 h	Auditorio/ Conference hall
LA NUEVA GENERACIÓN DEL FÚTBOL FEMENINO: HORMONAS, COMPOSICIÓN CORPORAL Y PROPORCIONALIDAD ANATÓMICA MIREIA PORTA OLIVA	17:00 - 18:00 h	
Descanso / Break/ Poster presentation 3	18:00- 18:30 h	Entrada / Hall
CONCLUSIONES, ENTREGA DE PREMIOS Y CLAUSURA DEL SIMPOSIO / CONCLUSIONS, AWARDS AND CLOSING CEREMONY	18:30 - 19:00 h	
MESA REDONDA/ ROUND TABLE Entrenamiento de fuerza y perfiles de fuerza velocidad FERNANDO PAREJA BLANCO, PEDRO JIMÉNEZ REYES, VÍCTOR CUADRADO PEÑAFIEL	19:00 - 20:30 h	Auditorio/ Conference hall

PONENTES / KEYNOTE SPEAKERS

SATURDAY, DECEMBER 17, 2022

12:00 - 13:00 H



ANTHONY C. HACKNEY, PHD, DSC
UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL, USA

Physiology of sex hormones: female athlete considerations

Anthony C. Hackney, es profesor de Fisiología del Ejercicio y Nutrición en la Facultad de Artes y Ciencias, Escuela de Salud Pública y Medicina (Universidad de Carolina del Norte en Chapel Hill). Su grupo de investigación estudia cómo el estrés (físico, ambiental, emocional) afecta a las respuestas hormonales del sistema endocrino. En particular, se centra en las disfunciones y desregulaciones que se desarrollan a partir de la(s) exposición(s) al estrés, que en última instancia pueden comprometer las respuestas y adaptaciones fisiológicas. Por otro lado, también ha trabajado en la ASEE (American Society for Engineering Education) para el centro de investigación de Salud Naval y para el centro espacial Johnson de la NASA. Estudió dos doctorados de fisiología del ejercicio y nutrición en la Universidad de Kent (Ohio), y el otro en la Universidad de Carolina del Norte (Chapel Hill).

Anthony C. Hackney, is a Professor of Exercise Physiology and Nutrition in the College of Arts and Sciences, School of Public Health and Medicine (University of North Carolina at Chapel Hill). His research group studies how stress (physical, environmental, emotional) affects the hormonal responses of the endocrine system. In particular, she focuses on the dysfunctions and dysregulations that develop from stress exposure(s), which can ultimately compromise physiological responses and adaptations. He has also worked at ASEE (American Society for Engineering Education) for the Naval Health Research Center and NASA Johnson Space Center. He studied two PhDs in exercise physiology and nutrition at the University of Kent (Ohio), and the other at the University of North Carolina (Chapel Hill).



NICOLA MAFFIULETTI, PHD
HUMAN PERFORMANCE LAB, SCHULTHLESS CLINIC

Neuromuscular electrical stimulation for training rehab

Nicola Maffiuletti es Director del Laboratorio de Rendimiento Humano en la Clínica Schulthess en Zurich (Suiza), también es consultor y asesor científico en la industria farmacéutica, en deporte profesional, en universidades, etc. Es Diplomado en Educación Física por la Università degli Studi di Milano, posteriormente se especializó en Ciencias del Deporte y Ciencias de la Rehabilitación en la Universidad de Borgoña. Nicola es un experto en Fisiología del Ejercicio y en Deporte y ha publicado y participado en más de 150 artículos científicos que le avalan como un gran profesional. Actualmente su campo de investigación principal se basa en los diferentes aspectos de las funciones neuromusculares humanas.

Nicola Maffiuletti is the Director of Human Performance Lab at Schulthess Clinic in Zurich (Switzerland), he is also scientific consultant and advisor in pharmaceutical industry, professional sports, universities, etc. He studied Physical Education at Università degli Studi di Milano, afterwards he specialized in Sport and Rehabilitation Sciences at University of Burgundy. Nicola is an expert in Exercise Physiology and Sports and he has published and taken part in more than 150 scientific researches that confirm him as an excellent professional. His current research focuses on different aspects of human neuromuscular function.



LORENA TORRES RONDA, PHD
FEDERACIÓN ESPAÑOLA DE BALONCESTO

La figura del Sport Scientist en el Alto Rendimiento Actual

Lorena Torres Ronda es graduada en Ciencias de la Actividad Física y realizó el máster de Alto Rendimiento en la Universidad Autónoma de Madrid. Unos años más tarde realizó el doctorado de Ciencias del Deporte en la Universidad Pablo Olavide. Tiene una amplia experiencia en deportes profesionales y olímpicos. Presenta también un enfoque en el rendimiento atlético, ciencia del deporte, tecnología e innovación, análisis y visualización de datos, monitorización del entrenamiento y la competición, gestión de la carga, recuperación avanzada, nutrición, entrenamiento de baloncesto y exigencias del juego. En su paso por la NBA, San Antonio Spurs estuvo enfocada en las ciencias del deporte, buscando tecnología para el 'tracking' durante los entrenamientos y cómo recoger y presentar la información para llegar fácil a jugadores y entrenadores. En Philadelphia 76ers trabajó como una figura de liderazgo. En la sala de preparación física o en la pista consiguió crear un proyecto de futuro y una filosofía de trabajo que identificara a la franquicia. Actualmente es coordinadora en la parte de rendimiento de la Federación Española de Baloncesto.

Lorena Torres Ronda has a degree in Physical Activity Sciences and a Master's Degree in High Performance at the Universidad Autónoma de Madrid. A few years later she completed her PhD in Sports Science at the Pablo Olavide University. She has extensive experience in professional and Olympic sports. She also has a focus on athletic performance, sport science, technology and innovation, data analysis and visualization, training and competition monitoring, load management, advanced recovery, nutrition, basketball training and game demands. Lorena spent time in the NBA. At San Antonio Spurs she was focused on sports science, looking at technology for tracking during training sessions and collecting and presenting information to easily reach players and coaches. And at Philadelphia 76ers she was a leadership figure. In the fitness room or on the court as creating a project for the future, a work philosophy that identifies the franchise. She is currently coordinator of the performance part of the Spanish Basketball Federation.

FERNANDO PAREJA BLANCO, PHD
UNIVERSIDAD PABLO DE OLAVIDE. COL. 63763



Efecto de la manipulación de los componentes de la carga durante el entrenamiento de fuerza

Fernando Pareja es profesor Contratado Doctor de la Universidad Pablo de Olavide de Sevilla (UPO) en la materia de Entrenamiento Deportivo. Doctor en Ciencias de la Actividad Física y el Deporte por la UPO. Cuenta en la actualidad con más de 70 artículos JCR en el apartado de Ciencias del Deporte debido en gran medida a una intensa labor investigadora desarrollada en el Centro de Investigación en Rendimiento Físico y Deportivo de la UPO. Coautor del libro “La velocidad de ejecución como referencia para la programación, control y evaluación del entrenamiento de fuerza”. Diferentes estancias nacionales (Centro de Estudios, Investigación y Medicina del Deporte, Pamplona; y Universidad de las Palmas de Gran Canarias) e internacionales (Southern Denmark University, Dinamarca; Núcleo de Alto Rendimiento Esportivo, Brasil; y University of Jyvaskyla, Finlandia).

Fernando Pareja is Associate Professor at the Pablo de Olavide University of Seville (UPO) in the subject of Sports Training. PhD in Physical Activity and Sport Sciences from the UPO. He currently has more than 70 JCR articles in the Sports Sciences section, largely due to the intense research work carried out at the Centre for Research in Physical and Sports Performance at the UPO. Co-author of the book "Execution speed as a reference for the programming, control and evaluation of strength training". He has carried out different national stays (Centro de Estudios, Investigación y Medicina del Deporte, Pamplona; and Universidad de las Palmas de Gran Canarias) and international stays (Southern Denmark University, Denmark; Núcleo de Alto Rendimiento Esportivo, Brazil; and University of Jyvaskyla, Finland).



AITOR VIRIBAY MORALES, PHD
SCIENTIFIC ADVISER IN PHYSIOLOGY, NUTRITION
AND SPORT SCIENCE. GLUT4SCIENCE

Aprendiendo con los mejores metabolismos del mundo

Aitor Viribay Morales (Vitoria-Gasteiz, 1994). Desde los 6 años, y hasta los 23, ha "vivido pegado a una bicicleta" llegando a competir en el ciclismo de ruta Élite-Sub23 durante 4 años. Sin embargo, la salud no le permitió seguir este camino. Dejó de lado la competición, comenzó una nueva era de aprendizaje y descubrimiento de sus límites personales en el deporte. Su curiosidad e inquietud le llevaron a realizar el Grado Universitario en Nutrición Humana y Dietética (especialidad en Rendimiento Deportivo) en tan sólo 2 años y medio, tiempo que aprovechó también para cursar distintos posgrados sobre la Fisiología del Ejercicio, Entrenamiento y Nutrición. Posteriormente estudió un Máster oficial en Investigación e Innovación en Ciencias de la Actividad Física y el Deporte. Fue así como abrió la puerta del Doctorado en Fisiología, Metabolismo y Nutrición Deportiva. Ahora es el creador y director del proyecto Glut4Science. Es un proyecto para la divulgación científica, creado por gente inquieta, llena de preguntas e hipótesis, con ganas de aprender y de compartir conocimiento, y enfocado, especialmente, para un público con el mismo objetivo.

Aitor Viribay Morales (Vitoria-Gasteiz, 1994). From the age of 6 until he was 23, he has "lived next to a bicycle", competing in Elite-Sub23 road cycling for 4 years. However, health did not allow him to follow this path. He left competition aside, began a new era of learning and discovering his personal limits in the sport. His curiosity and interest led him to complete his University Degree in Human Nutrition and Dietetics (specializing in Sports Performance) in just two and a half years, a time he also took advantage of to study various postgraduate courses on the Physiology of Exercise, Training and Nutrition. Subsequently, he studied an official Master's Degree in Research and Innovation in Physical Activity and Sport Sciences. This is how he opened the door to the PhD in Physiology, Metabolism and Sports Nutrition. He is now the creator and director of the Glut4Science project. Is a project for scientific dissemination, created by restless people, full of questions and hypotheses, eager to learn and share knowledge, and focused, especially, for an audience with the same objective.



MIREIA PORTA OLIVA
DEPARTAMENTO DE NUTRICIÓN DEL FC BARCELONA

La nueva generación del fútbol femenino: hormonas, composición corporal y proporcionalidad anatómica

Mireia Porta Oliva es graduada en Nutrición Humana y Dietética. Licenciada en Ciencia y Tecnología de los alimentos. Mireia es una de las profesionales más reconocida en Nutrición Deportiva, con una enorme experiencia docente tanto universitaria como fuera de la universidad así como una experiencia práctica de haber trabajado en diferentes deportes y equipos profesionales. Actualmente es nutricionista del FC Barcelona, además también ha trabajado como nutricionista en la Real Federación Española de Hockey y en Tottenham Hotspur Football Club. Por otro lado, también es profesora asociada en la UAB (Universidad Autónoma de Barcelona) desde el 2017.

Mireia Porta Oliva is a graduate in Human Nutrition and Dietetics. She has a degree in Food Science and Technology. Mireia is one of the most renowned professionals in Sports Nutrition, with a huge teaching experience both at university and outside the university as well as practical experience of having worked in different sports and professional teams. She is currently a nutritionist for FC Barcelona, and has also worked as a nutritionist for the Royal Spanish Hockey Federation and Tottenham Hotspur Football Club. On the other hand, she is also an associate professor at the UAB (Autonomous University of Barcelona) since 2017.



MIRIAM SALAS MONEDERO
HSP. NACIONAL DE PARAPLÉJICOS DE TOLEDO, COL. 58682

Entrenamiento de fuerza en personas con movilidad reducida

Miriam Salas Monedero es graduada en Ciencias de la Actividad Física y el Deporte en la Universidad de Castilla-La Mancha. También realizó en esa universidad el máster en Investigación en Ciencias del Deporte, itinerario de Salud. Está especializada en actividad física adaptada, actualmente es entrenadora del primer equipo de rugby en silla de ruedas de Castilla La Mancha "Carpetanos CRT", en Toledo. Además trabaja como monitora deportiva en el Hospital Nacional de Parapléjicos en Toledo (impartiendo deportes como judo o natación, entre otros). Los 10 integrantes del equipo Carpetanos CRT son del Hospital Nacional de Parapléjicos.

Miriam Salas Monedero graduated in Physical Activity and Sport Sciences at the University of Castilla-La Mancha. She also completed a Master's degree in Sport Science Research, Health itinerary at the same university. She is specialized in adapted physical activity and is currently coach of the first wheelchair rugby team of Castilla La Mancha "Carpetanos CRT", in Toledo. She also works as a sports instructor at the National Hospital of Paraplegics in Toledo (teaching sports such as judo and swimming, among others). The 10 members of the Carpetanos CRT team are from the Hospital Nacional de Parapléjicos.



ANTONIO GARCÍA DE ALCARAZ, PHD
UNIVERSIDAD DE ALMERÍA, COL. 60073

Demandas de juego y preparación física en deportes de arena: un caso real en voley playa

Antonio García de Alcaraz es graduado en Ciencias de la Actividad Física y el Deporte en la Universidad de Granada y doctor en Ciencias del deporte en la Universidad de Murcia. Lleva casi 18 años siendo entrenador de Voleibol, llevando equipos desde temprana edad del club hasta equipos de selección nacional. Aparte de entrenador en el voleibol también lleva su preparación física y es especialista en el análisis del juego. Actualmente es profesor en la Universidad de Almería y la Universidad Isabel I (Burgos). Enseñanza e investigación en deportes de equipo. Monitorización, fuerza y acondicionamiento, y análisis del rendimiento.

Antonio García de Alcaraz has a degree in Physical Activity and Sport Sciences from the University of Granada and a PhD in Sport Sciences from the University of Murcia. He has been coaching volleyball for almost 18 years, leading teams from the early age of the club to the national team. Apart from coaching volleyball he is also in charge of physical preparation and is a specialist in game analysis. He is currently a lecturer at the University of Almeria and the University Isabel I (Burgos). Teaching and research in team sports. Monitoring, strength and conditioning, and performance analysis.

**ENEKO BAZ VALLE**

DOCTORANDO UNIVERSIDAD DEL PAÍS VASCO, COL. 67574

Gestión del volumen de entrenamiento en las ganancias de masa muscular

Eneko Baz es Doctorando en la Universidad del País Vasco, mismo lugar donde estudió el Grado en Ciencias de la Actividad Física y el Deporte, posteriormente realizó dos Másteres, uno en Alto Rendimiento Deportivo en la UCAM y otro en Investigación en Ciencias del Deporte en la UPV. Además, Eneko es director de la Escuela Nacional de Fuerza y Acondicionamiento Físico (ENFAF) y crea contenido en la plataforma digital YouTube en su canal Bazman Science en el que habla sobre la fuerza y el acondicionamiento físico desde un punto de vista científico pero explicado de manera que cualquier público lo pueda entender, gracias a esto ha conseguido más de 80.000 seguidores, a los que hay que sumarle los de sus demás redes sociales donde también trata los temas anteriormente mencionados. También cabe destacar que Eneko es Campeón del Mundo Profesional de Culturismo Natural en la categoría Men's Physique Talla Alta.

Eneko Baz is a Doctoral Candidate at Universidad del País Vasco, same place where he studied the Degree in Physical Activity and Sports Sciences, afterwards, he received two master's degrees, one of them in High Sports Performance at UCAM, and the other in Sports Sciences Investigation at UPV. Eneko is also the head of the National School of Strength and Physical Conditioning (ENFAF) and he films videos and post them on the famous digital platform YouTube on his channel Bazman Science, he talks about strength and physical conditioning from a scientific point of view explaining everything in an easy way so everyone can understand him, thanks to this fact he has achieved more than 80.000 followers, added to the ones that he has in other social media where he also talks about the topics mentioned before. Worthy of mention is the fact that he is also Professional World Champion of Natural Bodybuilding in the High Size Men's Physique category.



PEDRO L. VALENZUELA TALLÓN, PHD
*INST. INVESTIGACIÓN DEL
HOSPITAL 12 OCTUBRE. COL. 67576*

Cáncer y ejercicio

Pedro Luis Valenzuela Tallón es investigador en la Unidad de Control de Rendimiento (Agencia Española para la Protección de la Salud en el Deporte, AEPSAD), investigador en la Universidad de Alcalá (Unidad de Fisiología) y asesor científico en el Centro de Medicina del Deporte (Unidad de Control de Rendimiento) del Centro de Alto Rendimiento de Madrid. Lleva 5 años de experiencia en el asesoramiento fisiológico y de rendimiento en deportistas, incluyendo deportistas de élite de distintas disciplinas. Graduado en Ciencias de la Actividad Física y del Deporte, máster en Fisiología Integrativa y Doctor en Ciencias de la Salud. Entrenador nacional de triatlón nivel III ITU. Y como si fuera poco, es uno de los tres creadores y editores de Fissac, una web de divulgación científica donde tratan de acercar los últimos estudios de investigación relacionados con la salud, el ejercicio físico y la medicina.

Pedro Luis Valenzuela Tallón is a researcher at the Performance Control Unit (Spanish Agency for Health Protection in Sport, AEPSAD), researcher at the University of Alcalá (Physiology Unit) and scientific advisor at the Sports Medicine Centre (Performance Control Unit) of the High Performance Centre of Madrid. He has 5 years of experience in physiological and performance assessment in sportsmen and women, including elite sportsmen and women from different disciplines. Graduate in Physical Activity and Sport Sciences, Master in Integrative Physiology and Doctor in Health Sciences. ITU level III national triathlon coach. And as if that were not enough, he is one of the three creators and editors of Fissac, a popular science website where they try to bring the latest research studies related to health, physical exercise and medicine.

**ADRIÁN CASTILLO GARCÍA**

*FISSAC: FISIOLOGÍA, SALUD Y ACTIVIDAD FÍSICA.
COL. 67575*

Cáncer y ejercicio

Adrián Castillo García es investigador científico, con formación en fisiología, ciencias del ejercicio, estadística e informática. Es uno de los tres creadores y editores de Fissac, una web de divulgación científica donde tratan de acercar los últimos estudios de investigación relacionados con la salud, el ejercicio físico y la medicina. Además, ha estado investigando durante los últimos 4 años en el Instituto de Investigación Biomédica de Barcelona-CSIC en el Departamento de Patología Experimental. Los últimos dos años y medio ha trabajado para M2RLab, una spin off del CSIC, donde ha formado parte del equipo de investigación donde desarrollan una nueva terapia de regeneración muscular.

Adrián Castillo García is a scientific researcher with a background in physiology, exercise science, statistics and computer science. He is one of the three creators and editors of Fissac, a popular science website where they try to explain the latest research studies related to health, physical exercise and medicine. In addition, he has been doing research for the last 4 years at the Institute for Biomedical Research of Barcelona-CSIC in the Department of Experimental Pathology. For the last two and a half years she has been working for M2RLab, a spin off of the CSIC, where she has been part of the research team developing a new muscle regeneration therapy.



JAVIER S. MORALES ROJAS, PHD
UNIVERSIDAD DE CÁDIZ. COL. 55414

Cáncer y ejercicio

Javer Salvador Morales Rojas es investigador en el área de ejercicio físico y salud en la Universidad Europea de Madrid, es Licenciado en Ciencias de la Actividad Física y el Deporte, Diplomado Universitario en Enfermería, Máster Universitario en Actividad Física y Salud y Máster Oficial en Fisiología Integrativa. Además, es uno de los tres creadores y editores de Fissac, una web de divulgación científica donde tratan de acercar los últimos estudios de investigación relacionados con la salud, el ejercicio físico y la medicina. Cuenta con más de 10 años de experiencia en el ámbito hospitalario y actualmente realiza programas de entrenamiento en niños con cáncer. Docente en las asignaturas de Fisiología Humana y Fisiología del Ejercicio en la Universidad Europea de Madrid. Primer Premio nacional de investigación en medicina del deporte.

Javer Salvador Morales Rojas is a researcher in the area of physical exercise and health at the European University of Madrid, he has a degree in Physical Activity and Sport Sciences, a University Diploma in Nursing, a Master's Degree in Physical Activity and Health and an Official Master's Degree in Integrative Physiology. He is also one of the three creators and editors of Fissac, a popular science website where they try to explain the latest research studies related to health, physical exercise and medicine. He has more than 10 years' experience in the hospital field and currently runs training programmes for children with cancer. Lecturer in Human Physiology and Exercise Physiology at the European University of Madrid. First National Award for research in sports medicine.

**JESÚS OLIVÁN MALLÉN, PHD**

UNIVERSIDAD POLITÉCNICA DE MADRID. COL. 67816

Aplicaciones de la pliometría

Jesús Oliván es Doctor en Actividad Física y Salud y trabaja como profesor Ayudante Doctor en el INEF de Madrid, encargándose de las asignaturas relacionadas con el atletismo. Esto no es casualidad, ya que Jesús no solo cuenta con grandes conocimientos teóricos, sino que además los ha experimentado por sí mismo siendo saltador de longitud de nivel internacional. Fue campeón de España de salto de longitud en 1991, 1995 y 1996. Además, compitió en los juegos olímpicos de Barcelona 1992 y Atlanta 1996, en los campeonatos de Europa de 1986 y 1992 y en los campeonatos del mundo indoor y outdoor de 1991. En cuanto a su aportación a la ciencia, cuenta con su participación en diversos artículos publicados en revistas científicas de primer nivel en los que investiga principalmente sobre la actividad física en niños.

Jesús Oliván is a Doctor of Physical Activity and Health and he works as an Assistant Professor Doctor in INEF (Madrid). He is responsible for subjects related with athletics, this fact is not accidental, besides he has enormous knowledge of the matter he had also experienced himself as he had been an international long jumper. He was Spanish Long Jump Champion in 1991, 1995 and 1996, he also performed in Barcelona 1992 and Atlanta 1996 Olympics, in 1986 and 1992 European Championships and finally he took part in the World Indoor and Outdoor Championships in 1991. If we take a look at his contribution to science, we can affirm that he has participated in different scientific studies posted in prestigious scientific journals, mostly of them related with physical activity in kids.



DAVID BAUTISTA MORENO
BAUMOVMENT. COL. 64382

Entrenamiento oclusivo

David Bautista es Graduado en Ciencias de la Actividad Física y el Deporte por la Universidad de Huelva, además, también ha adquirido conocimientos sobre neurociencia y biomecánica aplicada a la readaptación deportiva en Neuromecánica Lab. Fruto de esta formación fue su creación de la web Baumovement, en la que ofrece programas de readaptación y entrenamiento deportivo online, su equipo multidisciplinar ofrece un servicio profesional especializado en lesiones de rodilla y hombro. Complementando a la web también creó el podcast Baumovement donde divulga sobre temas como las lesiones, la readaptación o la salud. A parte de su web y podcast, David trabaja como readaptador y entrenador personal en un centro médico en Huelva.

David Bautista is a Physical Activity and Sports Sciences graduate at Universidad de Huelva, he has also gained knowledge about neuroscience and biomechanics applied to sports readaption at Neuromecánica Lab. Thanks to the mentioned formation, he created Baumovement web, where readaption and personal training programs are offered, his multidisciplinary team offers a professional service specialized in knee and shoulder injuries. He also started Baumovement podcast where he disseminates information about injuries, readaption or health. Although he is involved in the previously mentioned projects he also works as a personal trainer and sport therapist in a health center in Huelva.



VERÓNICA SANZ SANTIAGO, MD, PHD
HOSPITAL INFANTIL UNIVERSITARIO NIÑO JESÚS

Mesa redonda: El papel de la fuerza en la disfunción muscular

Verónica Sanz es pediatra especialista en neumología pediátrica, estudió medicina en la Universidad Complutense de Madrid y actualmente trabaja en el Hospital Infantil Universitario Niño Jesús. También cuenta con experiencia en otros hospitales como el Hospital Rey Juan Carlos o el Hospital Universitario Ramón y Cajal. Además de su labor como médico, Verónica también ha participado en estudios científicos, la mayoría de ellos relacionados con la salud en niños. No podemos pasar por alto sus publicaciones literarias como "Manual de Pediatría".

Verónica Sanz is a pediatrician specialized in pediatric pneumology, she studied medicine at Universidad Complutense de Madrid and nowadays she works at Hospital Infantil Universitario Niño Jesús. She also has experience in other hospitals such as Hospital Rey Juan Carlos or Hospital Universitario Ramón y Cajal. Although she works as a doctor, she has taken part in some scientific publications, most of them related to kids' health. Worthy of mention is the fact that she has written some books such as "Manual de Pediatría".



LUIS SERRATOSA FERNÁNDEZ, MD, PHD
HOSPITAL UNIVERSITARIO QUIRÓNSALUD MADRID

Mesa redonda: El papel de la fuerza en la disfunción muscular

Luis Serratosa es jefe de servicio de Rehabilitación y Medicina Deportiva del Hospital Universitario Quirónsalud Madrid y Complejo Hospitalario Ruber Juan Bravo. El Dr. Luis Serratosa es Licenciado en Medicina y Cirugía por la Universidad Autónoma de Madrid, se especializó en Medicina de la Educación Física y el Deporte en la Escuela Profesional de la Universidad Complutense de Madrid y es Doctor en Medicina por la Universidad Complutense de Madrid. Además de su labor en hospitales, también trabaja en los servicios médicos del Real Madrid, ha pertenecido al servicio de cardiología del CAR así como a la Investigación en Ciencias del Deporte del Consejo Superior de Deportes. Su aportación literaria a la ciencia también es numerosa, pues ha participado en más de 40 artículos y capítulos de libro en publicaciones nacionales y en más de 15 artículos en revistas internacionales.

Luis Serratosa is the head of the Rehabilitation and Sports Medicine service at Hospital Universitario Quirónsalud Madrid and in Complejo Hospitalario Ruber Juan Bravo. Dr. Luis Serratosa is a Graduate in Medicine and Surgery from Universidad Autónoma de Madrid, he specialized in Physical Education and Sports Medicine at Escuela Profesional de la Universidad Complutense de Madrid and he is Doctor of Medicine from Universidad Complutense de Madrid. Although he works in hospitals, he also works at medical services of Real Madrid, he was a member of the cardiology service at CAR and he also took part in Sports Sciences Investigation at Consejo Superior de Deportes. His contribution to science literature is extensive as he has taken part in more than 40 researches and book chapters in national publications and more than 15 researchers in international scientific journals.



HELIOS PAREJA GALEANO, PHD
UNIVERSIDAD AUTÓNOMA DE MADRID, COL. 62337

Mesa redonda: El papel de la fuerza en la disfunción muscular

Helios Pareja es Profesor en el Departamento de Educación Física, Deporte y Motricidad Humana y en la Facultad de Formación del Profesorado en la Universidad Autónoma de Madrid. Se licenció en Ciencias de la Actividad Física y del Deporte en la Universidad Autónoma de Madrid, posteriormente realizó un Máster en Fisiología en la Facultad de Medicina de la Universitat de València. Estuvo en el Departamento de Biología y Fisiología Integrativa en el Laboratorio NeuroLife de la Universidad de California realizando una estancia predoctoral, en 2014 terminó su Doctorado en Fisiología en la Universitat de València. Además de ser profesor en la UAM, también tiene experiencia como profesor en otras universidades como la Europea de Madrid. Helios cuenta con una gran participación en artículos y publicaciones científicas tratando temas de salud y actividad física fundamentalmente.

Helios Pareja is a Professor at the Physical Education, Sports and Human Motricity Department at Universidad Autónoma de Madrid. He is a Graduate in Physical Activity and Sports Sciences from Universidad Autónoma de Madrid, he also has studied a Master's degree in Physiology in the Medicine College at Universitat de València. He did a predoctoral stay in the NeuroLife Laboratory at University of California. In 2014, he finished his Doctoral Degree in Physiology at Universitat de València. Aside his work at UAM, he also has experience as a Professor in other universities such as Universidad Europea de Madrid. Helios has an extensive contribution in scientific publications addressing mainly health and physical activity topics.



PEDRO JIMÉNEZ REYES, PHD
UNIVERSIDAD REY JUAN CARLOS, COL. 68160

Mesa redonda: Entrenamiento y perfiles de fuerza-velocidad

Pedro Jiménez es investigador y profesor de Monitorización en el Entrenamiento Deportivo y Biomecánica Deportiva en la UCAM. Es licenciado en Ciencias de la Actividad Física y del Deporte por la Universidad de Granada, tiene un Máster en Deporte de Alto Rendimiento por la Universidad Autónoma de Madrid y es Doctor en Alto Rendimiento Deportivo por la Universidad Pablo de Olavide de Sevilla y la Universidad de Loughborough. Su historial científico cuenta con una gran cantidad de artículos científicos en los que principalmente se interesa por la investigación de la velocidad en diferentes tipos de atletas.

Pedro Jiménez is a research scientist and lecturer of Monitoring Sports Training and Sports Biomechanics at UCAM. He has a Bachelor of Science in Sport and Physical Activity from University of Granada, he has a Master's degree of High Performance in Sport from University Autónoma of Madrid and he is European Doctorate in High Performance in Sport from University Pablo de Olavide and Loughborough University. His scientific track has lots of scientific publications which are interested mainly in the investigation of the velocity in different types of athletes.



VÍCTOR CUADRADO PEÑAFIEL, PHD
UNIVERSIDAD AUTÓNOMA DE MADRID, COL. 62337

Mesa redonda: Entrenamiento y perfiles de fuerza-velocidad

Víctor Cuadrado es Profesor Ayudante Doctor en la Facultad de Formación del Profesorado en la Universidad Autónoma de Madrid. Es licenciado en Educación Física y ha realizado tres Másteres, uno en Alto Rendimiento por el Comité Olímpico Español, otro en Rendimiento Físico y Deportivo por la Universidad Pablo de Olavide y el tercero de ellos en Readaptación por la Universidad Europea de Madrid. Además de toda esta titulación es Doctor Internacional de Educación Física. Víctor también tiene un amplio recorrido en la preparación física en equipos de fútbol. En cuanto su labor científica, ha colaborado en diversos estudios, destacando su interés por el estudio de la velocidad en distintos tipos de atletas.

Víctor Cuadrado is an Assistant Lecturer at the Teacher Training Faculty at University Autónoma of Madrid. He is Bachelor in Physical Education and he has done three Master's degrees, one of them in High Performance by the Spanish Olympic Committee, other one in Physical and Sports Performance from University Pablo de Olavide and the third one in Readaptation by European University of Madrid. He also has an International Doctoral Degree in Physical Education. Víctor has an extensive background in physical training for football teams. If we talk about his scientific contribution, we can affirm that he has taken part in many scientific publications, emphasizing his research in velocity in different types of athletes.

COMUNICACIONES ORALES / ORAL PRESENTATION

FRIDAY, DECEMBER 16, 2022

9:00 - 10:30 H

Comunicaciones orales 1 / Oral presentation 1

09:00 - 09:15 h

ENERGY SUBSTRATES EVOLUTION AROUND VENTILATORY THRESHOLDS IN ACTIVE OLDER FEMALE ADULTS

MONFERRER-MARÍN J., ROLDÁN, A., BLASCO-LAFARGA C.

SPORT PERFORMANCE AND PHYSICAL FITNESS RESEARCH GROUP (UIRFIDE), PHYSICAL EDUCATION AND SPORT DEPARTMENT, UNIVERSITY OF VALENCIA, VALENCIA, SPAIN

INTRODUCTION: Lipids and carbohydrates (CHO) are largely sensitive to changes in exercise intensity (1). Key points in human metabolism are their oxidation rates at their maximum (i.e., the maximal fat oxidation [MFO] and the maximal CHO oxidation [CHOox] peak, this at exhaustion or maximal power [P100]. Notwithstanding, both rates at the ventilatory thresholds VT1 & VT2 may also need attention because of their relation to MFO & P100 (1). This work aims to analyze CHOox and FATOx rates in a group of active women over-60 considering the relationship among these 4 points in a graded cycling test, what remains unknown.

METHODS: Twenty-one active women (66.04 ± 11.44 years) completed a submaximal incremental cycling protocol (10W/3'15"), with continuous gas analysis by indirect calorimetry, power registration, and pre post-test lactate measurements (3-5 min). Oxidation rates were calculated by applying Frayn's equations (2), considering the mean $\dot{V}O_2$ and $\dot{V}CO_2$ of the last 30 seconds at the MFO, VT1, VT2 and P100 points, as well as the first step of the test (P1) (3). Ventilatory thresholds were calculated considering the last 30 seconds and using two methods per point. VT1 was calculated by analyzing the lowest point of the ventilatory oxygen equivalent ($Eq\dot{V}O_2$: $\dot{V}E/\dot{V}O_2$), as well as by plotting the $\dot{V}CO_2$ excess, with respect to $\dot{V}O_2$ (3). VT2 was calculated plotting the natural logarithms of $Eq\dot{V}O_2$ and $Eq\dot{V}CO_2$, with respect to $\dot{V}O_2$, in addition to the incremental jump criterion of RER with respect to $\dot{V}O_2$ (4).

RESULTS: Active elderly women confirmed limited ability to oxidize both FATOx and CHOox in each point P1 (0.73 ± 0.1 W/kgFFM), MFO (0.99 ± 0.27 W/kgFFM), VT1 (1.09 ± 0.34 W/kgFFM), VT2 (1.61 ± 0.40 W/kgFFM), and P100 (1.91 ± 0.38 W/kgFFM). MFO and VT1 points showed no differences, as suggested (1), confirming the reduction of fat oxidation upon them. Conversely, both VT1 vs VT2, and VT2 vs P100 displayed significant differences in terms of FATOx, although not in terms of CHOox.

CONCLUSION: Future studies will confirm the potential role of MFO in the detection of the first threshold, at least in inactive older women.

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ANALYSIS OF THE LOAD-VELOCITY RELATIONSHIP IN THE DECLINE BENCH PRESS IN TRAINED MEN AND WOMEN

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INTRODUCTION: The decline bench press exercise has been shown to have greater activation of the lower pectoralis major area when compared with an incline bench press (1). The purpose of this study was to analyze the load-velocity relationship in this exercise and to compare sex-related differences.

METHODS: A descriptive research design was used. Twelve young healthy men and women (6 men and 6 women), experienced in resistance training, performed one testing session where a progressive loading test was conducted for the determination of 1RM strength and individual load-velocity relationship in the decline bench press exercise. Velocity data was captured with a linear encoder (Speed4lifts, v2.0, Madrid, Spain), which has been validated elsewhere (2). This investigation was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics Committee of the Universidad Politécnica de Madrid (reference number: 2022-069). After being informed of the purpose and experimental procedures, the participants signed a written informed consent form before participation.

RESULTS: A very close relationship between mean propulsive velocity (MPV) and %1RM was observed ($R^2 = 0.94$). This relationship improved when plotting data separately by sex ($R^2 = 0.96$ for males and $R^2 = 0.97$ for females). Individual load-velocity profiles gave an $R^2 = 0.99 \pm 0.01$. Significant sex-related differences were found for MPV, with males having faster velocities than females at 30, 35 and 40% 1RM ($p = 0.01$). A prediction equation to estimate relative load (%1RM) from MPV (m/s) was obtained for males ($R^2 = 0.96$; SEE = 4.38) and for females ($R^2 = 0.97$; SEE = 3.47). Mean velocity attained with the 1RM load (V1RM) was 0.15 ± 0.02 m/s.

DISCUSSION: The results of this study show that a strong correlation exists between relative load and MPV in the decline bench press exercise, allowing the possibility of using one to predict the other with great precision, especially when a sex-specific equation is used. If maximum accuracy is needed, an individual load-velocity profile is recommended.

REFERENCES:

1. Glass SC, Armstrong T. Electromyographical Activity of the Pectoralis Muscle During Incline and Decline Bench Presses. *J Strength Cond Res.* 1997 Aug;11(3):163-7.
2. Pérez-Castilla A, Piepoli A, Delgado-García G, Garrido-Blanca G, García-Ramos A. Reliability and Concurrent Validity of Seven Commercially Available Devices for the Assessment of Movement Velocity at Different Intensities During the Bench Press. *J Strength Cond Res.* 2019;33(5):1258-65.

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THE INFLUENCE OF MENSTRUAL CYCLE PHASE ON NEUROMUSCULAR PERFORMANCEROMERO-MORALED A, B.¹, MORENCOS, E.², VARÓN, P., HARO, E.P.¹, GONZÁLEZ-GARCÍA, J.²¹DEPARTMENT OF PHYSICAL EDUCATION, SPORT AND HUMAN MOVEMENT, UNIVERSIDAD AUTÓNOMA DE MADRID, MADRID, SPAIN ²UNIVERSIDAD FRANCISCO DE VITORIA, FACULTY OF HEALTH SCIENCES, EXERCISE AND SPORT SCIENCES, POZUELO DE ALARCÓN, MADRID, SPAIN.

BACKGROUND: The effects of the menstrual cycle (MC) on neuromuscular performance (NP) and perception effort have presented mixed results(1-3). The aim of this study was to investigate the changes in half-squat velocity, perceived exertion and jump height during three different phases of the MC: early follicular phase (EFP), ovulation phase (OP) and mid-luteal phase (MLP).

METHODS: Fifteen professional footballers participated in the study (56.7 ± 4.1 kg, 24.0 ± 3.5 years). Footballers were evaluated during three different phases of the menstrual cycle with a crossover design. To verify EFP, the OP and MLP for each participant, a combination of calendar-based counting and ovulation tests was used(4). For each phase, mean propulsive velocity (MPV) in the 80%1RM half-squat, perceived exertion (PE) and jump height (JH) was measured. ANOVA test was used to identify differences between MC.

RESULTS: Performance for MPV (m/s) did not show significant differences through MC phases (EFP: 0.61 ± 0.1 ; OP: 0.59 ± 0.1 ; LP: 0.6 ± 0.1 ; $p > 0.17$). PE did not change significantly either (EFP: 7.4 ± 0.8 ; OP: 7.5 ± 0.8 ; LP: 7.53 ± 0.9 ; $p > 0.17$). However, JH (cms) showed significantly greater values ($p = 0.03$) in the LP (34.2 ± 4.3) compared to EFP (32.9 ± 3.9) and OP (33.03 ± 4.07).

DISCUSSION: In conclusion, neuromuscular performance measured as MPV at 80% 1RM and PE did not change during the 3 main phases of the MC. JH were greater in the luteal phase. These data suggest that female footballer maintain a similar muscle performance during different phases of the MC which may facilitate the organization of strength training. However, the individual responses should be considered to detect female athletes more prone to experience muscle performance declines during different phases of the MC(1). Moreover, it is important to find the dependent variables that could be more sensitive to changes in neuromuscular performance.

REFERENCES

1. Dam TV, Dalgaard LB, Sevdalis V, Bibby BM, Janse DE Jonge X, Gravholt CH, et al. Muscle Performance during the Menstrual Cycle Correlates with Psychological Well-Being, but Not Fluctuations in Sex Hormones. *Med Sci Sports Exerc.*;54(10):1678-89.
2. Romero-Parra N, Alfaro-Magallanes VM, Rael B, Cupeiro R, Rojo-Tirado MA, Benito PJ, et al. Indirect Markers of Muscle Damage Throughout the Menstrual Cycle. *Int J Sports Physiol Perform.*;16(2):190-8.
3. Pallavi LC, Souza UJD, Shivaprakash G. Assessment of Musculoskeletal Strength and Levels of Fatigue during Different Phases of Menstrual Cycle in Young Adults. *J Clin Diagn Res.*;11(2):CC11-3.
4. de Jonge XJ, Thompson B, Ahreum HAN. Methodological Recommendations for Menstrual Cycle Research in Sports and Exercise. *Med Sci Sports Exerc.*;51(12):2610-7.

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RELATIONSHIP BETWEEN PHYSICAL SELF-CONCEPT, EXERCISE ADDICTION AND ORTHOREXIA IN CROSSFIT PARTICIPANTS

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INTRODUCTION: The practice of physical exercise and a balanced diet with quality foods are healthy habits, although they can sometimes trigger behavioural addiction processes (1). A very fashionable type of training is CrossFit (CF), that would be framed in this type of High-Intensity Functional Training in which multiplanar movements with high demand for strength and executed at maximal intensity are performed (2). CF is also characterised by a philosophy of its affiliated centres based on real food and paleo diet, and slogans like "strong is the new sexy". The aim of this study was to examine the predictive relationship between physical self-concept, exercise addiction and orthorexia in CF athletes.

METHODS: The sample consisted of 135 CF athletes (M age = 34 ± 9) of which 53 were female that completed a battery of four validated questionnaires. In order to examine the predictive value of physical self-concept on exercise addiction, a linear regression was performed on the whole sample ($F=6.08$; $p<.01$; $R^2=.34$).

RESULTS: The physical condition variable of the physical self-concept was positively and linearly related to exercise addiction ($B=.28$; $t=4.38$; $p<.00$). The self-concept variable physical attractiveness showed a curvilinear relationship with exercise addiction ($B = -.13$; $t = -2.30$; $p < .02$). Participants who showed the highest values of physical self-concept on exercise addiction were re-examined. For males, in the regression analyses the model was not significant ($F=1.95$; $p<.11$; $R^2=.09$) but it was significant for females ($F=7.14$; $p<.001$; $R^2=.37$). Furthermore, we found that the physical fitness variable physical self-concept was positively and linearly related to exercise addiction ($B = .31$; $t = 3.56$; $p < .001$). On the other hand, the self-concept variable physical attractiveness showed a curvilinear relationship with exercise addiction ($B = -.20$; $t = -2.82$; $p < .01$). Finally, no significant relationship was found between physical self-concept and orthorexia.

DISCUSSION: CF practitioners with higher values in attractiveness and physical condition may present greater symptoms of exercise addiction. Therefore, adjusted physical self-concept seems to be shown as a predictive variable for exercise addiction and its associated effects.

REFERENCES

1. Bycura D, Feito Y, Prather C. Motivational Factors in CrossFit® Training Participation. *Heal Behav Policy Rev.* 2017;4(6):539–50.
2. Feito Y, Heinrich KM, Butcher SJ, Carlos Poston WS. High-intensity functional training (Hift): Definition and research implications for improved fitness. *Sports.* 2018;6(3).

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DECISIVE FACTORS FOR A GREATER PERFORMANCE IN LINEAR-MULTIDIRECTIONAL SPEED IN BASKETBALL PLAYERS BASED ON GENDER

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INTRODUCTION: Multidirectional speed actions are considered a key performance determinant in basketball match, therefore analyzing this skill is crucial to comprehend the basketball players' requirements. The present study aimed to analyze the relationship between functional movement and strength related variables upon linear and multidirectional speed based on gender. In addition, we aimed to determine the predictive effect of the analyzed sports performance related variables upon linear and multidirectional speed.

METHODS: Fifty basketball players (54% female) completed the assessment in which the weight-bearing dorsiflexion test, y-balance test, countermovement jump unilateral, drop jump unilateral, triple hop test unilateral, 10 meters of linear and multidirectional speed with different cut-off angles (45°, 90° and 180°) were performed. The speed variables were divided according to time execution into "low-responders" and "high-responders" to establish a comparison between performance groups. Both gender and performance were compared using Student's t-test and ANOVA. Multiple regression determined the multivariate influence of the independent variables as predictors of performance differentiating between gender.

RESULTS: Males showed higher performance in all tests assessed compared to females ($ES=0.62-2.05$; $p<0.034$). The faster athletes, the greater ankle mobility ($p<0.011$). Regarding both vertical and horizontal strength variables, all reflected significant differences on speed test performance ($p<0.021$), so that the stronger the athletes, athletes, the fastest they were. For the male players, the faster in linear speed, the greater change of direction deficit (CDDD) ($p<0.001$). Multiple regression analysis revealed that a slow and vertical stretch-shortening cycle (SSC) was the physical ability that best estimated change in speed tests in females (45-65% variance explained; $p<0.001$). In contrast, in men it was a fast and horizontal SSC (30-61% variance explained; $p<0.022$) that best predicted performance in speed actions.

CONCLUSIONS: The main findings of the present study suggest that gender should be considered to emphasize strength training in different vectors, as well as to determine the strength threshold within an individualized range of the force-velocity curve, especially when performing training programs focused on improving linear and multidirectional velocity. In addition, the faster the male players were, the higher the CDDD, so more emphasis on eccentric actions, braking and technique (1) might be recommended for basketball players.

REFERENCES

1. Freitas TT, Pereira LA, Alcaraz PE, Comyns TM, Azevedo PHSM, Loturco I. Change-of-Direction Ability, Linear Sprint Speed, and Sprint Momentum in Elite Female Athletes: Differences Between Three Different Team Sports. *JstrengthCondRes* [Internet]. 2022 Jan 1 [cited 2022 Jun 18];36(1):262-7.

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

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

METHODS: Two women ($58.6 \pm 2.69\text{kg}$; $161 \pm 2.97\text{cm}$; $25.3 \pm 0.91\text{years}$; $47.2 \pm 1.15\text{ml/kg/min}$) and four men ($71.5 \pm 4.21\text{kg}$; $176 \pm 2.09\text{cm}$; $22.3 \pm 1.57\text{years}$; $53.3 \pm 2.27\text{ml/kg/min}$) performed an incremental test protocol on a cycle-ergometer (Lode Excalibur, Germany) in three conditions (control, glycogen depletion and hyperthermia ($\sim 36^\circ\text{C}$)). The test started at 30W and increased 30W every 3 min until exhaustion. Capillary lactate levels were analysed using a lactate analyser (Biosen C-line-EKF Diagnostic, Germany) at rest, in the last 30 seconds of each step and immediately post-exhaustion, while HR was monitored constantly (Jaeger-CareFusion, Germany). Lactate threshold (LT) was determined through the D-max method (2) and the OBLA 4 method (3). HR and PO at these two LTs were compared among conditions using a two-way repeated measures ANOVA. Bonferroni post hoc tests were used. The effect size was calculated by partial eta-squared (η^2).

RESULTS: PO was significantly different between conditions at the LT calculated through Dmax ($p=0.012$; $\eta^2=0.588$) and OBLA 4 ($p<0.001$; $\eta^2=0.802$). PO at the Dmax LT was higher in glycogen depletion ($185 \pm 30.6\text{W}$) than hyperthermia ($162 \pm 19.6\text{W}$; $p=0.022$). PO at the OBLA 4 LT was higher in glycogen depletion ($217 \pm 37.9\text{W}$) than control ($200 \pm 35.3\text{W}$; $p=0.049$) and was higher in control than hyperthermia ($179 \pm 29.2\text{W}$; $p=0.026$). In contrast, HR was similar among conditions at the LT calculated using Dmax (control: $146 \pm 6\text{bpm}$; depletion: $147 \pm 10\text{bpm}$; hyperthermia: $149 \pm 11\text{bpm}$; $p=0.812$; $\eta^2=0.051$) and OBLA 4 (control: $153 \pm 6\text{bpm}$; depletion: $158 \pm 7\text{bpm}$; hyperthermia: $155 \pm 13\text{bpm}$; $p=0.571$; $\eta^2=0.131$).

DISCUSSION: In our study PO at the LT appears to change among conditions while HR does not seem to be affected, supporting previous results (1). Therefore, if the objective is to stimulate a metabolic pathway it is recommended to prescribe exercise intensity based on an internal variable, like HR, to induce the same physiological stimulus among conditions. Contrary, if the purpose is to analyse changes in performance among conditions it is suggested to observe mechanical variables, like PO at the LT. However, more research is needed to further investigate the relationship between these variables and whether these differences would be maintained in steady states.

REFERENCES:

- 1.Cheng B,et al.1992.DOI:10.1055/s-2007-1021309.
- 2.Skinner JS,et al.1980.DOI: 10.1080/02701367.1980.10609285.
- 3.Maunder E,et al.2021.DOI: 10.1080/02701367.1980.10609285.

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FRIDAY, DECEMBER 16, 2022

17:30 - 18:00 H

Comunicaciones orales 2 / Oral presentation 2

17:30 - 17:45 h

EFFECT OF ORAL CONTRACEPTIVES ON BONE (RE)MODELLING MARKER CONCENTRATIONS IN RESPONSE TO INTERVAL RUNNING IN ENDURANCE-TRAINED FEMALES

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INTRODUCTION: Beyond its reproductive function, estradiol is a key regulator of bone metabolism [1] and its deficiency promotes bone resorption [1]. Exercise may affect circulating concentrations of bone (re)modelling markers either by increasing bone formation marker (e.g., procollagen type 1 propeptide N (P1NP)) or decreasing bone resorption marker (e.g., type I collagen carboxy-terminal cross-linking telopeptide (β -CTX-1)) concentrations [2]. Given the high prevalence of oral contraceptive (OC) use in female athletes [3] and the resulting endogenous oestrogen levels decrease during the active pill-taking phase (APP) composed of synthetic estrogens [4], the aim of this study was to examine the bone (re)modelling marker responses to exercise in OC users.

METHODS: Eight OC users (age: 25.49 \pm 3.97 years; body fat: 24.74 \pm 6.8 5%; VO_{2max}: 48.68 \pm 6.39 ml/kg/min; endurance training: 267.19 \pm 82.54 min/week) carried out an interval running test consisting of eight bouts of 3 min at 85% of the maximal aerobic speed. Blood samples were taken to analyse P1NP and β -CTX-1 prior to and after this interval test in the different sex hormonal environments across the OC cycle: withdrawal (WP) and APP. Two-way repeated measures ANOVA was performed to compare OC cycle phases and pre-post exercise values.

RESULTS: Main effect for time (pre: 45.36 \pm 5.97 ng/ml; post: 57.73 \pm 11.24 ng/ml; p<0.001) and phase (WP: 54.17 \pm 11.52 ng/ml; APP: 49.18 \pm 10 ng/ml; p=0.003) was shown for P1NP, with a trend towards a significant time*phase interaction (p=0.051). No significant differences were shown in β -CTX-1 values for time (pre: 394.25 \pm 115.91 pg/ml; post: 397.56 \pm 137.94 pg/ml) and phase (WP: 422.56 \pm 142.99 pg/ml; APP: 369.25 \pm 102.51 pg/ml).

DISCUSSION: These results reflect a greater bone formation marker concentration in WP than in APP, suggesting that the cyclic decrease in endogenous estradiol levels observed during APP could alter the anabolic response to exercise whereas bone resorption was affected neither by time nor phase. This contrasts with the lack of differences shown by others between menstrual cycle phases [2], possibly due to the lower endogenous estradiol levels during the APP [4], despite the highest exogenous oestrogen concentration. These lower P1NP concentrations during the APP could endanger the long-term bone health of OC users since the anabolic response to exercise could be compromised owing to the effect of synthetic hormones on bone metabolism regulation.

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REFERENCES

1. Khosla S, et al.(2012) doi:10.1016/j.tem.2012.03.008
2. Guzman A et al.(2022) doi:10.1007/s00223-022-00970-4
3. Martin D et al.(2018) doi:10.1123/ijsspp.2017-0330
4. Martin D et al.(2021) doi:10.1016/j.bone.2021.115864

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EFFECTS OF PROTEIN-CARBOHYDRATE VERSUS CARBOHYDRATE ALONE SUPPLEMENTATION ON IMMUNE INFLAMMATION MARKERS IN ENDURANCE ATHLETES

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INTRODUCTION: The impact of ingesting carbohydrates alone or combined with proteins to support exercise immune adaptation in endurance athletes is scarcely investigated (Naclerio et al., 2019). The present study compares the effect of ingesting a combined protein-carbohydrate supplement vs. a carbohydrate-only supplement post-workout on immune inflammation markers following a 10-week periodized endurance training programme in well-trained athletes.

METHODS: Twenty-five men completed the study after being randomly assigned to one of the following intervention groups: combined protein-carbohydrate (PRO-CHO n=12, 31± 9 years, V' O₂peak 61.0 ± 5.6 ml.kg⁻¹.min⁻¹) or non-protein isoenergetic carbohydrate (CHO, n=13, 33± 8 years, V' O₂peak 60.6 ± 6.9 ml.kg⁻¹.min⁻¹). Treatment consisted of ingesting 24 g of assigned supplement, mixed with 250 ml of orange juice, once a day immediately post-workout (or before breakfast on non-training days). Measurements were conducted pre- and post-intervention on total leukocytes, leukocyte subsets (i.e., neutrophils, eosinophils, basophils, monocytes, and lymphocytes) and platelets. The inflammatory status was assessed by the neutrophil-to-lymphocyte ratio (NLR), the platelet-to-lymphocyte ratio (PLR), and the systemic immune inflammation index (SII).

RESULTS: Post-intervention, significant increases were observed for CHO group only for the three inflammatory markers: NLR (p=0.050, d=0.58); PLR (p=0.041, d= 0.60) and SII (p=0.004, d=0.81) but not for PRO-CHO (p>0.05).

CONCLUSION: Ingesting a post-workout protein- carbohydrate combined beverage promoted a more favourable immune status than carbohydrate only ingestion by attenuating cellular inflammation over a 10-week training period in endurance male athletes.

REFERENCES:

Naclerio F, Larumbe-Zabala E, Seijo M, Ashrafi N, Nielsen BV, Earnest CP (2019) Effects of Protein Versus Carbohydrate Supplementation on Markers of Immune Response in Master Triathletes: A Randomized Controlled Trial. Journal of the American College of Nutrition 38 (5):395-404.

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SATURDAY, DECEMBER 17, 2022

9:00 - 9:45 H

Comunicaciones orales 3 / Oral presentation 3

09:00 - 09:15 h

EFFECTS OF 12-WEEK RESISTANCE EXERCISE TRAINING IN FRAIL INSTITUTIONALIZED CENTENARIANS

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INTRODUCTION: The population aged 80 and over is growing faster than any other age groups in the world, with the number of centenarians rapidly increasing (1). The oldest-old are at high risk of intrinsic capacity deterioration with subsequent loss of functional independence, which translates into increased personal vulnerability and health cost (2). The objective of the present study was to determine whether a resistance training intervention can improve physical function, functional independence, frailty and health-related quality of life in frail institutionalized elderly over 100 years old.

METHODS: The study was a multicenter randomized controlled trial, conducted at 11 geriatric nursing homes in Spain. A total of 12 frail institutionalized centenarians (101.33 ± 2.06 yrs, 83.3% female) were included. Centenarians were randomized to an intervention ($n = 6$) or a control ($n = 6$) group. The intervention group performed supervised resistance training (1-3 sets of 8-10 repetitions as fast as possible, at 50-70% of the estimated one-repetition maximum; 8 exercises) at 2 sessions/week for 12 weeks. The following outcomes were assessed before and after the 12 weeks: Physical function [Short Physical Performance Battery (SPPB), Physical Performance Mobility Examination (PPME), isometric knee extension strength (IKE) and 30-second Sit-to-stand], functional independence [Barthel index], frailty [Fried's Phenotype and FTS-5] and health-related quality of life [EuroQoL-5D index (EQ-5D) and Visual Analog Scale (VAS)] were evaluated in both groups before and after the intervention.

RESULTS: Repeated measures ANOVA revealed significant group-by-time interaction ($p < 0.05$) for all the measured outcomes. After the 12-week training period, the intervention group significantly improved all the variables except for FTS-5: PPME (Baseline: 3.8 ± 2.6 points vs. Post-training: 6.5 ± 3.3 points), IKE (9.7 ± 4.3 kg vs. 12.5 ± 3.9 kg), Barthel index (32.50 ± 18.64 points vs. 50.00 ± 19.24 points), Fried's Phenotype (3.83 ± 0.75 vs. 3.00 ± 0.63) and EQ-5D (0.112 ± 0.118 vs. 0.233 ± 0.090) among others (all $p < 0.05$).

DISCUSSION: To our knowledge this is the first time that the effects of 12-week resistance training have been assessed in centenarians. Our findings suggest that no one is too old to benefit from resistance training, as we found a recovery of physical function and improvement of quality of life. Importantly, no major adverse events occurred during the intervention period despite the frailty of the centenarians. Therefore, supervised resistance exercise training could be considered a safe and effective intervention even in frail institutionalized people over 100 years old.

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REFERENCES:

United Nations. World Population Ageing 2019. data via website.
Valenzuela PL. et al. Compr Physiol. 2019;9(4):1281–304.

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DOES SKELETAL MUSCLE OF CYSTIC FIBROSIS ADULT PATIENTS RESPOND TO A STRENGTH TRAINING PROGRAM?

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INTRODUCTION: Cystic Fibrosis (CF) is a genetic disease caused by mutations in the Cystic Fibrosis Transmembrane conductance Regulator (CFTR) gene that encodes for an ion channel. Along with lung impairment, other tissues are also affected by the mutations. Recently it has been observed that it directly affects muscle tissue, causing dysfunction (1). Adult CF population has increased, up to 57.2% of total CF population according to the last registry (2). The exact magnitude of these deficiencies in CF adult patients have not been fully elucidated. Most exercise programs within the treatments are focused on cardiovascular training and few are focused on the muscle (3). Therefore, our main aim was to assess the effect of an 8-week telematic and supervised strength exercise program on muscle strength and body composition in adult patients with CF.

METHODS: A Randomized Controlled Trial was conducted in CF adult patients from Hospital Universitario La Princesa. Patients were divided into 2 groups: Exercise (EG) and Control Group (CG). EG performed an 8-week telematic and supervised strength training program, 3 times a week, 1 hour a day. CG followed life style recommendations of their doctor. The following variables were evaluated: i) upper and lower limbs strength on disc and pulley machines: Leg Press (LP) and Lat Pulldown (LPD); ii) body composition using dual-energy x-ray absorptiometry (DXA): Body Adiposity Index (BAI), Fat Mass Index (FMI), total and segmental muscle mass; and iii) lung function using spirometry: Forced Expiratory Volume in 1 second (FEV1).

RESULTS: Twenty-three patients (EG=14, CG=9) aged 32.13 ± 7.72 years were included. In terms of body composition, significant decreases in BAI and FMI were observed ($F[1,21]=16,264$; $p<0.05$; $\eta^2 p=0,436$) and ($F[1,21]=16,840$; $p<0.05$; $\eta^2 p=0,445$), respectively. Significant increases in muscle mass were also observed, specifically in the trunk ($F[1,21]=4,920$; $p<0.05$; $\eta^2 p=0,190$). Regarding the strength, significant improvements were observed in LP ($F[1,21]=7,799$; $p<0.05$; $\eta^2 p=0,281$). There were no significant changes in the LPD.

DISCUSSION AND CONCLUSION: Despite the structural failure of the CFTR receptor at muscular level, muscle responds to strength training, improving strength of the lower limbs. Despite the endocrine and nutrient absorption problems, the 8-week telematic and supervised strength exercise program achieved significant improvements in the body composition of adults with CF, with a decrease in fat mass and an increase in muscle mass.

REFERENCES

1. Troosters, T. et al. Eur. Respir. J. (2009)
2. Cystic Fibrosis Foundation. (2020)
3. Radtke, T. et al. Cochrane Database of Syst. Rev. (2017)

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ANÁLISIS DE LA RESPUESTA INMUNE INDUCIDA POR EL ENTRENAMIENTO DE FUERZA EN HIPOXIA MODERADA

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INTRODUCCIÓN: Numerosos estudios apoyan la vinculación del estrés por la exposición a un ambiente hipóxico y la activación del sistema inmune a través de HIF. El HIF-1 α es clave en la movilización de células inmunitarias y la supervivencia celular del músculo esquelético (1). Actualmente la relación entre el entrenamiento de fuerza y la respuesta del sistema inmune en hipoxia sistémica es controvertida (2). El objetivo de este estudio es analizar el efecto de un periodo de entrenamiento de fuerza en hipoxia moderada sobre la modulación de la respuesta inmune.

MÉTODO: Veinte varones ($22,75 \pm 3,73$ años; $176,4 \pm 5,93$ cm; $73,01 \pm 10,97$ kg) participaron en un programa de entrenamiento de 8 semanas (3 sesiones/semana) en hipoxia natural (HH) intermitente (2320m; CAR Sierra Nevada) o normoxia (690m). El programa comprendió una rutina full-body de 6 ejercicios funcionales (3x10 repeticiones; 70%1RM; 90s descanso). Antes y después entrenamiento se determinaron los marcadores inmunológicos (monocitos, neutrófilos, linfocitos) en suero mediante citometría por fluorescencia (Sysmex Xt-2000) y la fuerza máxima (1RM) en sentadilla y press de banca.

RESULTADOS: Los resultados arrojaron una mejora grande en la RM en ambos grupos en sentadilla ($ES > 1.11$; IC 0.29, 2.25; $p < 0.05$) y de pequeña a moderada en press banca ($ES > 0.47$; IC -0.20, 1.33; $p > 0.05$). Comparado con N, la HH solo registró un incremento pequeño pero significativo en la 1RM en sentadilla ($D = 0.18 \pm 0.14$ vs 0.30 ± 0.1 kg·kg $^{-1}$ peso corporal respectivamente; $p = 0.043$).

DISCUSIÓN: En concordancia con otros estudios, el entrenamiento de fuerza en HH se revela como una estrategia potencialmente beneficiosa en la ganancia de fuerza con respecto al mismo entrenamiento en N (3) sin llegar a afectar la respuesta inmune del atleta. Incluso el ejercicio en HH podría modificar la expresión de PGC1 α a través de HIF-1 α (4) e inducir cambios en la oxidación de ácidos grasos y en la biogénesis mitocondrial, contribuyendo hacia un fenotipo antiinflamatorio M2 (5), que juega un papel fundamental en la supervivencia celular (6). Las ganancias de fuerza en condiciones de HH posicionan esta condición como una herramienta real en la mejora de rendimiento deportivo sin comprometer el perfil inmunológico o salud del atleta.

REFERENCIAS

1. Krzywinska E, et al. *Biomedicines*. 2018;6(2):56.
2. Marcucci-Barbosa LS, et al. *Sport Sciences for Health*. 2020;16(2):239-48.
3. Van Doorslaer de Ten Ryen S, et al. *The FASEB Journal*. 2021;35(8):e21773.
4. Fan W, et al. *Current opinion in cell biology*. 2015;33:49-54.
5. Palazon A, et al. *Immunity*. 2014;41(4):518-28.
6. Yang M, et al. *Scientific reports*. 2015;5(1):1-12.

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VELOCITY AND LOAD EFFECTS IN MECHANIC WORK DURING ECCENTRIC PHASE IN JUMP SQUAT

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An essential parameter for the effectiveness of strength training programs is Mechanical Work (MW). MW is the product of the amount of force exerted by displacement during the task (1). This variable could be important in explaining performance in sporting actions such as jumping. The literature, within the force generated during the entire displacement, considers the capacity to generate force in the eccentric phase to be relevant, but few studies have evaluated the influence of the MW performed during the final moments of the eccentric phase. The aim of this study is to determine the influence of the different eccentric execution speeds on the MW in the jump squat, and how this variable influences the performance of the concentric phase. A total of 14 male participants performed four sets of four repetitions at 50% of their 1RM, with four different tempos of the eccentric phase (5s, 2s, maximum speed with stop and maximum speed with continuous jumps), in the half squat with jump exercise. The exercise was performed on a Smith machine. A linear encoder (T-Force System, Ergotech, Spain, Murcia) was used to measure the estimated 1RM, displacement (cm) and time (ms). For data analysis, a two-factor ANOVA and a post-hoc analysis with Bonferroni adjustment for pairwise comparisons were performed. Pairwise comparisons for strength in the first 100 milliseconds of the concentric phase and for mechanical work in the eccentric phase showed differences between all times ($P<0.05$), except for jumping at maximal velocity with standing versus maximal velocity with continuous jumping. It is concluded that as the speed of the eccentric phase increases, greater MW and greater strength are achieved in the first 100 milliseconds of the concentric phase. These results are in line with other studies (2). This may help athletes to improve jumping performance by taking into account mechanical work as an exercise prescription.

REFERENCES:

- McBride, J. M., McCaulley, G. O., Cormie, P., Nuzzo, J. L., Cavill, M. J., & Triplett, N. T. (2009). Comparison of methods to quantify volume during resistance exercise. *The Journal of Strength & Conditioning Research*, 23(1), 106-110.
- Handford, M. J., Bright, T. E., Mundy, P., Lake, J., Theis, N., & Hughes, J. D. (2022). The need for eccentric speed: A narrative review of the effects of accelerated eccentric actions during resistance-based training. *Sports Medicine*, 1-23.

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PRESENTACIÓN DE PÓSTERES / POSTER PRESENTATION

FRIDAY, DECEMBER 16, 2022

11:30 - 12:00 H

Presentación de pósteres 1 / Poster presentation 1 - PP01

PP01 - FISIOLOGÍA DEL EJERCICIO / EXERCISE PHYSIOLOGY

11:30 - 12:00 h

ACTIVACIÓN ELECTROMIOGRÁFICA DEL PECTORAL MAYOR DURANTE EJERCICIOS DE FUERZA DE EMPUJE HORIZONTAL

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INTRODUCCIÓN: El objetivo principal de esta revisión fue recopilar información sobre la activación del pectoral mayor en ejercicios de fuerza de empuje horizontal en los que se emplea una carga externa.

MÉTODO: Se realizó una revisión en tres bases de datos distintas (PubMed, Web of Science y SPORTDiscus) hasta el 4 de mayo de 2022 bajo los criterios PRISMA (2020) (1). Los criterios de inclusión fueron artículos que incluyeran a) sujetos sanos, b) adultos jóvenes entrenados, c) ejercicios de fuerza de empuje horizontal con carga externa, d) análisis de la activación del pectoral mayor mediante electromiografía. Por otra parte, se descartaron aquellos estudios que incluían a) uso de resistencias variables (e.g., cadenas, bandas elásticas), b) uso de superficies inestables, c) análisis en fatiga, d) metodologías específicas de entrenamiento (e.g., rest-pause, drop-set, entrenamiento con restricción de flujo sanguíneo, isométricos). Incluyéndose finalmente 22 artículos en la revisión sistemática.

RESULTADOS: En total, 362 sujetos entrenados (257 hombres, 31 mujeres y 74 cuyo sexo no fue especificado; 40 sujetos competían en powerlifting) fueron sometidos a la realización de 11 variantes de ejercicios de fuerza de empuje horizontal, las cuales también presentaban modificaciones técnicas (e.g., diferentes tipos de agarre, materiales). Se observó una alta heterogeneidad de los resultados principalmente debida a las diferentes unidades de medida utilizadas en el registro de la actividad electromiográfica (2).

DISCUSIÓN: La mayoría de los ejercicios reportaron una mayor activación cuando aportaban la carga empleada. Se demostró que un mayor rango de movimiento no siempre implica una mayor activación muscular, ya que el press banca con barra libre obtuvo mejores resultados en cuanto activación en comparación a utilizar mancuernas o la cambered bar. Sabiendo que la activación no es mayor con un mayor rango de movimiento, se podría recomendar el uso de ejercicios con rango de movimiento limitado para sujetos que deban evitar rangos extremos y deseen obtener buenos niveles de activación muscular. En el estudio de las diferentes porciones del pectoral mayor los resultados también fueron muy diversos, impidiendo sacar conclusiones claras respecto a qué ejercicios o grados de inclinación implican en mayor medida una porción concreta del músculo. En la porción abdominal del pectoral mayor, un estudio mostró que empleando un agarre ancho la activación aumentaba de manera significativa. Sin embargo, los resultados deben ser interpretados con cautela al proceder únicamente de un estudio.

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ANÁLISIS DE PRESIÓN INTRAOCULAR EN EL EJERCICIO DE SENTADILLA: COMPARACIÓN ENTRE BANDAS ELÁSTICAS Y DISCOS

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INTRODUCCIÓN: La ciencia ha generado un debate sobre las consecuencias del entrenamiento de la fuerza en la presión intraocular (PIO), con artículos asegurando aumentos y otros encontrando disminuciones. Sólo un estudio previo ha analizado el uso de bandas elásticas para cargar la barra en sentadillas y ha obtenido disminuciones de PIO similares a cuando eran utilizados discos. Sin embargo, el conocimiento en este campo continúa siendo escaso y más estudios son necesarios. Por tanto, el objetivo del presente estudio fue analizar las respuestas de la PIO al ejercicio de sentadilla de acuerdo con el material utilizado para cargar la barra [elásticos (resistencia variable) versus discos (resistencia constante)] e intensidad (40, 55, 70, 85 y 100% de una repetición máxima [1RM]).

MÉTODOS: Doce sujetos físicamente activos (5 mujeres, 7 hombres; 24.42 ± 3.83 años) participaron voluntariamente en el estudio. Todos los procedimientos cumplieron con los principios de la Declaración de Helsinki. En total se realizaron 10 series de sentadilla de manera aleatoria. Las sentadillas se ejecutaron a máxima velocidad intencionada en la fase concéntrica. Se realizaron repeticiones hasta alcanzar un 10% de pérdida de velocidad. Tras la firma del consentimiento informado, se midieron los valores fisiológicos en reposo y tras cada condición. Además de la PIO, se evaluaron como variables de rendimiento el volumen de repeticiones, esfuerzo percibido y potencia máxima. Se llevaron a cabo un análisis de la varianza y pruebas post-hoc con ajustes LSD.

RESULTADOS: La PIO se vio disminuida respecto a los valores basales de manera significativa en todas las condiciones excepto en la condición consistente en el 100%1RM con discos. En esta condición las diferencias con los valores basales no fueron significativas. Respecto a las diferencias entre condiciones, sólo se observaron diferencias significativas entre el 100%1RM con discos y la mayoría de las demás condiciones. Las bandas elásticas permitieron un menor esfuerzo percibido frente a valores de potencia mayores y un mayor volumen de repeticiones.

DISCUSIÓN: Todas las condiciones estudiadas parecen no ser peligrosas para sujetos que deban evitar aumentos de presión intraocular. Teniendo en mente los valores de PIO y de rendimiento, los sujetos en riesgo de padecer presión intraocular elevada y requieran obtener un mayor volumen de entrenamiento a máxima velocidad podrían beneficiarse del uso de las bandas elásticas para cargar la barra en sentadilla, siendo además el esfuerzo percibido menor.

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COMPARISON BETWEEN THE DETECTION OF THRESHOLDS USING LACTATE AND SMO2 IN DIFFERENT MUSCLES IN CYCLING

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INTRODUCTION: There are different models to calculate the metabolic thresholds using lactate (1,2). In recent years, muscle oxygen saturation (SmO₂) assessment using near-infrared spectroscopy (NIRS) has been suggested as a non-invasive method to detect these thresholds. However, most of the investigation was focused on only one muscle and little is known about detection can be different in each muscle. The aim was to compare the detection of the first and second lactate thresholds (LTP1 and LPT2) using lactate and SmO₂ data in different muscles during a cycling incremental test.

METHODS: 19 trained triathletes participated of this study (11 men and 8 women) with an age 23 ± 6 years, height 1.73 ± 0.1m, and body mass 64.9 ± 8.7kg. Participants performed an incremental test in a cycle ergometer (Cardigirus W3, Spain) with 3-min steps and power increments of 0.5W.kg⁻¹ in the first 10-sec of each step and with a cadence of 90 ± 10rpm. The test ended when the cadence was below 80rpm or the participant decided to give up. NIRS dispositives (Moxy, EE. UU.) were located in eight positions; right and left sides of vastus lateralis, tibialis anterior, gastrocnemius, and dominant side of the triceps sural and biceps femoris. Lactate (Lactate Pro2, Netherlands) was determined at the last 30-sec of each step. Differences between the detection of the threshold using lactate and SmO₂ data were assessed using Student's t-test. Intraclass correlation coefficient (ICC) between both methods was assessed and classified as: 1.00-0.81 (excellent), 0.80-0.61 (very good), 0.60-0.41 (good), 0.40-0.21 (reasonable) and 0.20-0.00 (deficient).

RESULTS: No differences between lactate and SmO₂ detection of LTP1 and LTP2 were observed in both vastus lateralis, and at LTP2 in biceps femoris ($p>0.05$). The other muscles had differences in both thresholds ($p<0.05$). The ICC varied from excellent (ICC 0.82-0.81 in biceps femoris, gastrocnemius and tibialis anterior in LTP2), to good (ICC 0.45-0.58 in vastus lateralis in LTP2 and biceps femoris, vastus lateralis and triceps in LTP1 (ICC 0.56-0.45), with the lower values at tibialis anterior in LTP1 (ICC 0.39-0.27).

DISCUSSION: The detection of thresholds using NIRS appears adequate. However, power output producing muscles during pedaling detected very good thresholds in muscles that are used during the exercise (3), while stabilizers muscles of position the SmO₂ detected the threshold before that the lactate. The NIRS would be a good technology for detecting thresholds.

REFERENCES

- Hofmann & Tschakert (2017)
Skinner & Mclellan (1980)
Salas-Montoro et al. (2022)

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EFFECTOS DE RESISTENCIAS VARIABLES Y CONTINUAS SOBRE PRESIÓN INTRAOULAR Y PRESIÓN ARTERIAL EN ENTRENAMIENTO DE POTENCIA

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INTRODUCCIÓN: El empleo de bandas elásticas (BE) para cargar la barra en sentadillas ha mostrado adaptaciones agudas similares de presión intraocular (PIO) y presión de perfusión ocular (PPO) en comparación con discos. Sin embargo, las BE permiten realizar más repeticiones, probablemente debido a movilizar menos kilogramos por debajo del punto en que las BE son aplicadas (normalmente bipedestación). Literatura previa aplicó BE con los kilogramos correspondientes inmediatamente encima del sticking point y obtuvo una carga mayor en bipedestación junto a un mayor volumen de repeticiones. El presente estudio plantea comparar las adaptaciones agudas de PIO, PPO y otras variables relacionadas con salud ocular (presión arterial [PA], frecuencia cardíaca [FC]) frente a al uso de discos o BE para cargar la barra en sentadillas.

MÉTODO: Catorce sujetos entrenados (9 hombres; edad: 24.21 ± 3.93 años; % graso: $14.33 \pm 5.37\%$; 1RM: 105.54 ± 28.14 kg) realizaron aleatoriamente dos condiciones del ejercicio de sentadilla al 70% de una repetición máxima (una utilizando discos y otra aplicando BE con los kilogramos correspondientes a 130° en la articulación de la rodilla). Las sentadillas se ejecutaron a máxima velocidad intencionada en la fase concéntrica. Se realizaron repeticiones hasta alcanzar un 10% de pérdida de velocidad. Se midieron los valores fisiológicos en reposo y tras cada condición. Como variables de rendimiento, se midió la potencia máxima, repeticiones realizadas, kilogramos en bipedestación, 130° de rodilla y paralela del fémur con el suelo. Se empleó un análisis de varianza de medidas repetidas y análisis post-hoc con ajustes de Bonferroni.

RESULTADOS: En comparación con los valores pre-ejercicio, la PIO disminuyó y la PPO, PA y FC incrementaron tanto con el uso de discos como de BE. Sin embargo, las diferencias entre condiciones fueron no significativas. Los kilogramos en bipedestación fueron mayores para la condición con BE y menores en el punto más profundo. El número de repeticiones realizadas y la potencia máxima fueron significativamente mayores para la condición con BE.

DISCUSIÓN: Ambas condiciones examinadas no parecen ser contraproducentes para la salud cardiovascular y ocular. Mientras que no existen diferencias significativas entre el uso de BE y discos, las BE permitieron un mayor número de repeticiones sin pérdida de velocidad con más kilogramos en bipedestación, lo cual permitió obtener valores de potencia máxima más elevados. Teniendo los resultados en mente, las BE parecen un material adecuado para cargar la barra cuando se busque un mayor volumen de trabajo a alta velocidad sin comprometer parámetros relacionados con salud ocular.

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PP01. Entrenamiento en mayores / Training in the elderly**BREAKING DOWN THE RISK OF FALLS IN THE ELDERLY: FALLSKIP**

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Balance and gait are the major predisposing factors for falls in older adults and safe and effective gait is a clear indicator and predictor of quality of life and life expectancy 1. There are several classifications of gait components: gait pattern and dynamic balance control; rhythm, speed and variability 3.

Therefore, it is necessary to intervene on it from different components of exercise.

The aim of this study is to analyse the different components of gait and the risk of falls in older adults using FallSkip technology and monitor their evolution after the intervention.

67 adults over 72 years of age were assessed using the FallSkip device to determine the risk of falls. 41 participated in a multicomponent exercise programme for 9 months, 2 days per week, while 26 participated as control group.

The intervention group went from a centre of gravity swing of 40.06 mm² (ED 26) to 37.6 mm² (ED 21.04) p=0.015, while the control group increased from 41.38 mm² (ED 28) to 52.51 mm² (ED 26.5) p=0.0047. The centre of gravity swing during walking of the intervention group increased from 76.2 mm² (SD 18.36) to 74.69 mm² (SD 19.12), the control group increased from 77.40 mm² (SD 19.91) to 82.31 mm² (SD 17.36) p=0.016. The intervention group increased from 225.5 W (ED 40.4) to 256.8 W (ED 46.6) p=0.0075 of power when lifting. The control group reduced it from 225.1 W (ED 41.8) to 221.2 W (ED 39.2) p=0.0280. The total test time was reduced by the intervention group from 18.68 s (ED 2.09) to 18 s (ED 2.2), the control group from 18.89 s (ED 2.04) to 19.79 s (ED 2.1). The results of the present study show that after 9 months the control group lost stability in both standing and walking. However, the intervention group was able to maintain and improve gait parameters.

REFERENCES:

1. Lord, S. et al. Independent Domains of Gait in Older Adults and Associated Motor and Nonmotor Attributes: Validation of a Factor Analysis Approach. *Journals Gerontol. Ser. A* 68, 820–827 (2013).
2. Vergheese, J., Wang, C., Lipton, R. B., Holtzer, R. & Xue, X. Quantitative gait dysfunction and risk of cognitive decline and dementia. *J. Neurol. Neurosurg. Psychiatry* 78, 929–935 (2007).

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PP01. Entrenamiento en mayores / Training in the elderly

DOES SUPERVISION DURING EXERCISE INFLUENCE STRENGTH IMPROVEMENT IN OLDER ADULTS? A SYSTEMATIC REVIEW AND META-ANALYSIS

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INTRODUCTION: Although it has previously been shown that unsupervised home-based (UHB) exercise training can provide health benefits for reducing the detrimental effects of aging (1), we still do not know how effective an UHB exercise program can be compared to one that is supervised. Thus, the aim of this systematic review and meta-analysis was to analyze whether a supervised exercise program improves muscle strength variables significantly more than an unsupervised program in older adults.

METHODS: Two researchers systematically searched five databases (PubMed, CINAHL, PsycInfo, SPORTDiscus and Web of Science) up to 04/09/2022. The electronic search was supplemented by a thorough manual review. Randomized controlled trials that compare supervised center-based (SCB) versus UHB in older adults (≥ 60 yrs) were included. The outcomes analyzed were upper-body and lower-body strength using handgrip and knee extension tests, respectively.

RESULTS: A total of 9,191 articles were found. Finally, 12 studies were included in the final synthesis (N= 1,238; mean age 67 yrs). A total of 11 studies analyzed lower-body strength while 4 of them analyzed upper-body strength. SCB training significantly improved lower-body strength measured through the knee extension test ($SMD=0.18$, 95%CI=0.06-0.30, $p=0.003$) compared to UHB, with no heterogeneity (0%) but signs of publication bias (Begg's test $p=0.043$). Sensitivity analyses confirmed significance when removing each study at a time. No greater effectiveness was found in the upper-body strength variable measured through the handgrip test for SCB training compared to training without the supervision of a professional ($SMD=0.13$, 95%CI=-0.18-0.45, $p=0.404$), with no heterogeneity (37.12%) nor signs of publication bias (Begg's test $p=0.154$).

DISCUSSION: Training under the supervision of a professional in a center improved measures of lower-body strength to a greater extent than training at home without direct supervision. However, no additional benefits were found for the upper-body strength variable. This may be due to the small number of studies that analyzed this outcome as well as the fact that most exercise programs focus exclusively on lower body exercises. Our analyses suggest that SCB exercise sessions are recommended, whenever possible, to improve lower-body strength in older adults.

REFERENCES:

- (1) Mañas, A., et al. (2021). Ageing Research Reviews, 69, 101368.

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ANÁLISIS DEL RENDIMIENTO NEUROMUSCULAR, ROM Y TÉCNICA DE EJECUCIÓN EN UN WOD DE CROSSFIT

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INTRODUCCIÓN: El CrossFit es una modalidad de entrenamiento con gran popularidad (1) que utiliza movimientos olímpicos (2), de alta complejidad, en situaciones de fatiga extrema (3). Sin embargo, apenas existen estudios que hayan analizado cómo influye esa fatiga en la técnica y rendimiento neuromuscular. Esta investigación tuvo como objetivo analizar la influencia de la fatiga en el rendimiento neuromuscular y la técnica de ejecución durante un WOD de CrossFit.

Método: Para ello, 10 sujetos con experiencia en entrenamiento de fuerza y CrossFit, ($80,26 \pm 10,77$ kg; $1,76 \pm 0,05$ m; $36,2 \pm 5,9$ años; $4,87 \pm 1,51$ años experiencia) realizaron un Snatch (30 repeticiones de snatch, con 61 kg, en el menor tiempo posible). Se analizó la velocidad media propulsiva (MVP) pre, durante y post WOD, la altura del salto CMJ pre y post WOD, así como la técnica de ejecución durante el WOD.

RESULTADOS: Respecto al rendimiento neuromuscular, los resultados mostraron una reducción significativa de valores post-WOD respecto a los obtenidos Pre-WOD: altura CMJ ($-7,59\% \pm 4,53$; $p<0,05$), MVP ($-4,72\% \pm 0,16$; $p<0,05$), y ROM ($-1,88\% \pm 16,17$; $p<0,05$). Respecto a la técnica de ejecución, se observó un deterioro significativo y progresivo conforme avanzó el WOD, con una disminución del 65,44%; ($p<0,001$) entre las primeras y últimas repeticiones, y del 49,23% ($p<0,05$) desde la mitad del WOD hasta el final.

CONCLUSIONES: Por tanto, la fatiga propia de realizar un ejercicio complejo a altas repeticiones parece tener una influencia significativa y negativa en el rendimiento neuromuscular, tanto en acciones sin carga como en el ejercicio de Snatch. Dicha fatiga parece afectar especialmente a la calidad de la ejecución técnica, siendo mayor cuantas más repeticiones se acumulan.

APLICACIONES PRÁCTICAS: Esta información podría ser fundamental para los entrenadores ya que les ayudará a programar la carga y las repeticiones atendiendo a la capacidad de mantener la calidad de ejecución técnica durante series de largas repeticiones y progresar evitando errores graves que podrían repercutir en la salud de los deportistas.

REFERENCIAS:

1. Claudino, J. G. et al. (2018). CrossFit Overview: Systematic Review and Meta-analysis. *Sports medicine - open*, 4 (1), 11.
2. Fisker, F. Y. et al. (2017). Acute Tendon Changes in Intense CrossFit Workout: An Observational Cohort Study. *Scandinavian Journal of Medicine and Science in Sports* 27 (11): 1258-62.
3. Sprey, Jan W.C. et al. (2016). An Epidemiological Profile of CrossFit Athletes in Brazil. *Orthopaedic Journal of Sports Medicine* 4 (8).

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ANÁLISIS DESCRIPTIVO DEL PERFIL DE FUERZA – VELOCIDAD EN JUDOKAS DE COMPETICIÓN

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INTRODUCCIÓN: El judo se considera un deporte de alta intensidad que demanda grandes cantidades de producción de fuerza muscular en sus distintas manifestaciones (1). Ya que las acciones ejecutadas a alta intensidad son decisivas para el rendimiento deportivo en judo, se hace importante la aplicación de la mayor cantidad de fuerza en régimen de velocidad. Basándonos en la metodología de relación fuerza-velocidad (F-V) de obtención de datos significativos individualizados implementables en los programas de entrenamiento (2), a través de distintos tipos de saltos verticales, se puede definir una relación del perfil de F-V lineal (3).

OBJETIVO: Conocer con precisión el perfil de F-V en judoca de competición (categoría nacional). Método. 22 judokas masculinos (edad: $21,2 \pm 4,4$ años; peso: $78,7 \pm 11,5$ kg; altura: $178,8 \pm 6,7$ cm; IMC: $31,9 \pm 2,4$ kg/m²) fueron evaluados en el perfil de F-V, según las directrices éticas de la declaración de Helsinki (2008) para la investigación en seres humanos. Realizaron un squat jump (SJ) con diferentes cargas (0, 25, 50, 75 y 100% del peso corporal del judoka) de manera progresiva. La altura de los saltos se determinó con el sistema OptoGait®, obteniéndose además la fuerza máxima (F0), velocidad máxima (V0), potencia máxima (Pmax), desviación del perfil ideal de F-V (Sfv), perfil óptimo de F-V (Sfvopt), así como las diferencias entre Sfv y Sfvopt (FVimb%).

RESULTADOS: Los valores más altos fueron obtenidos en F0. Además, se encontraron diferencias significativas entre Sfv y FVimb%. ($p < 0,001$).

DISCUSIÓN: Parece probada la eficacia del perfil de F-V como método fiable y económico de evaluación sobre el estado actual de cada judoka (de manera individual).

CONCLUSIÓN: Como aplicación práctica, se puede señalar que el método del perfil de F-V permite a los entrenadores y preparadores físicos ajustar los objetivos del entrenamiento y sus cargas para conseguir un óptimo rendimiento físico, por lo que es un método muy implementable de manera cotidiana.

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DIETARY NITRATE INGESTION DOES NOT IMPROVE NEUROMUSCULAR PERFORMANCE IN MALE ROCK CLIMBERS. A RANDOMIZED, DOUBLE-BLIND, PLACEBO-CONTROLLED STUDY.

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INTRODUCTION: Dietary nitrate ingestion in beetroot juice (BJ) form is commonly used as an ergogenic aid in endurance (Jones et al., 2021) and team sports modalities (Thompson et al., 2016). However, the effect of this supplement in rock climbing performance is barely studied. The purpose of the current study was to investigate the effect of acute BJ ingestion on neuromuscular and biochemical parameters in male rock climbers.

METHODS: Ten physically active rock climbers (28.8 ± 3.7 years) underwent a battery of neuromuscular tests consisting of: countermovement jump (CMJ) and squat jump (SJ) test, isometric handgrip strength, pull-up failure and half crimp test. Participants performed the neuromuscular test battery twice in a cross-over manner separated by 10 days, 150 minutes after having consumed either 70 mL of BJ (6.4 mmol NO₃-) or a 70 mL placebo (0.0034 mmol NO₃-). In addition, nitrate (NO₃-) and nitrite (NO₂-) saliva concentrations were analyzed, and a side effects questionnaire related to ingestion was administrated.

RESULTS: No differences were reported in the different neuromuscular parameters measured such as countermovement jump ($p = 0.960$; ES = 0.03), squat jump ($p = 0.581$; ES = -0.25), isometric handgrip strength (dominant/non dominant) ($p=0.459$ -0.447; ES=0.34-0.35), pull-up failure test ($p=0.272$; ES= 0.51) or maximal isometric half crimp test ($p=0.521$ -0.824; ES= 0.10-0.28). Salivary NO₃- and NO₂- increased significantly post BJ supplementation comparing placebo ($p < 0.001$) while no side effects associated to ingestion were reported ($p=0.330$ -1.000) between conditions (BJ/placebo ingestion). Conclusion: Acute dietary nitrate supplementation (70 mL, 6.4 mmol NO₃-) did not produce any statistically significant improvement in neuromuscular performance or side effects associated in male rock climbers.

REFERENCES:

Jones AM, Vanhatalo A, Seals DR, Rossman MJ, Pilkova B, Jonvik KL (2021) Dietary Nitrate and Nitric Oxide Metabolism: Mouth, Circulation, Skeletal Muscle, and Exercise Performance (2021). *Med Sci Sports Exerc*, 2021, 53(2): 280-294.

Thompson C, Vanhatalo A, Jell H, Fulford J, Carter J, Nyman L, Bailey SJ, Jones AM. (2016) Dietary nitrate supplementation improves sprint and high-intensity intermittent running performance. *Nitric Oxide*. 2016 30; 61:55-61.

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SATURACIÓN DE OXÍGENO Y PERDIDA DE SALTO EN COMPETICIONES SIMULADAS DE VOLEIBOL PLAYA

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INTRODUCCIÓN: La saturación de oxígeno muscular (SmO₂) medida mediante espectroscopía de infrarrojos cercano (NIRS) se utiliza como indicador de rendimiento muscular (1), debido a su no invasividad, su aplicación en el estudio de la fatiga muscular puede ser de gran interés junto a técnicas ya consolidadas como la pérdida de salto en contramovimiento (CMJ).

OBJETIVO: Combinar el dispositivo NIRS y la pérdida de salto para evaluar la fatiga producida en competición en jugadores de voleibol playa.

Métodos: Se llevó a cabo una competición simulada de voleibol playa en la que participaron 8 jugadores de nivel nacional (13 ± 1 años, $57,8 \pm 10,7$ Kg, $1,70 \pm 0,10$ m). Se formaron cuatro parejas y disputaron una liga todos contra todos a un set de 21 puntos. La SmO₂ se midió mediante NIRS (Moxy, EEUU) colocados en el vasto lateral de la pierna dominante durante la realización de un ejercicio isométrico de cuádriceps en pared de 45 segundos. La altura de salto CMJ se midió en plataforma de contacto (Chronojump Boscosystem, España). Las mediciones se realizaron antes (PRE) y después (POST) de la competición. Debido al número de participantes, se utilizó el tamaño del efecto D de Cohen para evaluar las diferencias.

RESULTADOS: Los valores de SmO₂ fueron más elevados en la medida post, tanto antes de comenzar la contracción (PRE = $59 \pm 12\%$, POST = $70 \pm 9\%$, d = 1.2), al finalizarla (PRE = $54 \pm 10\%$, POST = $58 \pm 13\%$, d = 1.2), en el valor promedio durante la contracción (PRE = $41 \pm 10\%$, POST = $53 \pm 13\%$, d = 1.3), y en el valor mínimo (PRE = $19 \pm 12\%$, POST = $35 \pm 15\%$, d = 1.2). Respecto al CMJ, los valores indicaron una pérdida de altura de salto tras el partido (PRE = $26,1 \pm 4,1$ cm, POST = $22,9 \pm 7,2$ cm, d = 0.4).

DISCUSIÓN Y CONCLUSIONES: Los cambios producidos en la SmO₂ del vasto lateral tras la competición combinados con la reducción de la altura de salto en el test CMJ sugieren que la SmO₂ puede emplearse a través de la tecnología NIRS para evaluar la fatiga producida por el ejercicio.

REFERENCIAS:

- Perrey S, Ferrari M. Muscle Oximetry in Sports Science: A Systematic Review. Sports Med. 2018 Mar;48(3):597–616.

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THE EFFECT OF TIME-OF-DAY ON MODIFIABLE HAMSTRING INJURY RISK FACTORS IN SOCCER REFEREES

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INTRODUCTION: Soccer referees normally are involved refereeing at various times in the day, ranging from morning to night-time matches under floodlights (Reilly et al., 2007). The aim of this study was to determine the effect of time-of-day on modifiable hamstring injury risk factors in soccer referees.

METHODS: Twenty-eight referees (age: 25.9 ± 3.8 years) volunteered to take part in the study. In a randomized counter-balance order, soccer referees realized a neuromuscular test battery based on modified injury risk related to hamstring injury such as range-of-motion values (e.g., straight leg raise test and ankle dorsiflexion range-of-motion), isometric knee flexion strength and dynamic balance realized in the morning (9.00 h), midday (14.00 h) and evening (19.00h). In addition, before realized the neuromuscular tympanic temperature was obtained and rate of perception exertion (RPE) was measured 30-minutes after the competition the test battery.

RESULTS: Significant difference were obtained in the isometric knee flexion strength in the dominant limb comparing 9.00 vs 19.00 hours ($p=0.048$, $d = 0.47$), while no differences were obtained in the non-dominant limb between time-of-day points ($p=0.165$, $\eta^2= 0.07$). In addition, no differences were reported in range of motion values in straight leg raise test (dominant/non-dominant) ($p=0.125-0.556$; $\eta^2= 0.02-0.07$) and ankle dorsiflexion (dominant/non-dominant) ($p= 0.176-0.321$, $p=0.06-0.11$) values as same reported in dynamic balance in the anterior, posterolateral, and posteromedial in the dominant ($p=0.271-0.348$; $\eta^2 = 0.04-0.05$) and non-dominant limb ($p=0.114-0.686$; $\eta^2= 0.01-0.07$)

CONCLUSION: Time-of-day affected to isometric knee flexion strength values in the dominant limb, however, no diurnal variations were showed in range-of-motion and dynamic balance in soccer referees.

REFERENCES:

Reilly T, Atkinson G, Edwards B, Waterhouse J, Farrelly K, Fairhurst E. (2007) Diurnal variation in temperature, mental and physical performance, and tasks specifically related to football (soccer) Chronobiol Int. 2007;24(3):507-19

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PP01. Acondicionamiento físico en EduFis / Conditioning in Physical Education**EFFECTS OF A PHYSICAL EDUCATION PROGRAM BASED ON RESISTANCE TRAINING AND HIGH INTENSITY INTERVAL TRAINING ON PHYSICAL FITNESS AND EXECUTIVE FUNCTIONS IN ADOLESCENTS. A PROTOCOL STUDY**

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BACKGROUND: During the last decades literature shows how the amount of physical activity (PA) is decreasing both in developed and developing countries (1, 2), deriving in sedentarism and obesity in the young population (3). In addition, more than 80% of adolescents worldwide do not reach the daily PA recommendations proposed by WHO guidelines (i.e., 60 minutes of PA at moderate-vigorous intensity). Also, according to scientific literature, those adolescents who are in an optimal physical fitness also perceive a better quality of life, in both physical and mental dimensions (4). In the latest update, WHO recommended to follow a resistance training program and cardiovascular activities at vigorous intensity at least 3 times per week (2,3). Since there is scarce literature on this topic within the school context, the aim of this study was to analyze the effect of two physical education training programs on the improvement of PF and executive functions (6).

METHODS: A total of ~200 adolescents (grade 2 secondary school; 12-14 years of age) from 1 secondary school in Melilla (Spain) will be randomly enrolled in an 8-week of intervention (2 sessions per week in physical education class) based on a training program separated by three groups: 1) experimental group 1 (EG1); HIIT training, 2) experimental group 2 (EG2); resistance training program, and 3) control group (CG); who will follow the standard PE classes. During sessions students will wear a heart rate monitor (Polar Ignite 2 monitor) to control the cardiovascular parameters, i.e.HR, HRmax, HRV, etc.

Main outcomes will be the PF levels and body composition (assessed using an Alpha-Fitness battery), (7) as well as executive functions (attention, inhibitory control and working memory) with d2 questionnaire. Students will also report PA levels and rate of perceived exertion of each session.

RESULTS: We believe that EG1 and EG2 will obtain greater improvements in PF levels (cardiovascular and muscular fitness and speed-agility) and body composition compared to EC ($p<0.05$) after the intervention. Likewise, similar results are expected in both experimental groups in the executive functions (attention, inhibitory control and working memory) analysed ($p<0.05$).

DISCUSSION: This protocol study will provide novel information about the effectiveness and implementation of a school-based resistance and HIIT training programs on PF, body composition, and executive functions in adolescents.

REFERENCES:

- Tomkinson, G.R. et al.(2019)DOI:10.1136/bjsports-2017-097982
Villa-González, E. et al.(2022)DOI:10.1080/17461391.2022.202957
WHO (2020)DOI:10.1136/bjsports-2020-102955
Eddolls,et al.(2018)DOI:10.1007/s11136-018-1915-3
Watson,et al. (2016)DOI:10.1371/journal.pone.0159116
Xue Y et al.(2019) DOI:10.1136/bjsports-2018-099825
Ortega, FR. 2011)DOI:10.1590/S0212-16112011000600003

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PP01. Acondicionamiento físico en EduFis / Conditioning in Physical Education

RETRAGAM: RESISTANCE TRAINING BASED ON GAMIFICATION IN SCHOOL-AGE CHILDREN: RATIONALE AND STUDY PROTOCOL**VANACLOCHA-AMAT, P., FAIGENBAUM A.D., MOLINA-GARCÍA, J. & VILLA-GONZÁLEZ, E.**

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BACKGROUND: The lack of physical activity and the increasing spent time in sedentary behaviours in modern-day youth have contributed to secular declines in measures of muscular fitness (1,2) that are directly correlated with adverse health outcomes (3). These facts highlight the importance on developing resistance training programs from early childhood (4,5). Several educational strategies have been developed to increase physical activity levels, such as Gamification, which consists on the use of game mechanics and dynamics in order to motivate students during the learning process (6). However, the implementation of resistance training programs based on Gamification in the school environment has been scarcely studied.

METHODS: A total of ≈300 children (grade 5 and 6; 10-12 years of age) from 6 schools in Valencia (Spain) will be randomly enrolled in an 8-week intervention based on a physical education warm-up of 15 minutes of resistance training / 3 times per week with and without gamification strategy (EGG or EG, respectively), and a control group (CG). Briefly, the warm-up main part will include a FunctionalHIIT (7) circuit with body weight ad free weights with a gradual intensity progression up to 7-10 rating of perceived exertion. Gamification story will carry out in a digital platform supervised by teachers, where children will achieve points and badges to improve their superhero avatar, accumulating points to defeat a common villain in the final battle. Main outcomes will include muscular strength (assessed using an ad hoc battery), anthropometry and body composition (BMI, weight, sitting and standing height, and waist circumference), as well as enjoyment and motivation (assessed by the PACES and Situational Motivation Scale in PE questionnaires).

RESULTS: EGG will obtain greater improvements in muscle strength levels, body composition and enjoyment/motivation for the activity compared to EG as well as CG.

DISCUSSION: Short bouts of moderate and high intensity exercise will improve muscular strength in school children. The RETRAGAM will provide information about the effectiveness and implementation of a school-based resistance training intervention with and without gamification in students' muscular strength, body composition, as well as enjoyment and motivation.

REFERENCES:

1. Chulvi-Medrano, I. et al. (2020). DOI: 10.3390/jfmk5030064
2. Faigenbaum, A. D. et al. (2019). DOI: 10.1007/s42978-019-00038-0
3. García-Hermoso, A. et al. (2019). DOI: 10.1007/s40279-019-01098-6
4. Villa-González, E. et al. (2022). DOI: 10.1080/17461391.2022.2029578
5. Valle-Muñoz, V. et al. (2022). DOI: 10.17979/sportis.2022.8.2.8955
6. Díaz, Ó. L. et al. (2019). DOI: 10.24310/riccafd.2019.v8i1.5791
7. Engel, F. A. et al (2019). DOI: 10.3389/fpubh.2019.00291

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FRIDAY, DECEMBER 16, 2022

18:00 - 18:30 H

Presentaciones de pósteres 2 / Poster presentation 2

PP02 - MUJER Y ENTRENAMIENTO / WOMEN & TRAINING

18:00 - 18:30 h

BACK SQUAT MEAN PROPULSIVE VELOCITY ACROSS THE MENSTRUAL CYCLE IN FEMALE RUGBY PLAYERS: PRELIMINARY RESULTS

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INTRODUCTION: There is little research on the variation of sports performance in women during the different phases of the menstrual cycle (MC). The MC is related to sports performance and injury risk through the hormones that govern it [3]. The loss of mean propulsive velocity (MPV) was related with fatigue and, consequently, with the risk of injury [1]. Objective: To determine if the different phases of CM produce significant changes in MPV in female rugby players.

METHODS: Four active rugby players (Height 162.0±4.2 cm; Weight 61.3±9.3 kg; Age 25.1±2.2 years) with experience in training with loads participated in the study. Two different tests have been carried out: an incremental power test [2], and a maximal MPV test, both in back-squat exercise. MPV and power data has been taken with a VITRUVE Encoder (Speed4lifts, Spain), and the MC has been controlled with ovulation strips (Ellatest, Qingdao Hightop Biotech, China). Friedman tests were performed to analyse differences between the MC phases in power and MPV. Effect size was calculated by W Kendall with the following criteria: =1.0 small, >0.3 medium, and >0.5 long. Results are expressed as mean (M), and standard deviation (SD). Statistical analyses were performed with SPSS version 26.0 (IBM, USA), and the level of significance was set at 0.05.

RESULTS: Significant differences were found between the early and late follicular phases ($p=0.01$, $W=0.05$), with higher values in power and MPV in the late follicular phase. There were not significant differences in the rest of phases in power and MPV.

DISCUSSION: These preliminary results showed that the early follicular phase produced the least development of MPV and power in female rugby players. The differences in MPV between phases were 14% between the early and late follicular phase, and 6.6% between late follicular and luteal phase ($p=0.16$; $W=0.25$). Practical application: It seems that the late follicular phase produced the highest capacity to develop MPV and power compared to the rest of the cycle. These preliminary results could help coaches to plan the strength training, and to diminish the risk of injury based on the differences observed in MPV and power in the MC phases.

REFERENCES:

1. Guerrero et al. J Funct Morphol Kinesiol.2018;3(4):55.
2. Maté-Muñoz et al. JISSN. 2018;25;15:19.
3. Romani et al. J Women's Health. 2004; 12(3).

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ENHANCED MITOCHONDRIAL RESPIRATION AFTER RESISTANCE EXERCISE TRAINING IN YOUNG ACTIVE WOMEN

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INTRODUCTION: The molecular transducers of benefits from different exercise modalities remain incompletely defined. Mitochondria have a main role in providing cellular energy and fulfill a key function in cellular calcium management. Exercise training is known to be the most powerful intervention to increase mitochondrial number, size, and density in a tissue such as skeletal muscle. Traditionally, it has been considered that cardiorespiratory training is appropriate for improving mitochondrial function in different tissues, while resistance training programs are appropriate for inducing hypertrophy and increases in muscle strength. However, recent research suggests that both training modalities have an impact on mitochondrial respiration.

METHODS: 14 healthy young women (19.43 (3.74) years) followed a resistance-training program consisted of lower-body exercises two days each per week for six weeks. The participants visited the hospital on two occasions separated from each other by a period of six weeks, which is the duration of the exercise intervention. In these visits they were assessed clinically including their body composition, blood analysis and muscle quality. A muscle-biopsy of the vastus lateralis muscle of the thigh was performed using the TSK Acecut biopsy needle (11 G x 75 mm, 22 mm Type) before and after the training period to measure skeletal muscle mitochondrial respiratory function with high-resolution respirometry (Oroboros O2k-FluoRespirometer) from isolated mitochondria. Paired t-tests were conducted to compare means before and after the intervention. All data are expressed as mean (standard deviation). A value of p<0.05 was considered statistically significant.

RESULTS: Here we report that 6-weeks of resistance training improved, very significantly, the muscle strength as assessed by both the leg press and leg extension one-repetition maximum tests. Moreover, the mitochondrial respiratory function measured in skeletal muscle showed an improvement after training in Complex I, Complex I+II, Complex II, maximal respiration, and Complex IV. Basal determinations vs those measured after training show the following data: Complex I, 42.10 (36.32) pmol·s⁻¹·mL⁻¹ vs 88.58 (27.10) pmol·s⁻¹·mL⁻¹, p<0.001; Complex I+II, 122.83 (66.52) pmol·s⁻¹·mL⁻¹ vs 195.36 (51.39) pmol·s⁻¹·mL⁻¹, p<0.01; Complex II 95.22 (53.15) pmol·s⁻¹·mL⁻¹ vs 145.74 (45.53) pmol·s⁻¹·mL⁻¹, p<0.05; Maximal respiration, 130.14 (63.23) pmol·s⁻¹·mL⁻¹ vs 224.13 (60.66) pmol·s⁻¹·mL⁻¹, p<0.001 and Complex IV 356.30 (107.90) pmol·s⁻¹·mL⁻¹ vs 437.07 (96.08) pmol·s⁻¹·mL⁻¹, p<0.05.

CONCLUSIONS: We provide evidence showing that 6-weeks of resistance exercise training results in quantitative changes in skeletal muscle strength and mitochondrial respiration. Thus, resistance exercise training appears to be a means to augment the respiratory capacity and intrinsic function of skeletal muscle mitochondria.

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MONITORING MODIFIABLE INJURY RISK FACTORS OVER AN IN-SEASON MESOCYCLE IN SEMIPROFESSIONAL FEMALE FIELD HOCKEY PLAYERS

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INTRODUCTION: This study aimed to determine the fluctuations of modifiable injury risk factors and fatigue parameters during a mesocycle in semi-professional female field hockey players.

METHODS: Fourteen players (age: 22.6±4.9 years) participated in the study over four months of the competitive season. The players were tested each month for their: maximal isometric knee flexion, hip adduction and abduction muscle strength; passive straight leg raise and ankle dorsiflexion range of motion (ROM); countermovement jump height; and perceptual fatigue.

RESULTS: Statistical differences were reported in isometric knee flexion strength in the dominant and non-dominant limb ($p<0.001$, $\eta^2=0.629$, 0.786 respectively), non-dominant isometric hip abductors strength ($p=0.016$, $\eta^2=0.266$) and isometric hip adductors strength in dominant and nondominant limbs ($p<0.001$, $\eta^2=0.441$ -546). Also, significant differences were reported in the straight leg raise test ($p<.001$, $\eta^2=0.523$, 0.556) and ankle dorsiflexion ($p=0.001$, $\eta^2=0.376$, 0.377) for the dominant and non-dominant limb respectively. Finally, the jump height measured showed significant differences ($p<.001$, $\eta^2=0.490$), while no differences were reported in fatigue parameters ($p=0.089$ -0.459).

DISCUSSION: Fluctuations in maximal isometric muscle strength, ROM values, and vertical jumping capacity are reported during a competitive season which can be used to target recovery strategies to make them more efficient.

REFERENCES:

McLean, B., Coutts, A., Kelly, V., McGuigan, M. and Cormack, S. (2010) Neuromuscular, endocrine, and perceptual fatigue responses during different length between-match microcycles in professional rugby league players. International Journal of Sports Physiology and Performance 5, 367-383.

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RESPIRATORY MUSCLE TRAINING IN AN ELITE FEMALE TRIATHLETE: A CASE STUDY

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INTRODUCTION: It has been shown that inspiratory muscle training (IMT) can improve muscular strength and endurance, playing an important role in sports such as swimming, cycling or triathlon (1). In addition, IMT training seems to play a determining role in fatigue (metaboreflex) in aerobic endurance disciplines and is easily implemented through devices with resistance to air conduction (2, 3). The object of this study exposes the effect of IMT for 15 weeks in a triathlete (competing in Spanish, European and world championships).

METHODS: Maximal Inspiratory Pressure (MIP) was evaluated using the POWERBreathe® Kinetic KH1 electronic device of an elite triathlete (20 years old; weight: 53 kg and height: 1,65 m). The evaluations were made after 21 day, 33 day and 51 day to adjust the resistance of the training (dates according to availability between competitions). Training was performed with the POWERBreathe® Competition Series apparatus and the protocol consisted in 2 sessions per day (minimum 5 days per week) of 30 breaths at 75-79% of adjusted MIP performed after 21 day, 33 and 51.

RESULTS: Compared to baseline (133 cmH₂O; 2.5 cmH₂O/Kg), PIM improved by 17% at 21 days (156 cmH₂O; 2.9 cmH₂O/Kg), 23% at 33 days (163 cmH₂O 3.1 cmH₂O/Kg) and 20% at 51 days (160 cmH₂O; 3.0 cmH₂O/Kg). On the other hand, differences of 17%, 4% and -2%, respectively, were found in each measurement with the previous one.

DISCUSSION: The maximum MIP value reached by the athlete is among the highest MIP values references in elite athletes (4) and according to their characteristics (weight and height). The athlete begins study with a very high MIP value compared to the references. After four weeks, she showed her maximum MIP value and seems to stabilize at a value of 3,0 cmH₂O/Kg. Despite starting the study with high MIP values, the athlete achieved a high percentage of improvement (20%) after training with POWERBreathe®; and also, she reported an improvement at perceptual level. In conclusion, this case study highlights that IMT training can be beneficial for a high performance female triathlete in a short period of time.

REFERENCES:

- HajGhanbari, B., et al. 2013. The Journal of Strength & Conditioning Research, 27(6), 1643-1663.
Romer, L. M., et al. 2008. Journal of Applied Physiology, 104(3), 879-888.
Fernández-Lázaro, D., et al. 2021. International Journal of Environmental Research and Public Health, 18(13), 6703.
Ohya, T., et al. 2016. Respiratory physiology & neurobiology, 230, 68-72.

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PP02. Optimización del entrenamiento / Training optimization

ARE THERE DIFFERENCES IN POWER OUTPUT BETWEEN FLYWHEEL SQUAT AND LUNGE EXERCISES ON EACH INERTIAS?

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PALABRAS CLAVE: yo-yo squat, power, eccentric overload.

INTRODUCTION: The benefits of isoinertial training has been described in some previous research (1, 2). Training level and exercises could be modify optimal load to achieve the power level. The objective of this study is to know if there are differences in training level and exercises to achieve the maximal power output.

METHODS. Subjects (n=46) came to the lab in three times. The first two times, subjects completed a familiarization protocol with yo-yo squat (1) and repetition maximum (RM) test. In last session, participants completed a randomized and counterbalanced flywheel testing protocol (Incremental (I), Decremental (D), Mixed 1 (M1) and Mixed 2 (M2)) doing one set of 10 repetitions with every load (0.025 kg·m², 0.05 kg·m², 0.075 kg·m² and 0.1 kg·m²) of squat and split squat exercise. After each set, participants rest two or three minutes according to Sabido et al. (3) criteria. During each repetition, concentric and eccentric power were recorded throughout an optical receiver (SmartCoach, Europe AB, Stockholm, Sweden). The information was processed using specialized software (SmartCoach Power Encoder, Europe AB, Stockholm, Sweden). The variables used for data analysis were peak concentric power (PPconc), peak eccentric power (Ppecc), and the eccentric/concentric ratio (i.e., peak eccentric power/peak concentric power; Ecc/Conc Ratio) in both exercises. Values were compared between the different loads and exercises through two-factor ANOVA test (load and training level based in ratio RM/body mass).

RESULTS: ANOVA showed non-differences between training level and exercises. Besides of that differences was found between inertia.

DISCUSSION AND PRACTICAL APPLICATION: In line of this results, load one be optimal for develop power in both exercises. The use of this inertias are independent of exercises and training level.

REFERENCES:

- Sabido, R., Hernández-Davó, J. L., Botella, J., Navarro, A., & Tous-Fajardo, J. (2017). Effects of adding a weekly eccentric-overload training session on strength and athletic performance in team-handball players. European journal of sport science, 17(5), 530-538.
- Beato, M., & Dello Iacono, A. (2020). Implementing flywheel (isoinertial) exercise in strength training: current evidence, practical recommendations, and future directions. Frontiers in Physiology, 11, 569-575.
- Sabido, R., Hernández-Davó, J. L., Capdepon, L., & Tous-Fajardo, J. (2020). How are mechanical, physiological, and perceptual variables affected by the rest interval between sets during a flywheel resistance session?. Frontiers in Physiology, 11, 663-671.
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BLOOD FLOW RESTRICTED RESISTANCE TRAINING: WHERE DO WE START?

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INTRODUCTION: Blood flow restriction (BFR) training was discovered in 1966 by Yoshiaki Sato, who called it Kaatsu (1). Over the years, BFR has gained popularity both in the scientific community and the practical field. The prolific literature in the field accumulated over these years may overwhelm a professional or scientist willing to explore BFR. In this study, we aimed to conduct a bibliometric analysis on BFR to easily present the most relevant clues for bibliographic search and offer some directions for its study.

METHODS: We conducted a search on Web Of Science on 09/27/2022. The search string was: ("blood flow restriction" OR "blood flow restricted" OR "kaatsu" OR "occlusion training") AND ("resistance training" OR "strength training"), and we filtered by "Humans" (MeSH). We exported the data to Microsoft Excel® to remove duplicates or erratum.

RESULTS: We found 518 publications, 20.5% of which were reviews. In 2010, research increased a 750% compared to the previous year. Since then, publications have steadily increased. 2022 received the most citations per article (43.4, avg.:18.7). The 3 journals that publish the most are European Journal Of Applied Physiology (10.4%), Clinical Physiology And Functional Imaging (8.1%) and Journal Of Strength And Conditioning Research (7.5%). Authors from USA, Brazil and Japan account for 71.6% of the publications. The most prolific author was J.P. Loenneke, who participated in 38.6% of the publications (200, 21 as 1st author), while the production index was 4%: 147 authors out of 3,858 authored 50% of the publications.

DISCUSSION: The field of BFR shows a high rate of reviews per original manuscript. Hence, we recommend opting for higher-level evidence ones. Since research is being produced at a constant rate, recent reviews or the position stand (1) can provide a general overview. Moreover, we also recommend reading about how it is being applied in practice (2).

To sum up, this paper provides an overview of the evolution of BFR over time, as well as the state of the art, offering useful information for researchers and professionals working with BFR.

REFERENCES:

Patterson SD, Hughes L, Warmington S, Burr J, Scott BR, Owens J, et al. Blood Flow Restriction Exercise: Considerations of Methodology, Application, and Safety. *Frontiers in Physiology*. 2019;10. Cuffe M, Novak J, Saithna A, Strohmeyer HS, Slaven E. Current Trends in Blood Flow Restriction. *Frontiers in Physiology*. 2022;1355.

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VARIABILITY IN FORCE SIGNAL FOR DETECTING NEUROMUSCULAR FATIGUE IN DYNAMIC CONTRACTIONS: A STUDY PILOT

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Neuromuscular fatigue is an important phenomenon since it conditions performance, adaptations to a training and a risk of injury. Fatigue has been analysed through variability, studying both the amount and the structure of variability in force signals. In general, studies have been conducted on isometric contractions, reporting an increase in the amount of variability and a decrease in the complexity of the variability structure (1,2). While the evidence is strong for isometric contractions, it is unknown what happens in dynamic contractions. Since most actions in sport and in everyday life involve dynamic contractions, it is necessary to know what happens in these types of actions. For this purpose, four participants were asked to participate in this experiment. They performing a 30 repetitions of knee extension on an isokinetic dynamometer with a range of movement of 90° at a velocity of 30°/s to an all-out intensity. Prior to this, participants performed a Maximal Voluntary Contraction (MVC) for three seconds, rested for 10 minutes and then, performed the fatigue protocol. Immediately after, participants performed another MVC. From the time series obtained in the MVC, the second most stable was analysed. For the variability amount analysis standard deviation was used, and for the variability structure analysis detrended fluctuation analysis was used. The results showed a decrease in MVC in all participants, confirming fatigue. The amount of variability, as well as the complexity of the variability structure, tended to increase in the majority of participants (n=3). It seems that the behaviour in variability is different when fatigue is produced by dynamic or isometric actions. These findings could indicate that the mechanisms that produce fatigue are different when dealing with dynamic or isometric actions, as it has been already pointed out by other authors (3).

REFERENCES:

1. Pethick J, Winter SL, Burnley M. Loss of knee extensor torque complexity during fatiguing isometric muscle contractions occurs exclusively above the critical torque. Am J Physiol - Regul Integr Comp Physiol. 2016;310(11):R1144-53.
2. Chatain C, Ramdani S, Vallier JM, Gruet M. Recurrence quantification analysis of force signals to assess neuromuscular fatigue in men and women. Biomed Signal Process Control. 2021 Jul 1;68.
3. Allen DG, Lamb GD, Westerblad H. Skeletal muscle fatigue: Cellular mechanisms. Physiol Rev. 2008;88(1):287-332.

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CORRELACIONES ENTRE PERSONAS CON OBESIDAD Y SU FUNCIONALIDAD**PINELO TRANCOSO M., BUTRAGUEÑO J.**

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INTRODUCCIÓN: El aumento del sobrepeso y la obesidad es un problema de salud mundial. El objetivo de este estudio fue el de analizar diferentes parámetros, estableciendo si existen correlaciones entre ellos en personas con obesidad y sobrepeso.

MÉTODOS: La muestra estuvo compuesta por 111 sujetos. (Mujeres=55, Hombres=56) con una edad media de 48,11 años (DT: 32; 60) con un IMC=32,46 (DT=29; 39,60). Se realizaron diferentes pruebas para valorar la condición física de los participantes y sus valores antropométricos (DXA y test funcionales). Se analizó la correlación entre variables como función muscular (dinamometría) y consumo máximo de oxígeno relativo al peso, densidad mineral ósea, grasa total y grasa abdominal; utilizando el programa informativo SPSS v.27. Se utilizaron estadísticos descriptivos para explorar la distribución y tendencia de cada medida, se determinó el coeficiente de correlación a través de Spearman y se realizó una regresión multivariante para el VO2max.

RESULTADOS: Se encontró una mayor correlación entre la función muscular relativa al peso y el consumo máximo de oxígeno relativo al peso ($p=<0,01$). La grasa abdominal correlaciona negativamente con el VO2 máx y con la función muscular afectando esto a la funcionalidad de este colectivo.

DISCUSIÓN: La grasa abdominal correlaciona negativamente con el VO2 máx siendo determinante en la reducción de funcionalidad. La masa magra correlaciona positivamente con la densidad mineral ósea, explicando la importancia de tener una buena masa muscular y su relación con el hueso.

Estos resultados van en consonancia con otros estudios (Moreno Bolívar, et al 2012; Marcos-Pardo, P et al 2020) en poblaciones de mediana y avanzada edad con sobrepeso u obesidad.

REFERENCIAS:

- Marcos-Pardo, P. J., González-Gálvez, N., Espeso-García, A., Abelleira-Lamela, T., López-Vivancos, A., & Vaquero-Cristóbal, R. (2020). Association among Adherence to the Mediterranean Diet, Cardiorespiratory Fitness, Cardiovascular, Obesity, and Anthropometric Variables of Overweight and Obese Middle-Aged and Older Adults. *Nutrients*, 12(9), 2750. <https://doi.org/10.3390/nu12092750>
- Moreno Bolívar, H., Ramos Bermúdez, S., & Parra Sánchez, J. H. (2012). Correlation of anthropometric variables, conditional and exercise habits in activite olders. *Colombia medica* (Cali, Colombia), 43(3), 216–220.
- Zapico, A. G., Benito, P. J., González-Gross, M., Peinado, A. B., Morencos, E., Romero, B., Rojo-Tirado, M. A., Cupeiro, R., Szendrei, B., Butragueño, J., Bermejo, M., Alvarez-Sánchez, M., García-Fuentes, M., Gómez-Candela, C., Bermejo, L. M., Fernandez-Fernandez, C., & Calderón, F. J. (2012). Nutrition and physical activity programs for obesity treatment (PRONAF study): methodological approach of the project. *BMC public health*, 12, 1100. <https://doi.org/10.1186/1471-2458-12-1100>

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EXERCISE IN CARDIAC REHABILITATION

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INTRODUCTION: Cardiac rehabilitation, based on strength and resistance training, has proven to reduce all-cause mortality and the likelihood of re-hospitalization in people who have suffered a myocardial infarction (AMI) or chronic heart failure (CHF). The intensity at which these workouts should be performed is highly controversial and clinical practice guidelines recommend using relatively low loads (40-60% 1RM) (1). However, new evidence suggests that training above this intensity is safe and achieves equal or greater benefits than training at low loads (2). Therefore, this review aimed to evaluate the effectiveness of strength training at different intensities in improving functional parameters in patients after AMI or CHF.

METHODS: A review of the current evidence on cardiac rehabilitation and strength training was conducted using the terms "resistance training", "strength training" and "heart failure", "myocardial infarction" in the PubMed, Clinical Key and Web of Science databases. We included articles published from 2000 onwards, that had at least a 5 on the PEDro scale, that included strength training within cardiac rehabilitation and that were published in English or Spanish.

RESULTS: Twelve articles were included for data extraction. 5 studies assessed strength through 1RM, showing significant improvements in all of them (100%). 8 studies assessed VO₂ Max, showing significant improvements in 4 of them (100%), and time to exhaustion, showing significant improvements in 6 of them (50%). 6 articles evaluated the 6-Min Walking Test showing significant improvements in all of them (100%). Improvements in quality of life were observed in 4 articles taken with different types of measurements.

DISCUSSION: RT seems to significantly improve the strength, cardiorespiratory fitness, functional capacity and quality of life of people with AMI and CHF as well as their quality of life. RT does not appear to be harmful to the central cardiac system, although there are too few data to make a strong statement about its safety in all types of patients.

REFERENCES

1. Visseren FLJ, Mach F, Smulders YM, Carballo D, Koskinas KC, Back M, et al. 2021 ESC Guidelines on cardiovascular disease prevention in clinical practice. European Journal of Preventive Cardiology. 2022;29(1):5-115.
2. Hansen D, Abreu A, Doherty P, Voller H. Dynamic strength training intensity in cardiovascular rehabilitation: is it time to reconsider clinical practice? A systematic review. European Journal of Preventive Cardiology. 2019;26(14):1483-92.

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TRAINING PRESCRIPTION IN TYPE 2 DIABETES: A CASE STUDY

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INTRODUCTION: Diabetes is a chronic non-communicable disease characterized by high blood glucose levels. Specifically, type 2 diabetes (T2DM) is increasingly prevalent and is responsible for more than 90% of diabetes cases today. Strength training is one of the available interventions that has been shown to be adequate to improve the health and quality of life of patients with T2DM (1). Therefore, the present work tried to verify the effect of strength training in an older adult with T2DM.

METHODS: A 69-year-old man underwent resistance training program (3 days/week, on alternate days) for 10 weeks (2 familiarization + 8 progressive training) at his home. The participant completed between 6-8 exercises per session, and 1-3 sets each. The intensity was prescribed according to the relationship between the number of repetitions performed and the number of possible repetitions for each set. According to this, the participant never completed more than half of the possible repetitions per set.

Parameters related to glucose control (HbA1c and fasting blood glucose), as well as handgrip and lower limb strength and functional capacity with the 5 Times-sit-to-stand test, were analyzed both before and after the training intervention. A pre-post comparison of the variables studied was carried out.

RESULTS: HbA1c decreased from 7.6% to 7.1% after the training protocol. Also, a downward trend in fasting blood glucose was observed. The functional capacity measured through the 5 times sit to stand test (5STS) improved by 30.33%, as well as the strength measured through dynamometry and the movement speed of a submaximal load.

CONCLUSIONS: The results obtained extend the evidence that supports the positive effect of resistance training in the treatment of T2DM. The program allowed to reduce HbA1c and glycemia levels, improve strength and functional capacity in a 69-year-old subject.

REFERENCES:

Colberg SR, Sigal RJ, Yardley JE, Riddell MC, Dunstan DW, Dempsey PC, Horton ES, Castorino K, Tate DF. Physical Activity/Exercise and Diabetes: A Position Statement of the American Diabetes Association. *Diabetes Care*. 2016 Nov;39(11):2065-2079. doi: 10.2337/dc16-1728. PMID: 27926890; PMCID: PMC6908414

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SATURDAY, DECEMBER 17, 2022

11:30 - 12:00 H

Presentaciones de pósteres 3 / Poster presentation 3

PP03 - OPTIMIZACIÓN DEL ENTRENAMIENTO / TRAINING OPTIMIZATION

11:30 - 12:00 h

RECUPERACIÓN ENTRE SERIES PASIVA VS. ACTIVA CON DIFERENTES CARGAS EN PRESS DE BANCA

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INTRODUCCIÓN: Los estudios sobre la recuperación entre series en entrenamientos de fuerza han comparado diferentes duraciones, aunque se sabe que los estímulos activos podrían ser más eficaces que la recuperación pasiva para mejorar el rendimiento (1). De hecho, seguir realizando el ejercicio durante las recuperaciones podría reducir la pérdida de rendimiento intraserie sin generar mayor fatiga (2). Por ello, nuestro objetivo es comparar los efectos de la recuperación activa vs. pasiva sobre el rendimiento en press banca en hombres entrenados.

MATERIAL Y MÉTODOS: 7 hombres (24.14 ± 1.07 años, 83.43 ± 9.85 kg, 1.84 ± 0.07 cm, potencia máxima 784 ± 91 W) realizaron 3 sesiones de 3×8 en press de banca con la carga óptima para la potencia máxima calculada individualmente, con 2 min de recuperación entre series pasivos (PAS), activos con una carga del 10%1RM (ACT1) o activos con una carga del 20%1RM (ACT2), ambos a velocidad lenta. Registramos la velocidad media propulsiva de cada repetición (VMP) y calculamos la velocidad media de cada serie y la pérdida de velocidad intraserie (VMPLoss). Además, medimos la lactatemia antes y después de cada serie, y 1, 3 y 5 min tras finalizar.

RESULTADOS: La prueba ANOVA no mostró diferencias significativas en ninguna variable, aunque hubo una menor VMPLoss en ACT1 y ACT2, en comparación con PAS [VMPLoss (%)] set 1: 15.00 vs. 9.92 vs. 8.74, set 2: 11.55 vs. 11.30 vs. 10.31, set 3: 9.42 vs. 6.64 vs. 8.86; for PAS, ACT1 and ACT2 respectively; $p > 0.05$]. Además, todas las series se iniciaron con valores más bajo de lactato en ACT1 respecto a los otros grupos [Lactate (mmol/L) pre-set 1: 2.171 vs. 1.743 vs. 2.714, pre-set 2: 3.000 vs. 2.814 vs. 3.586, pre-set 3: 4.671 vs. 3.271 vs. 4.114; for PAS, ACT1 and ACT2 respectively; $p > 0.05$].

DISCUSIÓN: Mantener el mismo ejercicio que el que se está entrenando durante las recuperaciones entre series en ejercicios de fuerza, con baja carga y a velocidad de ejecución lenta, podría reducir la fatiga metabólica y disminuir la pérdida de rendimiento inherente a la acumulación de trabajo durante la sesión. Sin embargo, serían necesarios más estudios en esta línea, con la realización de un mayor número de series para tener más cantidad de períodos de recuperación entre ellas, con el fin corroborar estos resultados.

REFERENCIAS:

- Latella et al. J Strength Cond Res. 2019;33(S1):S180-S193.
Berlanga et al. Apunts. 2021;145:17-24.

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SEX DIFFERENCES IN LOAD-VELOCITY PROFILES IN THREE DIFFERENT ROWS EXERCISES

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INTRODUCTION: Velocity Based Training (VBT) has been developed to provide accurate and objective data to support resistance training prescription [1]. The interest by VBT is increasing in recent years, but some studies have shown differences in the velocity-profile between men and women in exercises as squat, bench press or shoulder press [2]. This study aimed to examine the differences in the load-velocity profile in prone bench row (PBR), smith machine bent over row (SMBOR) and barbell bent over row (BBOR) exercises between men and women.

METHODS: 13 men and 13 women were tested during the PBR, SMOR and BBOR exercises. The individual load-velocity profiles were determined by means of an incremental loading test (from 30% to 100% of the one-repetition maximum [1-RM] in approximately 5% increments). Relationship between mean propulsive velocity (MPV) and each percentage of 1-RM (% 1-RM) were analyzed. A second-order polynomial equation for predicting the corresponding MPV of each % 1-RM was developed for men and women. A mixed model analysis of variance (ANOVA) was applied to each dependent variable with the exercise (PBR, SMOR and BBOR) as within-participant factor and sex (men and women) as between-participant factor. Significance was set at $p < 0.05$.

RESULTS: The ANOVAs applied on the MPV attained at each tested %1RM revealed that higher velocity values were generally achieved for the SMOR, followed by the PBR, and finally the BBOR. Men provided higher velocity values than women. Significant exercise \times sex interactions were observed only from 30% to 40 %1RM. Very strong correlation between bar velocity and relative load were observed in both sexes for PBR, SMOR and BBOR ($r > 0.94$, $p < 0.01$).

DISCUSSION & CONCLUSION: These results reveal that load-velocity relationship during PBR, SMOR and BBOR is markedly steeper in men than in women. The same result (i.e., lower velocities at low % 1RM in women) has been reported in other studies when compared bench press, squat or shoulder press exercises [2,3]. Based on the results of this study, it can be concluded that men presented higher mean propulsive velocity, especially under 85% 1-RM, compared to women during PBR, SMOR and BBOR exercises.

REFERENCES:

1. Weakley J, et al 2020. Velocity-Based Training: From Theory to Application.
2. Balsalobre-Fernández C, et. al. 2017. Load-velocity profiling in the military press exercise: Effects of gender and training.

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VELOCIDAD DEL MOVIMIENTO Y DISTRIBUCIÓN DEL % DE ACTIVACIÓN MUSCULAR EN EJERCICIOS DE FUERZA

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INTRODUCCIÓN: La velocidad del movimiento puede influir en la activación muscular (1). Hasta la fecha, ningún estudio ha investigado la influencia de la velocidad de movimiento en la distribución del % de la actividad muscular en ejercicios típicos de fuerza de los miembros inferiores. El objetivo del presente estudio es comparar la distribución del % de participación de los músculos recto anterior (RA), biceps femoral (BF), semitendinoso (ST) y glúteo mayor (GM) en la sentadilla (SE), hip-thrust (HT) y sentadilla búlgara (SB) en base a diferentes velocidades de ejecución y con la misma carga.

MÉTODO: Quince estudiantes físicamente activos participaron en este estudio. Se utilizó la electromiografía de superficie (EMG) para la valoración de la activación neuromuscular de la pierna dominante y un encoder lineal (vinculado al software Speed4lifts) para medir la velocidad del movimiento. Se obtuvo la activación muscular máxima y media del RA, BF, ST y GM durante dos velocidades de movimiento diferentes: movimiento de velocidad máxima (VM) y movimiento de velocidad controlada (VC). Se realizaron los test isométricos de fuerza máxima y posteriormente se realizaron los 3 ejercicios de fuerza (60% del 1-RM) de forma aleatoria. Se utilizó la contracción isométrica voluntaria máxima para normalizar los datos de la EMG. Se utilizó la prueba T-student para muestras relacionadas (nivel de significancia, $p < 0,05$).

RESULTADOS: En la SE, el BF y ST obtuvieron un valor significativamente mayor con el método de VM ($M=22,61$; $19,69$ SE= $6,97$; $5,81$ respectivamente) que con el método de VC ($M=20,81$; $17,56$ SE= $6,41$; $6,32$ t (14) = $2,18$; $3,38$ $p=0,047$; $0,005$ r= $0,50$; $0,67$ respectivamente). Por el contrario, el RA obtuvo un valor significativamente mayor con el método de VC ($M=42,17$ SE= $11,24$) que con el método de VM ($M=38,32$ SE= $9,56$ t (14) = $4,03$ $p=0,001$ r= $0,73$). No se encontraron diferencias significativas entre ambos métodos para el HT y la SB.

CONCLUSIONES: La velocidad de movimiento puede afectar a la distribución del % de la activación de los músculos implicados en la SE, mientras que esto no ocurre en el HT y la SB. El incremento de la velocidad bajo la misma carga en el ejercicio de la SE debería contemplarse en las progresiones de fuerza destinadas al trabajo específico de los isquiotibiales.

REFERENCIAS:

(1) Stastny P, Golaś A, Blazek D, Maszczyk A, Wilk M, Pietraszewski P, et al. A systematic review of surface electromyography analyses of the bench press movement task. PloS one. 2017;12(2): e0171632.

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VELOCITY-BASED TRAINING: A BIBLIOMETRIC ANALYSIS

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INTRODUCTION: Velocity-based training (VBT) has emerged as a new training methodology to try to guide and improve strength training practices. Practical applications of this methodology range from providing feedback to increasing motivation to velocity-based programming (1). Since the last decade, a multitude of studies have been done to try to clarify the utilities of this type of training resulting in a large body of knowledge, however, this new evidence has not been studied yet. For this reason, our work aimed to carry out a bibliometric review to obtain information about the characteristics of the studies published and the impact they have had to date.

METHODS: A search was carried out using the term “velocity-based training” in the PubMed, Web of Science, Cochrane and Science Direct databases. To be included, studies had to use velocity during training, using it with traditional strength exercises and being published in English or Spanish. Data were extracted on the number of articles and citations, authors, journals, countries and institutions.

RESULTS: A total of 164 articles on the topic were analysed, totalling 1866 citations (M: 11.4). 2 articles received 100-119 citations, 1 80-99, 4 60-79, 5 40-59, 13 20-40 and 139 0-19. The authors who published the most as first authors were Perez-Castilla (14; 8.5%), Garcia-Ramos (6; 3.7%) and Weakley (4; 2.4%). The journals that published the most were J STRENGTH COND RES (37; 22.6%), INT J SPORT PHYSIOL (22; 13.4%) and SPORTS (15; 9.1%), being 4 journals responsible for more than 50% of the publications (those three and J SPORT SCI). The most contributing countries to VBT publications were Spain (79; 48.2%), Chile (39; 23.8%) and USA (35; 21.3%), and the institutions from which most of these papers were published were UGR (40; 24.4%), UCSC (38; 23.2%) and UPO (17; 10.4%).

DISCUSSION: The study of VBT is growing year over year, both in the number of articles and citations. The journals that contribute most to this growth belong to the area of Sports Science. Spain and, more specifically, the UGR, are the largest contributors. However, as it is a relatively recent methodology, many articles have not yet been cited and more time is needed for it to become firmly established in the practice of coaches and trainers.

REFERENCES:

- Weakley et al. Velocity-Based Training: From Theory to Application. Strength Cond J. 2021;43(2):31-49.

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VELOCITY-BASED TRAINING: A GUIDE TO PRESCRIBING EXECUTION VELOCITIES

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INTRODUCTION: Strength training intensity has traditionally been quantified based on the % of 1 repetition maximum (1RM) or repetition maximums (RMs) (1). However, new methodologies based on execution velocity are emerging to monitor the degree of intensity of strength training (2). To date, there are no known guidelines that summarise the evidence regarding the relationship between the execution velocity of the set and the load it entails based on %1RM for different population groups. For this reason, our review aimed to gather information about the execution velocity of different loads in traditional strength exercises.

METHODS: A review was carried out using the term "velocity-based training" in the databases PubMed, Web of Science, Cochrane and Science Direct. The inclusion criteria were to use traditional strength exercises, evaluate 1RM, measure the mean velocity, that this information was related to a load based on %1RM and that the articles were published in English or Spanish.

RESULTS: 14 articles were included. For the back squat the loads analysed ranged from 35 (0.88 ± 0.19 m/s) to 100% 1RM (0.23 ± 0.01 - 0.31 ± 0.08 m/s). For the front squat the load analysed was 100% 1RM (0.29 ± 0.08 - 0.32 ± 0.08 m/s). For conventional deadlift the loads analysed went from 20 (1.22 ± 0.07 - 1.38 ± 0.11) to 100% 1RM (0.14 ± 0.05 - 0.37 ± 0.06 m/s). For the sumo deadlift the loads analysed were 100% 1RM (0.24 ± 0.08 - 0.27 ± 0.11 m/s). For the barbells (free) bench press the loads analysed ranged from 35 (1.02 ± 0.17) to 100% 1RM (0.10 ± 0.04 - 0.18 ± 0.07 m/s). For the Smith machine bench press the loads analysed from 20 (1.21 ± 0.10 - 1.41 ± 0.09) to 100% 1RM (0.15 ± 0.03 - 0.172 ± 0.041 m/s). In addition, execution velocity of different exercises (incline bench press on Smith machine, seated military press, overhead press, free prone bench pulls, bent over barbell row and leg press) were analysed.

DISCUSSION: Execution velocity gives us information on the relative internal load that the weight used in the series represents for the subject. With this work, the coach can know, with the execution velocity, the load based on the %1RM that a series represents for the individual and, thereby, facilitate the use of this training methodology, within the personal training, without the need to make additional measurements.

REFERENCES:

Sierra-Ramón et al. Resistance training intensity: which is the most used intensity marker in the most cited studies? NSCA Spain Abstracts 2021. J. Strength Cond. Res. 2022; 36 (8): e89-e104.
Gonzalez-Badillo & Sanchez-Medina. Movement velocity as a measure of loading intensity in resistance training. Int J Sports Med. 2010;31(5):347-52.

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IMPACT OF COVID-19 CONFINEMENT ON STRENGTH, FITNESS AND LUNG FUNCTION IN CHILDREN WITH CYSTIC FIBROSIS

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INTRODUCTION: Cystic fibrosis (CF) is a genetic-multisystemic condition that causes progressive chronic lung disease and multiple associated comorbidities. From 2009-2010, the influenza pandemic (H1N1) resulted in very high mortality among CF patients(1); this fact conditioned the 2020 pandemic (SARS-CoV-2) to be classified as a highly vulnerable population recommending longer isolation time than the rest of the people, reporting a reduction in hospital admissions and an improvement in lung function in CF(2,3). However, COVID-19 confinement also implied decrease in physical activity (PA) levels(4). Therefore, it is interesting to analyze confinement's impact on lung function and physical fitness in a group of children with CF.

METHODS: Observational study of a cohort of 10 children with CF evaluated at the Hospital Infantil Universitario Niño Jesús at three-time points: T1 before the start of confinement (January 2020); T2 at the end of confinement (July 2020), and T3 six months after the end of confinement (December 2020). The variables analyzed at all times were: forced expiratory volume in 1 second (FEV1), peak oxygen consumption (VO2peak), and relative body weight upper limb strength.

RESULTS: At T1 mean age was 11.9 ± 2.68 years, FEV1 z-score -1.70 ± 1.48 ; VO2peak 41.7 ± 7.86 ml/kg/min and FrMS 0.47 ± 0.17 kg/kg-weight. FEV1 z-score significantly improved ($p=0.003$) between T1-T2 reaching -1.02 ± 1.45 , and remained significantly unchanged between T2-T3. On the other hand, relative body weight upper limb strength not have significant changes between T1-T2 but did between T2-T3 with an increase from 0.45 ± 0.16 kg/kg-weight to 0.50 ± 0.12 kg/kg-weight, $p=0.013$. Finally, VO2peak showed a non-significant downward trend between T1-T2 but was clinically relevant.

DISCUSSION/CONCLUSION: Our results highlight the period in which patients were in isolation significantly improved pulmonary function, which was associated with a lower risk of infections, coinciding with Meystre 2005 and Fusco 2014, which prove that the reduction of hospital admissions is associated with an improvement of pulmonary function(2,3). However, confinement led to a decrease in PA levels(4) which could affect the reduction in VO2peak and the decrease in relative body weight upper limb strength. It is noteworthy that at T3 after resuming regular activities, a significant increase in strength was observed along with a smaller decline in VO2peak, highlighting muscle strength as a variable of interest to achieve maintenance in cardiorespiratory fitness which is, by itself, a prognostic variable in CF(5).

REFERENCES:

(1)Viviani L et al., 2011; (2)Meystre., 2005; (3)Fusco et al. 2014; (4)Lavie et al., 2019; (5)Pianosi., 2005.
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MODERATE-INTENSITY CYCLIC HYPOXIC TRAINING AS A LONG-TERM EFFECTIVE TOOL TO IMPROVE CARDIOVASCULAR RISK OUTCOMES IN PATIENTS RECOVERED FROM COVID-19: THE AEROBICOVID STUDY

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INTRODUCTION: Most of the infected patients who recovered from SARS-CoV-2 received hospital discharge with sequels after COVID-19. Rehabilitation program for these patients has been determined as crucial to achieving a good level of health. Besides, the recovery duration may vary from ten days to three months, being necessary to set up strategies to accelerate their recovery as well as, maintain the improvements as period of cessation are common. The aim of this study was to analyse the long-term effects of a training program under hypoxic conditions on cardiovascular risk factors in patients recovered from COVID-19.

METHODS: Eighty-four patients recovered of COVID-19 (age: 48.48 ± 9.79 years, body mass: 83.15 ± 16.55 kg, BMI: 29.86 ± 5.06 ; VO_{2max}: 21.13 ± 6.16 kg·ml·min⁻¹) were divided in control group (CG) who were not available to participate in the intervention but who could take part in the assessments; training and recovery with hypoxia (TH:RH), training in normoxia and recovery with hypoxia (TN:RH) or training and recovery in normoxia (TN:RN). Training groups performed of 3 and 6 sets of 5 minutes cycling (90-110%) with 2.5 minutes of passive recovery between sets. Participants training or recovering under hypoxic conditions inspired a fraction of O₂ of 13.5%. Anthropometric and body composition, biochemical parameters and maximal oxygen uptake were evaluated pre-(T1) and post-intervention (T2) and 8 weeks after training cessation (T3) with intention-to-treat analysis.

RESULTS: Fat-free mass significantly decrease in CG (-1.17%; p=0.004). Fat mass significantly decrease in TH:RN in T3 compared with T2 (+1%; p=0.024). While all of training group showed significant decrease in hip circumference in T3 compared with baseline (p<0.001), TH:RH achieved significant improvements in waist circumference too (-1.89%; p=0.002). According to maximal oxygen uptake, while TN:RN showed significantly a decrease (-7.17%; p=0.003) in T3 compared with T2, groups who training (+7.59%; p=0.036) or recovery (+7.08%; p=0.019) in hypoxia showed higher values in T3 compared with baseline.

DISCUSSION: Hypoxic stimulus during exercise or recovery may lead an additional benefit on fat mass located in the trunk and maximal oxygen uptake, maintaining improvements after training cessation. Training programs combined with hypoxia may be useful tool to maximize the effects of exercise, increasing adherence and motivation as benefits as even maintaining after training cessation. As patients who recovered from SARS-CoV-2 show post-acute sequelae of COVID-19, they could need usual period of inactivity which could be balance with this type of program.

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NOTAS/ NOTES



THE ULTIMATE STRENGTH TRAINING EXPERIENCE

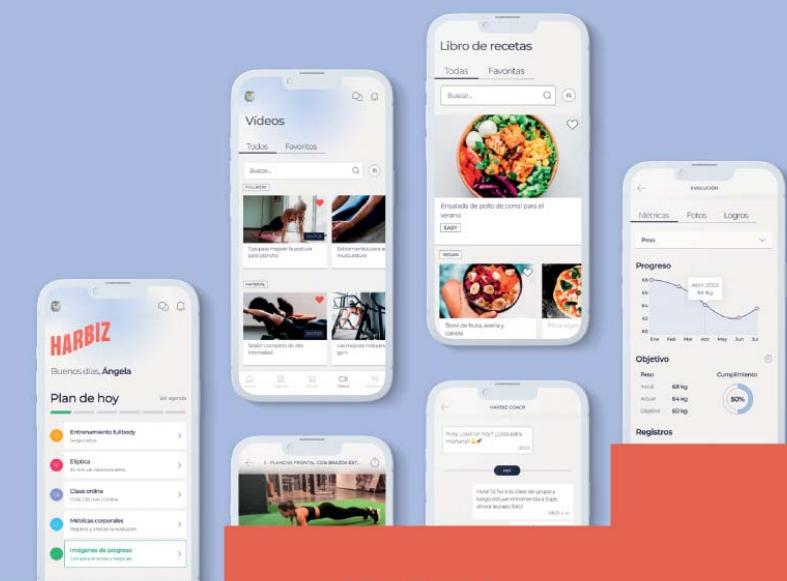
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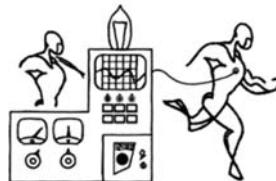
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