XIII Simposio Internacional de Actualizaciones en Entrenamiento de la Fuerza

III NSCA Spain National Conference

17-18 de diciembre de 2021
Madrid (España)

UNIVERSIDAD POLITÉCNICA DE MADRID
Facultad de Ciencias de la Actividad Física y del Deporte (INEF)
Departamento de Salud y Rendimiento Humano
NSCA Spain

Editores: Ana B. Peinado,. Pedro J. Benito, Rocío Cupeiro & Lara Pablos

PROGRAMA
y
LIBRO DE RESÚMENES

Organizado por:

POLITÉCNICA

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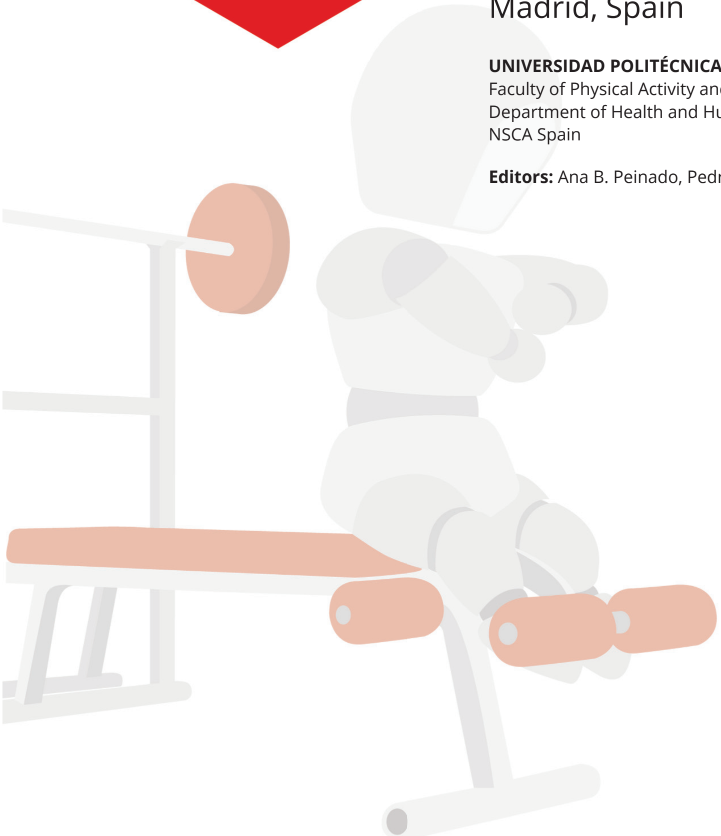

PROGRAM
&
BOOK OF
ABSTRACTS

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Pedro J. Benito,
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Rocío Cupeiro
Lara Pablos
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BIENVENIDOS

BIENVENIDOS AL XIII SIMPOSIO DE FUERZA - III NSCA SPAIN NATIONAL CONFERENCE

No hace falta volver mucho la vista atrás para ver lo que nos ha acontecido. La pandemia del COVID-19, todavía con nosotros, nos ha dejado marcados de por vida. Pero es muy humano reconocer nuestras limitaciones y también nuestras capacidades, así como sobreponerse y superar las dificultades. El mundo del ejercicio físico ha supuesto una válvula de escape para muchos ciudadanos en todo el mundo. Hemos valorado la libertad de movimiento cuando hemos estado confinados en casa, casi sin poder salir, y llevando a su mínima expresión el movimiento humano. Pero hoy vernos aquí, de nuevo en nuestra casa y superando todas las dificultades, provoca que una sonrisa de superación, satisfacción y plenitud me inunde. Ver de nuevo a tantos amigos es un lujo que no se tiene todos los días.

En estos dos años hemos aprendido a valorar la enseñanza del “contacto” físico. Los eventos donde puedes ver a tus científicos de referencia y con los que puedes intercambiar opiniones en un mismo lugar no podrán sustituirse nunca. Si bien la tecnología ha jugado y jugará una vital trascendencia en nuestro futuro próximo, eso no hará más que poner en valor poder ver “in vivo” a la persona que solemos leer en las publicaciones y en los libros.

Que “aquello que no te mata, te hace más fuerte” es una frase atribuida a Friedrich Nietzsche, a la que yo suelo añadir: pero te puede matar. Esto debe hacernos reflexionar sobre el poder del ahora y la necesidad de estar presentes en lo que hacemos. Por ello queridos compañeros, espero que disfrutéis de este evento, que nos acoge cada año. Estamos sin lugar a dudas en un momento cuya historia escribimos para nuestras generaciones venideras. Este libro y su contenido, con el esfuerzo de todos ustedes permanecerá en el tiempo, ya sea en el mundo virtual o en el analógico, para recordarnos que nada ni nadie es infalible y que debemos cuidar y cuidarnos para tener un mañana que ofrecer.

Que nos juzgue el mañana, pero disfrutemos hoy de estar juntos en “la casa” y compartir con amigos una buena discusión inteligente.

Pedro J. Benito Peinado
Presidente del Simposio de Fuerza

WELCOME

WELCOME TO THE XIII INTERNATIONAL SYMPOSIUM IN STRENGTH TRAINING - III NSCA SPAIN NATIONAL CONFERENCE

It is not necessary to look back to see what happened to us, since the COVID-19 pandemic is still with us and it has scarred us for life. However, it is very human to recognize our limitations and our capacities, as well as to overcome the difficulties. The world of physical exercise has been a scape valve for many people around the world. We have valued freedom of movement even more during the lockdown, almost being unable to leave, and limiting human movement to its minimum expression. Despite all that, today we are here together, after all difficulties back to our home, which puts me a big smile of overcoming, satisfaction and fulfillment on my face and keeps me excited. It is a pleasure to see so many friends again, an opportunity that we don't have every day.

In the last two years we have learned to value the teaching through physical "contact". Events, where you can see reference scientists and with who we can exchange opinions in person, can never be replaced. Although technology has played and will play a vital importance in our near future, this will only add value to being able to see the person "in vivo" who we know only through publications and books.

I usually add to the phrase "what does not kill you, makes you stronger" attributed to Friedrich Nietzsche the following: but it can kill you. This should make us reflect on the power of the moment and the necessity of being present in what we do. Therefore, dear colleagues, I hope that you enjoy this event, which brings us together every year. Undoubtedly, we are in a moment, the history of which we are writing now for the forthcoming generations. This book and its content, with the effort of all of you, will persist in time, whether in the virtual or the analog world, to remind us that nothing and no one is infallible and that we must care and take care of ourselves to have a tomorrow to offer.

Let tomorrow judge us, but let's enjoy being together at "home" today and sharing a nice intelligent discussion with friends.

Pedro J. Benito Peinado
Symposium President

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PRESENTACIÓN DEL SIMPOSIO

Este año despegamos con más fuerza que nunca. Con la vista puesta en el pasado, pero con ganas de superarlo. Esta decimotercera edición del Simposio de Fuerza y III NSCA Spain National Conference, viene cargada de optimismo y ciencia aplicada al entrenamiento físico. Prueba de que no nos olvidamos del pasado, pero que lo trascendemos, es la charla de Jon Irazusta, que fue muy valiente para llegar a cabo investigaciones sobre cómo influía la pandemia en los niveles de actividad física de la población.

Pero empecemos por el principio: más de 40 jóvenes científicos y entrenadores han sometido sus trabajos al comité científico, que como siempre han trabajado con esmero y cariño para seleccionar a los mejores. Los veremos defendiendo esos trabajos.

Empezaremos el viernes hablando de la capacidad del ejercicio físico para sanar, lo que está fuera de toda duda, aunque muchas de las ponencias están orientadas a mostrar evidencias sobre este hecho. Borja Bandera, Sara Tabares, Mario Redondo e Irene Esteban-Cornejo, son claros exponentes de cómo podemos contribuir con nuestro trabajo en el campo de la salud. No buscamos competición con otras profesiones, sino colaboración, y estas conferencias acercan mundos.

A mediodía, dos profesionales como la copa de un pino tendrán contacto directo con los participantes en nuestros workshops, como son Iván Gonzalo y Jesús Rivilla.
Margarita Pérez inaugurará este XIII Simposio de Fuerza, con la satisfacción de saberse ya profesora del Departamento de Salud y Rendimiento Humano. Es todo un honor que hable sobre el papel del ejercicio físico en una patología tan importante como la fibrosis quística. También por la tarde, ya era momento de que nos visitara Pedro Emilio Alcaraz, uno de los científicos españoles más prolíficos y que sigue aportando mucho conocimiento a nuestro ámbito.

En el plano internacional, ya en la jornada del sábado, dos pesos pesados: Brian T. Gearity, entrenador de entrenadores, que nos hablará sobre la preparación física en el siglo XXI; y nuestro querido amigo Íñigo San Millán, un español afincado en Colorado que ha demostrado el valor de la perseverancia y el estudio. El Dr. San Millán es unos de los mejores científicos del mundo en el metabolismo del lactato, al que exprimiremos hasta el último segundo.

Para terminar, una mesa redonda donde nos acercaremos al mundo de la Sociedad Española de Obesidad (SEEDO) y su comité de expertos en ejercicio para el tratamiento de la obesidad, un equipo multidisciplinar de profesionales que estudia sin complejos el abordaje de esta compleja patología.

Como todos los años, el equipo del SDF está deseoso de recibiros y compartir este tiempo navideño juntos, recordando que seguimos en pandemia y la responsabilidad debe ser de todos nosotros.

SYMPOSIUM PRESENTATION

This year we take off stronger than ever. With an eye to the past, but willing to overcome it. This thirteenth edition of the Strength Symposium and III National Conference NSCA Spain, is loaded with optimism and science applied to physical training. Proof that we do not forget the past, but we transcend it, is the talk of Jon Irazusta, who was very brave to carry out research on how the pandemic has influenced the levels of physical activity of the population.

But let's start at the beginning: more than 40 young scientists and trainers have submitted their work to the scientific committee, which, as always, has worked with care and affection to select the best works. We will see these authors defending those works.

On Friday we will start talking about the ability of physical exercise to heal, which is beyond doubt its most important feature, so that many of the presentations are aimed to show evidence of this fact. Borja Bandera, Sara Tabares, Mario Redondo and Irene Esteban-Cornejo are clear exponents of how we can contribute to our work in the field of health. We do not seek competition with other professions, but collaboration, and these conferences bring worlds closer together.

At midday, two recognized experts will have direct contact with the participants in our workshops, such as Iván Gonzalo and Jesús Rivilla.

Margarita Pérez will inaugurate this XIII Symposium in Strength, with the satisfaction of knowing that she is already a professor in the Department of Health and Human Performance. It is an honor to listen to her speaking about the role of physical exercise in a pathology as important as the cystic fibrosis. On the other hand, in the afternoon, it was time for Pedro Emilio Alcaraz to visit us, one of the most prolific Spanish scientists who continues to contribute knowledge to our field.

At the international level, already on Saturday, two heavyweights: Brian T. Gearity, coach of coaches, who will talk about physical preparation in the 21st century; and our dear friend Iñigo San Millán, a Spaniard living in Colorado who has demonstrated the value of perseverance and study. Dr. San Millán is one of the best scientists in the world in lactate metabolism, which we will squeeze until the last second.

Finally, a round table where we will get closer to the world of the Spanish Society of Obesity (SEEDO) and its committee of experts in exercise for the treatment of obesity, a multidisciplinary team of professionals who study steadily the approach to this complex pathology.

Like every year, the SDF team is eager to welcome you and share this Christmas time, remembering that we are still in a pandemic and the responsibility must lie with all of us.

PROGRAMA CIENTÍFICO / SCIENTIFIC PROGRAM

DÍA 1/ DAY 1

Horario/Time	DÍA 1 / DAY 1 17/12/2021
8:30 - 9:00 h	**Acreditación / Registration**
9:00 - 10:30 h	**Comunicaciones orales 1/ Oral presentation 1**
10:30 - 11:30 h	Ejercicio físico: la polipíldora del siglo XXI **BORJA BANDERA**
11:30 - 12:00 h	**DESCANSO / BREAK / POSTER PRESENTATION**
12:00 - 13:00 h	Efectos del ejercicio físico en personas con trastornos de la conducta alimentaria **SARA TABARES**
13:00 - 14:00 h	Ejercicio físico en el paciente oncológico: ¿Estamos haciendo lo suficiente? **MARIO REDONDO**
14:00 - 15:30 h	**COMIDA / LUNCH** **WORKSHOP 1**
15:30 - 17:30 h	**ACTO DE APERTURA/ OPEN CEREMONY** El ejercicio de fuerza como aliado en el tratamiento de la fibrosis quística **MARGARITA PÉREZ RUIZ**
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	Cambios de los hábitos de actividad física del alumnado universitario durante la pandemia causada por la Covid-19 **JON IRAZUSTA**
19:45 - 21:00 h	Optimización del trabajo de potencia en deportes de equipo: Complex vs. Contrast training **PEDRO EMILIO ALCARAZ**

PROGRAMA CIENTÍFICO / SCIENTIFIC PROGRAM

DÍA 2/ DAY 2

Horario/Time	DÍA 2 / DAY 2 18/12/2021
8:30 - 9:00 h	**Acreditación / Registration**
9:00 - 10:00 h	**Comunicaciones orales 3/ Oral presentation 3**
10:00 - 11:30 h	Control del entrenamiento en el deporte del bádminton. La importancia de la carga interna **GUILLERMO SÁNCHEZ**
11:30 - 12:00 h	**DESCANSO / BREAK / POSTER PRESENTATION**
12:00 - 13:00 h	Coaching up the coaches! S&C coach development in the 21st century **BRIAN T. GEARITY**
13:00 - 14:00 h	Importancia del lactato en la salud y en el rendimiento **ÍÑIGO SAN MILLÁN**
14:00 - 15:30 h	**COMIDA / LUNCH** **WORKSHOP 2**
15:30 - 17:30 h	**MESA REDONDA EMPRENDIMIENTO** **JAVIER BUTRAGUEÑO, CARLOS IRIARTE, ANTONIO PASTOR y JOSÉ PABLO RODRÍGUEZ**
17:00 - 18:00 h	Ejercicio y salud cerebral durante la niñez y el envejecimiento: proyectos ActiveBrains y AGUEDA **IRENE ESTEBAN-CORNEJO**
18:00 - 18:30 h	**DESCANSO / BREAK / POSTER PRESENTATION**
18:30 - 19:00 h	**Conclusiones, entrega de premios y clausura del Simposio** **Conclusions, awards and closing ceremony**
19:00 - 20:30 h	**MESA REDONDA SEEDO** **JAVIER BUTRAGUEÑO, FELIPE ISIDRO, WALTER SUÁREZ CARMONA y FRANCISCO JOSÉ TINAHONES**

PROGRAMA AMPLIADO / EXTENDED PROGRAM

	VIERNES, 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 1 / Oral Presentation 1	9:00 - 10:30 h	
1	Effect of modified feedback on power output in the bench press **Fernando García Aguilar**	09:00 h	Aula Magna
2	From the paper to the gym. Adaptation of an exercise program for frail adult **Fernando Millan-Domingo**	09:15 h	
3	Effects of two consecutive field hockey matches on isometric hip strength in female players **Violeta Sánchez-Migallón Millán**	09:30 h	
4	Effects of concurrent training and detraining on physical function, muscle power, frailty and independence in activities of daily living in frail older adults **Iván Baltasar Fernández**	09:45 h	
5	Sex-related differences in the second lactate threshold **José Antonio Benítez Muñoz**	10:00 h	
6	Effects of eccentric training on power and velocity during half-squat in athletes with patellar tendinopathy **Alejandro San Juan Ferrer**	10:30 h	
	EJERCICIO FÍSICO: LA POLIPÍLDORA DEL SIGLO XXI **BORJA BANDERA**	10:30 - 11:30 h	Aula Magna
	Descanso / Break/ Poster presentation 1	11:30 - 12:00 h	
	EFECTOS DEL EJERCICIO FÍSICO EN PERSONAS CON TRASTORNOS DE LA CONDUCTA ALIMENTARIA **SARA TABARES**	12:00 - 13:00 h	Aula Magna
	EJERCICIO FÍSICO EN EL PACIENTE ONCOLÓGICO: ¿ESTAMOS HACIENDO LO SUFICIENTE? **MARIO REDONDO**	13:00 - 14:00 h	Aula Magna
	Comida / Lunch	14:00 - 15:30 h	
	WORKSHOP 1: ENTRENAMIENTO DE FUERZA CON TOMA DE DECISIONES. UNA PROPUESTA PARA LA MEJORA FÍSICA Y COGNITIVA **JESÚS RIVILLA**	14:00 - 15:30 h	Aula 604

PROGRAMA AMPLIADO / EXTENDED PROGRAM

	VIERNES, 17 DE DICIEMBRE		
	PROGRAMA DE TARDE/ AFTERNOON PROGRAM		
	DESCRIPCIÓN / *DESCRIPTION*	**HORA / *TIME***	**LUGAR / *VENUE***
	CONFERENCIA INAUGURAL / OPENING CEREMONY	15:30 - 16:00 h	Aula Magna
	EL EJERCICIO DE FUERZA COMO ALIADO EN EL TRATAMIENTO DE LA FIBROSIS QUÍSTICA	16:00 - 17:30 h	Aula Magna
	MARGARITA PÉREZ		
	Comunicaciones orales 2 / Oral Presentation 2	17:30 - 18:00 h	
1	Cross-sectional analysis of the influence of antenatal and postpartum physical activity levels on stroke volume **Olga Roldán Reoyo**	17:30:00 h	Aula Magna
2	Use of inertial motion units to study motor variability during resistance movements **Rafael Sabido Solana**	17:45:00 h	
	Descanso / Break/ Poster presentation 2	18:00- 18:30 h	
	CAMBIOS DE LOS HÁBITOS ACTIVIDAD FÍSICA DEL ALUMNADO UNIVERSITARIO DURANTE EL CONFINAMIENTO **JON IRAZUSTA**	18:30 - 19:45 h	Aula Magna
	OPTIMIZACIÓN DEL TRABAJO DE POTENCIA EN DEPORTES DE EQUIPO: COMPLEX VS. CONTRAST TRAINING **PEDRO E. ALCARAZ**	19:45 - 21:00 h	Aula Magna

PROGRAMA AMPLIADO / EXTENDED PROGRAM

SÁBADO, 18 DE DICIEMBRE		
PROGRAMA DE MAÑANA/ MORNING PROGRAM		
DESCRIPCIÓN / *DESCRIPTION*	**HORA / T*IME***	**LUGAR / *VENUE***
Apertura de acreditaciones / *Registration open*	08:30 - 09:00 h	**Entrada / *Hall***
Comunicaciones orales 3 / Oral Presentation 3	9:00 - 10:30 h	
1 Effects of the set configuration in a concurrent exercise program on the force-velocity relationship in frail older people **Héctor Soto Paniagua**	09:00 h	Aula Magna
2 Analysis of pulmonary function and physical condition in adult cystic fibrosis patients **Tamara Iturriaga Ramirez**	09:15 h	
3 Resistance training in hypoxia improves the bone health of older adults **Rafael Timon Andrada**	09:30 h	
4 Influence of the menstrual cycle on crawl performance in young females swimmers **Darío Rodrigo Mallorca**	09:45 h	
CONTROL DEL ENTRENAMIENTO EN EL DEPORTE DEL BÁDMINTON. LA IMPORTANCIA DE LA CARGA INTERNA **GUILLERMO SÁNCHEZ**	10:00 - 11:30 h	Aula Magna
Descanso / Break/ Poster presentation 3	11:30 - 12:00 h	
COACHING UP THE COACHES! S&C COACH DEVELOPMENT IN THE 21ST CENTURY **BRIAN T. GEARITY**	12:00 - 13:00 h	Aula Magna [ENG] **TRADUCCIÓN SIMULTÁNEA**
IMPORTANCIA DEL LACTATO EN LA SALUD Y EL RENDIMIENTO **IÑIGO SAN MILLÁN**	13:00 - 14:00 h	Aula Magna
Comida / Lunch	14:00 - 15:30 h	
ENTRENAMIENTO DE LA ESTABILIDAD CENTRAL: DEL CONTROL POSTURAL AL RENDIMIENTO **IVÁN GONZALO**	14:00 - 15:30 h	Aula 604

PROGRAMA AMPLIADO / EXTENDED PROGRAM

SÁBADO, 18 DE DICIEMBRE		
PROGRAMA DE TARDE/ AFTERNOON PROGRAM		
DESCRIPCIÓN / *DESCRIPTION*	HORA / T*IME*	LUGAR / *VENUE*
Mesa Redonda Emprendimiento / Round Table	15:30 - 17:00 h	Aula Magna
JAVIER BUTRAGUEÑO, ANTONIO PASTOR Y JOSÉ PABLO RODRÍGUEZ, CARLOS IRIARTE		
EJERCICIO Y SALUD CEREBRAL DURANTE LA NIÑEZ Y EL ENVEJECIMIENTO: PROYECTOS ACTIVEBRAINS Y AGUEDA **IRENE ESTEBAN-CORNEJO**	17:00 - 18:00 h	Aula Magna
Descanso / Break/ Poster presentation 3	18:00- 18:30 h	
CONCLUSIONES, ENTREGA DE PREMIOS Y CLAUSURA DEL SIMPOSIO / CONCLUSIONS, AWARDS AND CLOSING CEREMONY	18:30 - 19:00 h	Aula Magna
Mesa Redonda SEEDO / Round Table	19:00 - 20:30 h	Aula Magna
JAVIER BUTRAGUEÑO, WALTER SUÁREZ CARMONA, FELIPE ISIDRO, FRANCISCO JOSÉ TINAHONES		

PONENTES / KEYNOTE SPEAKERS

SATURDAY, DECEMBER 18, 2021 13:00 - 14:00 H

ÍÑIGO SAN MILLÁN, MD

UNIVERSITY OF COLORADO (CO, USA)

Control del entrenamiento en el deporte del bádminton. La importancia de la carga interna.

Íñigo San Millán, estudió Ciencias de la Salud y el ejercicio con la especialidad de medicina en la Colorado State University, completando sus estudios de doctorado en Fisiología en la Universidad del País Vasco, donde empezó a trabajar con deportistas de élite, entre ellos los corredores del equipo Saunier Duval. Desde 2008 trabaja en la Universidad de Denver en el centro de Medicina Deportiva y actualmente trabaja como Profesor Asociado adjunto de Medicina y Profesor Investigador Asociado. Además del trabajo con deportistas de elite -ciclistas, atletas, remeros, nadadores, triatletas, esquiadores de fondo y de los deportes de equipo, da clases y ha creado un equipo de investigación del cáncer, enfermedades cardiovasculares y diabetes. También trabaja como Director de Rendimiento del equipo UAE Emirates Cycling Team.

Íñigo San Millán, studied Health Exercise Science-Sport Medicine at the Colorado State University, completing his doctoral studies in Physiology at the Universidad del País Vasco, where he began working with elite athletes, including cyclist of the Saunier Duval team. Since 2008 he has worked at the University of Denver in the Center for Sports Medicine and currently works as Assistant Professor of Medicine and Associate Research Professor. In addition to working with elite athletes - cyclists, athletes, rowers, swimmers, triathletes, cross-country skiers and team sports, he teaches and has created a research team on cancer, cardiovascular disease and diabetes. He also works as the Performance Director for the UAE Emirates Cycling Team.

BRIAN GEARITY, PHD

UNIVERSITY OF DENVER (CO, USA)

Coaching up the Coaches! S&C Coach development in the 21st Century

Brian Gearity, PhD, ATC, CSCS, FNSCA, es director fundador y profesor asistente del programa de Máster en Artes y Entrenamiento Deportivo, el Grado en Strength and Conditioning (S&C) y Fitness Coaching, y es graduado especializado en S&C y Psicología Deportiva por la Universidad de Denver. Brian ha trabajado como preparador físico en deportistas en etapas escolares, secundarias, universitarias y profesionales, incluyendo una etapa en la Universidad de Tennessee y los Cleveland Indians. Como miembro de la National Strength and Conditioning Association (NSCA), es Editor Jefe de la revista NSCA Coach y Editor Jefe Asociado de la Strength and Conditioning Journal (SCJ). Miembro del consejo editorial de Qualitative Research in Sport, Exercise and Health, Sport Coaching Review, International Sport Coaching Journal, and the Journal of Aging and Physical Activity. Utiliza la teoría sociológica y psicológica para mejorar la calidad del entrenamiento. Es coeditor de Coach Education and Development: Instructional Strategies y coautor de Understanding Strength and Conditioning as Sport Coaching: Bridging the Biofysical, Pedagogical and Sociocultural Foundations of Practice ambos publicados por Routledge en 2020

Dr. Brian Gearity, ATC, CSCS, FNSCA is founding Director and Assistant Professor of the Master of Arts in Sport Coaching program, the Graduate Certificate in Strength and Conditioning (S&C) and Fitness Coaching, and specialized graduate certificates in S&C and the Psychology of Coaching at the University of Denver. Dr. Gearity has been a S&C coach for youth, high school, collegiate, and professional athletes, including stops at the University of Tennessee and Cleveland Indians. A Fellow of the National Strength and Conditioning Association (NSCA), he is Editor-in-Chief for NSCA Coach and Associate-Editor-in-Chief for Strength & Conditioning Journal. He also serves on the editorial board for Qualitative Research in Sport, Exercise and Health, Sport Coaching Review, International Sport Coaching Journal, and the Journal of Aging and Physical Activity. He uses sociological and psychological theory to enhance quality coaching. He is co-editor of Coach Education and Development published by Routledge in 2020.

MARGARITA PÉREZ RUIZ, MD
UNIVERSIDAD EUROPEA DE MADRID

El ejercicio de fuerza como aliado en el tratamiento de la fibrosis quística.

Margarita Pérez es médico especialista en Medicina en la Educación Física y el Deporte, Máster en Fisiología del Ejercicio y Doctora en Medicina por la Universidad Complutense de Madrid. Trabaja como Investigador Senior del grupo Ejercicio es Salud y BIomarcaDores Aplicados (ESBIDA), centrándose en la fisiología del ejercicio y aunque inicialmente se basó en el estudio de las respuestas y adaptaciones del cuerpo humado al ejercicio, trabajó algunos años en el deporte de resistencia. Desde el 2003 trabaja en población infantil y adolescente, estudiando la utilidad del ejercicio físico como terapia en la patología crónica. Pionera en la implantación en España de uno de los primeros gimnasios intrahospitalarios para la aplicación del ejercicio dentro de la patología crónica como la anorexia, enfermedad respiratoria o el cáncer. Ha conseguido implementar ejercicio en las salas de diálisis para la enfermedad renal crónica dentro de la Fundación Renal Iñigo Álvarez. Fruto de su trabajo investigador, ha recibido 12 premios Nacionales de Medicina del Deporte por la Universidad de Oviedo y también ha sido premiada la institución a la que representa, por algunas de sus ideas en el Diario Médico durante el año 2013 y 2015.

Margarita Pérez is Specialist in Medicine in Physical Education and Sports, Master in Exercise Physiology and Doctor of Medicine from the Universidad Complutense de Madrid. Currently Senior Researcher of the group Exercise is Health and Applied Biomarkers (ESBIDA). Su research activity has focused mainly on the physiology of exercise and although at the beginning of my career the work was based on the study of the responses and adaptations of the human body to exercise and worked for endurance sports. Since 2003 she have been working in the child and adolescent population and she study the usefulness of physical exercise as a therapy in chronic pathology. Pioneer in the implementation in Spain of one of the first in-hospital gyms for the application of exercise within chronic pathology such as anorexia, respiratory disease or cancer. She has been awarded for some of their ideas in the Medical Journal during 2013 and 2015.

PEDRO E. ALCARAZ, PHD

UNIVERSIDAD CATÓLICA SAN
ANTONIO DE MURCIA. COL. 11372

Optimización del trabajo de potencia en deportes de equipo: Complex vs. Contrast Training

Catedrático de Universidad (ANECA) en el área de Educación Física y Deporte, y Doctor Europeo en Ciencias del Deporte con premio extraordinario. NSCA-CPT,*D y CSCS,*D. Presidente de la Strength and Conditioning Society (SCS). Máster de Alto Rendimiento del Comité Olímpico Español (C.O.E.). Director del Centro de Investigación en Alto Rendimiento Deportivo de la UCAM. Director de UCAM Spanish Sports University y del Programa de Doctorado en Ciencias del Deporte. Director del Máster Universitario en Alto Rendimiento Deportivo: Fuerza y Acondicionamiento Físico, y del Máster en Preparación Física y Readaptación Deportiva. Investigador Principal del grupo de Investigación Optimización del Entrenamiento, el Rendimiento Deportivo y el Acondicionamiento Físico (OPEN-RED). Autor de más de 200 documentos de investigación relacionados con el rendimiento deportivo y el entrenamiento en algunas de las mejores revistas internacionales, editoriales y foros de Investigación del ámbito de las Ciencias del Deporte. Investigador invitado en varios centros de Investigación en Rendimiento Deportivo y Humano (Brunel University, UK; Edith Cowan University, Australia; Porto University, Portugal, etc.). Ponente invitado en decenas de Congresos de ámbito nacional e internacional. Asesor en Preparación Física y Prevención de Lesiones en varios equipos de fútbol profesional (LaLiga), equipos nacionales y deportistas olímpicos. Revisor experto de varias Agencias de Investigación tanto nacionales (AEI) como internacionales (MIUR-Italia, Coldeportes-Colombia, etc.). Experto asesor en el Área de Salud para el Consejo-COLEF.

University Professor (ANECA) in the area of Physical Education and Sports, and European Doctor in Sports Sciences with an extraordinary award. NSCA-CPT,*D and CSCS,*D. President of the Strength and Conditioning Society (SCS). High Performance Master of the Spanish Olympic Committee (C.O.E.). Director of the Research Center on High Sports Performance at UCAM. Director of UCAM Spanish Sports University and of the Doctorate Program in Sports Sciences. Director of the Master's Degree in High Sports Performance: Strength and Physical Conditioning, and of the Master's Degree in Physical Preparation and Sports Readaptation. Principal Investigator of the Optimization of Training, Sports Performance and Physical Conditioning Research group (OPEN-RED).

JON IRAZUSTA, PHD

UNIVERSIDAD DEL PAÍS VASCO

Cambio de los hábitos de actividad física del alumnado universitario durante el confinamiento

Licenciado (1987) y Doctor en Biología (1992) por la UPV/EHU. Ejerce como profesor en el Departamento de Fisiología desde el año 1989, donde imparte docencia en los Grados de Medicina y Fisioterapia y en los Másteres de Investigación Biomédica y de Envejecimiento Saludable y Calidad de Vida. De este último fue su impulsor y su primer director (2013-2015). Es también profesor del Doctorado en Investigación Biomédica y ha dirigido 20 Tesis Doctorales (2 de ellas internacionales, 6 premios extraordinarios y 2 premios Koldo Mitxelena). Su investigación se ha llevado a cabo en dos ámbitos: comunicación celular y fisiología del ejercicio, con un enfoque en los últimos años en el envejecimiento saludable. Es responsable del Grupo de Investigación AgeingOn. Su labor investigadora ha quedado plasmada en 130 artículos en revistas internacionales de impacto y más de 250 comunicaciones en Congresos. Ha participado en más de 30 proyectos de investigación, de los cuales ha sido IP en 20. Tiene 5 sexenios de investigación. En la actualidad es Director del Departamento de Fisiología de la UPV/EHU

Graduate (1987) and Doctor in Biology (1992) from the UPV / EHU. He has been a professor in the Department of Physiology since 1989, where he teaches in the Degrees of Medicine and Physiotherapy and in the Masters of Biomedical Research and Healthy Aging and Quality of Life. The latter was its promoter and its first director (2013-2015). He is also a professor of the Doctorate in Biomedical Research and has directed 20 Doctoral Theses (2 of them international, 6 extraordinary awards and 2 Koldo Mitxelena awards). His research has been carried out in two areas: cellular communication and exercise physiology, with a focus in recent years on healthy aging. He is responsible for the AgeingOn Research Group. His research work has been reflected in 130 articles in high-impact international journals and more than 250 communications in Congresses. He has participated in more than 30 research projects, of which he has been IP in 20. He has 5 six-year research. He is currently Director of the Department of Physiology

GUILLERMO SÁNCHEZ

FEDERACIÓN ESPAÑOLA DE BÁDMINTON. COL. 65490

Control del entrenamiento en el deporte del bádminton. La importancia de la carga interna.

D. Guillermo Sánchez es Graduado en Ciencias de la Actividad Física y el Deporte por la Universidad Pablo de Olavide (Sevilla), Máster en Fisiología del ejercicio (Universitat de Barcelona) y Máster Universitario en Rendimiento Físico y Deportivo (UPO). Ha trabajado como investigador en el Instituto de investigaciones neurobiológicas, Neurobia Research, analizando el uso del sistema Kinect para la evaluación del movimiento y la neurorehabilitación mediante ejercicio físico. Actualmente trabaja como Preparador Físico de Alto Nivel en la Federación española de bádminton llevando a Deportistas Olímpicos. Guillermo es además Entrenador Personal Certificado por NSCA, NSCA-CPT desde 2014.

D. Guillermo Sánchez has a Sport Science Degree from Universidad Pablo de Olavide (Sevilla), a Master Degree in Exercise Physiology (Universitat de Barcelona) and a Máster Degree in Physical and Sport Performance (UPO). He has worked as a researcher at the Neurobia Research Institute for neurobiological research, analyzing the use of the Kinect system for the evaluation of movement and neurorehabilitation through physical exercise. He currently works as a Strength Coach in the Spanish Badminton Federation leading Olympic Athletes. Guillermo is also a Certified Personal Trainer by NSCA, NSCA-CPT since 2014.

BORJA BANDERA, MD
HOSPITAL CLÍNICO VIRGEN DE LA VICTORIA (MÁLAGA)

Ejercicio físico: la polipíldora del Siglo XXI

Borja Bandera es médico especialista en Endocrinología y Nutrición, Doctorando en Medicina, Investigador en las áreas de Metabolismo y Nutrición y Creador de Contenido Online. El Blog de Empoderamiento por Bandera dio paso a la página personal (Borjabandera.es), a la cuenta de Instagram (@banderaempodera) y al canal de Youtube (Dr. Borja Bandera).

Borja Bandera is a specialist in Endocrinology and Nutrition, a PhD student in Medicine, Researcher in the areas of Metabolism and Nutrition and Online Content Creator.
The Blog of Empoderamiento por Bandera gave way to the personal page (Borjabandera.es), to the Instagram account (@ banderaempodera) and to the YouTube channel (Dr. Borja Bandera).

MARIO REDONDO

HEALTH & EXERCISE CLINIC. COL. 66794

Ejercicio físico en el paciente oncológico: ¿Estamos haciendo lo suficiente?

Mario Redondo es fisioterapeuta y Licenciado en Ciencias de la Actividad Física y del Deporte por la Universidad Europea de Madrid. Especializado a través de la Fundación IPEFC (Instituto Profesional de Ejercicio Físico y Cáncer) para la rehabilitación del paciente oncológico mediante el ejercicio físico como herramienta terapéutica. Defensor de que es posible mejorar la calidad de vida, reducir efectos secundarios de la enfermedad y tratamientos (sarcopenia, dinapenia, cardiotoxicidad, osteoporosis, fatiga, dolores articulares, empeoramiento de la composición corporal, etc.) así como aumentar la supervivencia de estas personas evitando una posible recurrencia de la enfermedad u otra complicación. Siempre de la mano de la evidencia científica.

Mario Redondo is a physiotherapist and has a degree in Physical Activity and Sports Sciences from the Universidad Europea de Madrid. Specialized through the IPEFC Foundation (Professional Institute of Physical Exercise and Cancer) for the rehabilitation of cancer patients through physical exercise as a therapeutic tool. Defender that it is possible to improve the quality of life, reduce side effects of the disease and treatments (sarcopenia, dinapenia, cardiotoxicity, osteoporosis, fatigue, joint pain, worsening of body composition, etc.) as well as increase the survival of these people avoiding a possible recurrence of the disease or other complication. Always hand in hand with scientific evidence.

SARA TABARES

CEO DE PERFORMA ENTRENADORES PERSONALES. COL. 62850

Efectos del ejercicio físico en personas con trastornos de la conducta alimentaria

CEO de PERFORMA SALUD. Fisióloga del ejercicio (Universidad de Barcelona) en el Centro sanitario Performa. Graduada en Ciencias de la Actividad Física y el Deporte (Colegiada 62850) y Licenciada en Periodismo. Ha publicado los libros: “Entrena bien, vive mejor” y “La profesión del entrenador personal”. Su área de investigación se desarrolla en el Impacto del ejercicio físico supervisado en el tratamiento de pacientes con anorexia nerviosa (Universidad Católica de Valencia).
Desde 2012 dirige SER SALUDABLE, programa radiofónico de salud basado en la evidencia científica de la Cadena SER. Premio Concha García Campoy a la divulgación científica (radio).

CEO of PERFORMA SALUD. Exercise Physiologist (University of Barcelona) at the Performa Health Center. Graduated in Physical Activity and Sports Sciences (Collegiate 62850) and Graduated in Journalism. She has published the books: “Train well, live better” and “The profession of personal trainer.” Her area of research is developed in the Impact of supervised physical exercise in the treatment of patients with anorexia nervosa (Catholic University of Valencia).
Since 2012, she has directed SER SALUDABLE, a radio health program based on the scientific evidence of Cadena SER. Concha García Campoy Award for scientific dissemination (radio).

IRENE ESTÉBAN- CORNEJO, PHD

UNIVERSIDAD DE GRANADA. COL. 56724

Ejercicio y salud cerebral durante la niñez y el envejecimiento: Proyecto Activebrains y Agueda.

Irene Esteban-Cornejo es Licenciada en Ciencias de la Actividad Física y el Deporte (2010), Máster en Formación de Profesorado, especialidad en Educación Física (2011), y Doctor en Ciencias de la Actividad Física y el Deporte (2014) todo ello por la Universidad Autónoma de Madrid. Continuó como investigadora posdoctoral en la Universidad Autónoma de Madrid (2015). Ha realizado estancias pre y post-doctorales en USA, Brasil y Portugal. Actualmente es Investigadora Juan de la Cierva en la Facultad de Ciencias del Deporte de la Universidad de Granada.
Sus principales áreas de interés son:
Evaluación de la condición física en población joven, Evaluación de la actividad física y el sedentarismo de forma objetiva mediante acelerometría, Estilos de vida, factores relacionados con la salud y su influencia en el rendimiento académico en población joven, Ejercicio físico y su efecto sobre diferentes dimensiones de la salud física, mental, cognición y cerebro en población joven, Actividad física y su impacto en el síndrome de fragilidad y el deterioro cognitivo en el adulto mayor.

Irene Esteban-Cornejo has a Bachelor in Exercise and Sport Science Degree (2010), a Master’s in Teacher Training, specializing in Physical Education (2011), and a Doctor of Exercise and Sport Science (2014) all for the Universidad Autónoma de Madrid. She continued as a postdoctoral researcher at the Universidad Autónoma de Madrid (2015). She has carried out pre and post-doctoral stays in the USA, Brazil and Portugal. She is currently a Juan de la Cierva Researcher at the Faculty of Sports Sciences of the University of Granada.
Her main areas of interest are:
Evaluation of physical condition in young population, Objective evaluation of physical activity and sedentary lifestyle through accelerometry, Lifestyles, health-related factors and their influence on academic performance in young population, Physical exercise and its effect on different dimensions of physical, mental, cognition and brain health in the young population, Physical activity and its impact on frailty syndrome and cognitive impairment in the elderly.

JESÚS RIVILLA, PHD

UNIVERSIDAD POLITÉCNICA DE MADRID. COL. 53806

Entrenamiento de fuerza con toma de decisiones. Una propuesta para la mejora física y cognitiva.

Jesús Rivilla es Doctor en Ciencias de la Actividad Física y del Deporte y profesor Contratado Doctor en la Universidad Politécnica de Madrid. Master en Dirección RR.HH., Técnico Sup. Coaching Deportivo y Experto Nutrición y Planificación Dietética. Trabaja como director de Cursos y Ponente Principal: Entrenamiento BodyCoreTM, Entrenamiento en Suspensión y Entrenamiento Funcional aplicado Grupos Reducidos y Clases Dirigidas. Ha participado en más de 30 ponencias en congresos, jornadas y clínics científicos. Ha publicado más de 20 artículos científicos en revistas indexadas y especializadas, 2 libros completos, participando en la publicación de 3 capítulos de libro. Creador de materiales docentes, registros de propiedad intelectual y de marca. Como investigador ha participado en 12 proyectos de innovación educativa, 2 como investigador principal y obtuvo el 3er Premio al Joven Investigador en 6th International Scientific Conference on Kinesiology (Opatija, Croacia). Como profesional, es el Preparador Físico de la Selección Española de Balonmano en Real Federación Española de Balonmano, y como ayudante de Entrenador y Preparador Físico del Club Balonmano Ciudad Real, elegido mejor equipo del mundo y Entrenador del Club Balonmano Puertollano (1ª División).

Jesús Rivilla, PhD in Physical Activity and Sports Sciences and Associate Professor at the Universidad Politécnica de Madrid. Master in Human Resources Management, Technical Sup. Sports Coaching and Expert in Nutrition and Diet Planning. He works as Course Director and Keynote Speaker: BodyCoreTM Training, Suspension Training and Functional Training applied Small Groups. He has participated in the publication of 3 book chapters. As a researcher, he has participated in 12 educational innovation projects, 2 as principal investigator and obtained the 3rd Young Researcher Award at the 6th International Scientific Conference on Kinesiology (Opatija, Croatia). As a professional, he is the S&C Coach of the Spanish Handball Team in the Federación Española de Balonmano, and as Assistant Coach and SC of the Ciudad Real Handball Club and Coach of Puertollano Handball Club (1st Division).

IVÁN GONZALO MARTÍNEZ

ELEMENTS SYSTEM. COL. 53021

Entrenamiento de la estabilidad central: del control postural al rendimiento.

Iván Gonzalo es Licenciado en Ciencias de la Actividad Física y el Deporte por la Universidad Politécnica de Madrid (UPM). Máster Oficial en investigación en Ciencias del deporte (UPM), Postgrado en Entrenamiento Funcional por la Universidad Caece Mar del Plata (Argentina), Especialista Universitario en Nutrición Deportiva y humana por la Universidad de Cádiz. CEO y creador Elements System e Indoor Triathlon. Lleva trabajando más de 20 años como entrenador personal en diferentes instituciones y con deportistas profesionales. Profesor en diferentes másters nacionales e internacionales (UPM, UEM, UEMC, UAB). Posee numerosa formación técnica (ACSM, NSCA, Technogym, etc). Profesor y Colaborador Docente y Técnico del INEF de Madrid y la NSCA Spain. Ha participado como ponente en numerosas ediciones del Simposio Internacional de Entrenamiento de Fuerza con workshops relacionados con preparación al movimiento, calentamiento, Kettlebells y entrenamiento de Core, entre otros.

Iván Gonzalo has a degree in Physical Activity and Sports Sciences from the Polytechnic University of Madrid (UPM). Postgraduate in Functional Training from the Caece Mar del Plata University (Argentina), University Specialist in Sports and Human Nutrition from the University of Cádiz. CEO and creator of Elements System and Indoor Triathlon. He has been working for more than 20 years as a personal trainer in different institutions and with professional athletes. Professor in different national and international master's degrees (UPM, UEM, UEMC, UAB). He has extensive technical training (ACSM, NSCA, Technogym, etc). Professor and Teaching and Technical Collaborator of the INEF of Madrid and the NSCA Spain. He has participated as a speaker in numerous editions of the International Symposium on Strength Training with workshops related to movement preparation, warm-up, Kettlebells and Core training among others.

JAVIER BUTRAGUEÑO, PHD

OBESITY MANAGEMENT SCHOOL. COL. 12740

Mesa redonda de emprendimiento

Javier Butragueño es Doctor en Ciencias de la Actividad Física y del Deporte y maestro de Educación Física. Trabajó durante 12 años en el Laboratorio de Fisiología del Esfuerzo de la Facultad de Ciencias de la Actividad Física y del Deporte de la Universidad Politécnica de Madrid. Creador de la Obesity Management School, una escuela online con el objetivo de transferir el conocimiento sobre "cómo manejar el sobrepreso y la obesidad desde todos los ámbitos de la salud (endocrinología, psicología, entrenamiento, nutrición, nuevas tecnologías, etc). Forma parte del proyecto "The Apple Project", un proyecto innovador para desarrollar un departamento saludable en colegios. Por último, es el Coordinador del Grupo de Trabajo de Ejercicio Físico y Obesidad de la Sociedad Española para el Estudio de la Obesidad (SEEDO).

Javier Butragueño is a Doctor in Physical Activity and Sports Sciences and a Physical Education teacher. He worked for 12 years at the Effort Physiology Laboratory of the Faculty of Physical Activity and Sports Sciences of the Universidad Politécnica de Madrid. Creator of the Obesity Management School, an online school with the aim of transferring knowledge about "how to manage overweight and obesity from all areas of health (endocrinology, psychology, training, nutrition, new technologies, etc.). It is part of the project "The Apple Project", an innovative project to develop a healthy department in schools.

Finally, he is the Coordinator of the Work Group on Physical Exercise and Obesity of the Sociedad Española para el estudio de la Obesidad (SEEDO).

ANTONIO PASTOR - JOSÉ PABLO RODRÍGUEZ

PERSONAL RUNNING. COL. 14018- 14077

Mesa redonda de emprendimiento

Antonio Pastor y José Pablo Rodríguez son Licenciados en Ciencias de la Actividad Física y el Deporte, Especialistas Universitarios en Entrenamiento Personal por la Universidad Politécnica de Madrid y Entrenadores Personales Certificados por NSCA (NSCA-CPT). Organizadores de carreras populares, desde 2010 dirijen el proyecto Personal Running, una empresa orientada al entrenamiento personal cuya labor se fundamenta en un sentimiento, una filosofía construida sobre los principios del respeto hacia uno mismo, constancia, trabajo, sacrificio y superación personal.

Antonio Pastor and José Pablo Rodríguez are Graduates in Physical Activity and Sports Sciences, Specialist in Personal Training from the Universidad Politécnica de Madrid and Certified Personal Trainers by NSCA (NSCA-CPT). Organizers of popular races, since 2010 direct the Personal Running project, a company oriented to personal training whose work is based on a feeling, a philosophy built on the principles of self-respect, perseverance, work, sacrifice and personal improvement.

CARLOS IRIARTE OLALLA

ENTRENADOR DE NEGOCIOS - CEO SPORTUP. COL. 53966

Mesa redonda de emprendimiento

Carlos Iriarte es Licenciado en Ciencias de la Actividad Física y el Deporte. Responsable de expansión de franquicias SportUp Personal Trainers. Fundador y director de CiSport, venta de productos especializados en entrenamiento personal y equipamiento deportivo. Consultor de negocios de Entrenador Personal, preparador físico y actualmente formándose en Scouting de Fútbol. Ha trabajado como profesor del Grado de Ciencias de la Actividad Física y el Deporte en la Universidad San Jorge; además, es miembro docente en los cursos de certificación organizados por NSCA Spain. Posee las certificaciones NSCA-CPT y CSCS. Creador del Canal de Youtube "Entrenador de negocios" donde ayuda a profesionales a digitalizar su negocio de entrenamiento personal.

Carlos Iriarte has a degree in Physical Activity and Sports Sciences. Responsible for expansion of franchises SportUp Personal Trainers. Founder and director of CiSport, sale of specialized products in personal training and sports equipment. Personal Trainer business consultant, physical trainer and currently training in Soccer Scouting. He has worked as a professor of the Degree in Physical Activity and Sports Sciences at the Universidad San Jorge; in addition, he is a teaching member in the certification courses organized by NSCA Spain. It is NSCA-CPT and CSCS certified by NSCA. Creator of the Youtube Channel "Business Coach" where he helps professionals to digitize their personal training business.

WALTER SUÁREZ CARMONA

MIEMBRO DEL GRUPO DE EJERCICIO FÍSICO Y OBESIDAD DE LA SEEDO

Mesa redonda SEEDO

Walter Suárez es Graduado en Fisioterapia. Entrenador personal en ASEP.Investigador en la Facultad de Ciencias del Deporte Pablo de Olavide (Sevilla). Miembro del grupo de trabajo Ejercicio Físico y Obesidad en SEEDO (Sociedad Española para el Estudio de la Obesidad). Profesor en diversos másteres de nutrición y fisiología clínica del ejercicio. Autor de trabajos relacionados con el tejido adiposo, fisiología del ejercicio, obesidad y músculo esquelético.

Walter Suárez is Graduated in Physiotherapy. Personal trainer at ASEP. Researcher at the Pablo de Olavide School of Sports Sciences (Seville). Member of the Physical Exercise and Obesity working group at SEEDO (Spanish Society for the Study of Obesity). Professor in various master's degrees in nutrition and clinical exercise physiology. Author of works related to adipose tissue, exercise physiology, obesity and skeletal muscle.

FELIPE ISIDRO
MIEMBRO DEL GRUPO DE EJERCICIO FÍSICO Y OBESIDAD DE LA SEEDO

Mesa redonda SEEDO

Felipe Isidro es Catedrático en Educación Física de la Generalitat de Catalunya, miembro de la Junta Directiva y Responsable del área de Ejercicio Físico, Salud y Patologías del Instituto internacional de Ciencias del Ejercicio Físico y Salud (IICEFS) y Coordinador del Departamento Internacional de Actividad Física de PronoKal Health Group, CEO de Physical Exercise & Health Consulting. Investigador, ponente, articulista y autor en Ejercicio Físico, Salud y Fitness en diversas Universidades a nivel nacional e internacional y en publicaciones especializadas. Autor de libros de referencia relacionados con el entrenamiento personal y la prescripción de ejercicio físico en personas con obesidad. Invitado regularmente en diferentes medios de comunicación nacionales e internacionales para ser entrevistado en temas de Ejercicio Físico y Salud. Miembro del grupo de Ejercicio Físico y Obesidad de la Sociedad Española de Estudio de la Obesidad (SEEDO).

Felipe Isidro is Professor in Physical Education of the Generalitat de Catalunya, Member of the Board of Directors and Head of the area of Physical Exercise, Health and Pathologies of the International Institute of Physical Exercise and Health Sciences (IICEFS) and Coordinator of the International Department of Physical Activity of PronoKal Health Group, CEO of Physical Exercise & Health Consulting. Researcher, speaker, columnist and author in Physical Exercise, Health and Fitness at various national and international universities and in specialized publications. Author of reference books related to personal training and the prescription of physical exercise in people with obesity. Regularly invited in different national and international media to be interviewed on Physical Exercise and Health issues. Member of the Physical Exercise and Obesity group of the Sociedad Española de Estudio de la Obesidad (SEEDO).

FRANCISCO JOSÉ TINAHONES, MD
PRESIDENTE DE LA SOCIEDAD ESPAÑOLA DE ESTUDIO DE LA OBESIDAD (SEEDO)

Mesa redonda SEEDO

Francisco José Tinahones es Investigador Responsable en Endocrinología celular y molecular. Director Científico de IBIMA e Investigador Principal / Responsable en el Instituto. Jefe de Servicio de Endocrinología y Nutrición del Hospital Universitario Virgen de la Victoria de Málaga. Catedrático de Medicina en la Facultad de Medicina de Málaga. Presidente SEEDO. Miembro del Comité Científico del CIBERobn.
Autor de más de 460 publicaciones originales en revistas médicas indexadas y revisadas por pares. Indice de impacto acumulado de las publicaciones superior a 2300. Investigador principal de más de 40 proyectos competitivos públicos (nacionales y europeos) y de más de 120 ensayos clínicos en las áreas de la diabetes y la obesidad. 27 tesis doctorales dirigidas. Premio Nacional a la mejor trayectoria de grupo de la SEEN. Sus líneas de investigación son: estado posprandial y riesgo cardiovascular, la paradoja de los obesos metabólicamente sanos como una oportunidad para la búsqueda de nuevas dianas terapéuticas, capacidad neogénica del tejido adiposo y su relación con las enfermedades metabólicas, el papel de la microbiota en la enfermedad autoinmune y metabólica.

Francisco José Tinahones is a Senior Researcher in Cellular and Molecular Endocrinology. Scientific Director of IBIMA and Principal / Responsible Researcher at the Institute. Head of the Endocrinology and Nutrition Service at the Virgen de la Victoria University Hospital in Malaga. Professor of Medicine at the Faculty of Medicine of Malaga. President SEEDO. Member of the Scientific Committee of CIBERobn.
Author of more than 460 original publications in indexed and peer-reviewed medical journals. Cumulative impact index of publications over 2300. Principal investigator of more than 40 competitive public projects (national and European) and of more than 120 clinical trials in the areas of diabetes and obesity. 27 supervised doctoral theses. National Award for the best trajectory of a group of the SEEN. His lines of research are: postprandial state and cardiovascular risk,
the paradox of the metabolically healthy obese as an opportunity to search for new therapeutic targets.

COMUNICACIONES ORALES / ORAL PRESENTATION

FRIDAY, DECEMBER 17, 2021

9:00 - 10:30 H

Comunicaciones orales 1 / Oral presentation 1

09:00 - 09:15

EFFECT OF MODIFIED FEEDBACK ON POWER OUTPUT IN THE BENCH PRESS

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UNIVERSIDAD MIGUEL HERNÁNDEZ

External feedback about physical movements can modify performance in those actions. Several authors have reported that human motor performance is greater when athlete receive external feedback about execution . Feedback or knowledge of results can be qualitative or quantitative. When feedback is quantitative, coaches can employ a neutral or modified feedback. Modified feedback is a variation where the performance results could be increased (IN) o decreased (DE). IN feedback has been shown to produce better results than no feedback or DE feedback during isometric force evaluations (2). Since there is little information on the effect of feedback type on ballistic strength exercises, the aim of this study was to analyse the effect of different types of feedback on power production in the bench press exercise. For this purpose, 14 men with experience in resistance training were recruited to perform two sessions separated by at least 48 hours. The first session was a familiarisation session and their bench press maximum repetition (RM) were calculated. During second, participants performed six sets of six repetitions at 50% RM, with a rest between repetitions of 15s and between sets of three minutes. During the rest between repetitions a neutral (repetition result without change), IN feedback (+5% of repetition result) or DE (-5% of repetition result) was administered in random order between sets in the training session. An ANOVA were employed to compare power values of repetitions after the different feedback administered. No significant differences were found between the different types of feedback. The results obtained do not coincide with those reported by other authors (2,3). This discordance in the results we believe may be due to task constraints (to execute as fast as possible) or to participant constraints (effect of feedback vary between participants). Thus, although from previous research it seems that feedback always has a positive effect, it is not clear the use of IN or DE feedback to increase performance.

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FROM THE PAPER TO THE GYM. ADAPTATION OF AN EXERCISE PROGRAM FOR FRAIL ADULTS

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FRESHAGE RESEARCH GROUP. DEPARTMENT OF PHYSIOLOGY. FACULTY OF MEDICINE, UNIVERSITY OF VALENCIA AND CIBERFES. FUNDACIÓN INVESTIGACIÓN HOSPITAL CLÍNICO UNIVERSITARIO/INCLIVA. VALENCIA, SPAIN.

INTRODUCTION: The aging of the world population is one of the biggest challenges to be faced by society, both economically and socially. Frailty is a geriatric syndrome characterized by a reduced capacity to respond to stressors, affecting 33% of people over 80 years and 11% over 65 years .The aim of our study was to adapt and transfer to real life the methodology and results obtained in a previous clinical trial intervention carried out by our research group (2).

METHODS: 50 people over 75 years of age followed a multicomponent physical exercise program for 3 days a week along 6 months. In each session, strength exercises (45%-75% maximum repetition), cardiorespiratory (55%-75% maximum heart rate), balance, and joint mobility were trained. The main modifications of the original program occurred in the number of sessions per week, from 5 to 3, and the inclusion of all physical capacities in each session. The statistical analysis was done with the student's t test for paired samples and the Wilcoxon test for non-parametric samples.

RESULTS AND DISCUSSION: Our results, show that the improvements achieved with the new intervention outweighs significantly those found in the clinical trial. We found that the real-life approach was superior in improving: frailty criteria ($p<0.0001$), hand grip strength ($p=0.0331$), Tinetti gait and balance scale ($p=0.0003$), number of falls ($p=0.0073$), visits to the primary care centre ($p=0.0312$), Barthel scale ($p=0.0001$) and Lawton scale ($p = 0.0011$). We can conclude that the modifications included in the real-life intervention to adapt the exercise program to community dwelling old individuals have meant an improvement to the previous exercise program.

ACKNOWLEDGEMENTS AND FINANCING: This work was supported by Instituto de Salud Carlos III CB16/10/00435 (CIBERFES), (PID2019-110906RB-I00/ AEI / 10.13039/501100011033) from the Spanish Ministry of Innovation and Science; 109_RESIFIT from Fundación General CSIC.

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EFFECTS OF TWO CONSECUTIVE FIELD HOCKEY MATCHES ON ISOMETRIC HIP STRENGTH IN FEMALE PLAYERS

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INTRODUCTION: The purpose of this study was to examine the effects of two competitive field hockey matches, played on consecutive days, on maximal isometric hip adductor and abductor strength [1].

METHODS: Fourteen professional female field hockey players (age: 20.4 ± 5.4 years; body mass: 60.7 ± 7.2 kg; height: 167.0 ± 1.0 cm) volunteered to participate in this investigation. Locomotion patterns during the matches were obtained with portable Global Positioning System (GPS) units. Maximal isometric hip adductor and abductor strength were obtained before (pre-match 1) and after the first match (post-match 1), after the second match (post-match 2) and 48 h after the second match. Perceived exertion (s-RPE) was assessed after each match. The Wellness Questionnaire (5-WQ) and the Total Quality Recovery Scale (TQR) were employed before the matches and 48 h after the second match.

RESULTS: There were no differences in the total distance covered when comparing match 1 and match 2. In the non-dominant limb, maximal isometric hip adductor and abductor strength were lower after post-match 2 when compared to pre-match 1 ($p = 0.011$). Hip abductor strength in the non-dominant limb remained reduced 48 h after post-match 2 ($p < 0.001$). Players reported more acute fatigue (5-WQ, $p = 0.009$) and increased muscle soreness on pre-match 2 compared to pre-match 1 ($p = 0.015$), while fatigue returned to pre-competition levels 48 h after post-match 2 ($p = 0.027$). No changes were observed in TQR.

DISCUSSION: The main findings of this investigation indicate that abductor and adductor muscle strength in the non-dominant limb were reduced in comparison to pre- competition values, suggesting that muscle weakness accumulated during the two consecutive matches. Notably, match performance (locomotion profile) in the second match was similar to the first match. This may indicate that professional field hockey players are at a higher risk of groin injury when exposed to successive matches on consecutive days, although match performance may not be substantially affected by the accumulation of fatigue. From a practical application view, physiotherapist/strength and conditioning coaches could monitor maximal isometric hip strength during congested calendars to assess the likelihood of sustaining groin injury.

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EFFECTS OF CONCURRENT TRAINING AND DETRAINING ON PHYSICAL FUNCTION, MUSCLE POWER, FRAILTY AND INDEPENDENCE IN ACTIVITIES OF DAILY LIVING IN FRAIL OLDER ADULTS

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INTRODUCTION: The combination of endurance and resistance training improves physical performance and reduces frailty in older people (1). However, whether these positives adaptations are maintained in the long term in the absence of exercise training in frail older adults is unknown. This study aimed i) to assess the effects of a 6-week concurrent exercise program (power training and high intensity interval training) on physical function, muscle power, frailty and independence in activities of daily living in frail older people, and ii) to assess the effects of a 6-month detraining period on these outcomes.

METHODS: A total of 59 frail and pre-frail older adults (>75 years; Fried's criteria ≥1) were divided into an intervention (INT; n=32) and a control (CON; n=27) group. Primary outcomes were the Short Physical Performance Battery (SPPB) score, relative sit-to-stand (STS) power (2), Fried's frailty criteria, Barthel index and Lawton scale. Assessments were performed in both groups at baseline, after the concurrent training program, and after 6 months of follow-up. Mixed model repeated measures ANOVA with Bonferroni's post hoc tests were used to assess changes at each time point and to compare both groups.

RESULTS: INT improved SPPB (Δ= 3.0 points; p0.05). In addition, there were significant differences in SPPB (9.7±1.9 vs 7.8±2.5 points; p<0.001), relative STS power (2.92±0.53 vs 2.40±0.60 W·kg-1; p<0.001) and frailty (1.58±1.28 vs 2.68±1.36 criteria; p<0.001) between INT and CON after, but not before, the exercise program. After 6 months of detraining, INT showed higher SPPB (Δ= 2.2 points; p<0.001), higher relative STS power (Δ= 0.73 W·kg-1; p<0.001) and lower frailty (Δ=-1.24 criteria; p<0.001) values than those reported at baseline, which were significantly different from those reported by CON (all p<0.05). Barthel index and Lawton scale values did not change significantly during the study in any of the groups.

CONCLUSIONS: A 6-week program composed of power training and high intensity interval training improved physical function, muscle power and reduced frailty in frail older people, and these improvements were maintained above baseline levels after 6 months of detraining.

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Francisco José García-García: CB16/10/00456
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SEX-RELATED DIFFERENCES IN THE SECOND LACTATE THRESHOLD

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INTRODUCTION: Women present higher fat oxidation at the same relative intensity compared to men On the other hand, blood lactate concentration influences fat oxidation (2), so it is hypothesized that lactate kinetics may differ between male and females. Thus, the aim of this study was to assess the differences in lactate kinetics between male and female athletes.

METHODS: Nine trained males (23.88±4.51 years, 72.5kg±6.79 and 176.41±5.14cm) and 12 trained females (19.81±2.18 years, 58.4±8.03 Kg and 164.69±8.14 cm) were selected. All with the AA genotype for the T1470A polymorphism of the MCT1 gene (to avoid this moderate genetic factor) (3,4). Genotyping was performed using Real-Time PCR. All participants completed an incremental cycle test (35W increase every 3 minutes) until exhaustion, while capillary blood lactate concentration was analysed (Lactate Plus, Germany) at rest, in the last 30" of each step and immediately post-test. Second Lactate Threshold (LT) was determined via D-max method (5). (Lactate level at the LT (mM/L) expressed as percentage of the maximal lactate, as well as power output at LT (W) expressed as a percentage of the maximal power were compared between sexes using a Mann-Whitney U test.

RESULTS: Percentage of LT lactate relative to maximal lactate was higher in females (54.51±15.23%) compared to males (43.52±5.77%) (p=0.018) whereas no significant differences in power output relative to maximal power output (p=1.000) were observed between sexes (females: 70.12±7.99% and males: 70.45±6.35%). Regarding maximal lactate, there were no significant differences between sexes (p=0.602) (females: 10.95±2.47mM/L and males: 11.65±2.28mM/L).

DISCUSSION AND CONCLUSION: Our findings suggest that lactate threshold occurs nearer to the maximal lactate in females compared to males. This suggest that, at the same submaximal power intensity, women rely more than men on oxidative metabolism. This is in agreement with previous results reporting higher fat oxidation rate in females compared to males at the same submaximal relative intensity (1). Possible explanations for this are the inhibition of fat oxidation by lactate (2) or the higher percentage of slow muscle fibers in women (6). More studies are needed to further explain these metabolic differences between sexes. Thus, trainers and coaches should consider the metabolic difference when prescribing exercise based on power output if they want to stimulate similar metabolic adaptations.

FUNDING: PINV18ENW9ML92B2287R

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EFFECTS OF ECCENTRIC TRAINING ON POWER AND VELOCITY DURING HALF-SQUAT IN ATHLETES WITH PATELLAR TENDINOPATHY

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INTRODUCTION: Patellar tendinopathy is an injury which causes pain, loss of strength and sport performance levels. It is highly prevalent in sports modalities that involve jumps, sprints, and changes of direction (1). Eccentric exercise (EE) using declined single leg squats has been shown to be one of the most effective treatments to reduce pain and restore functional capacity in PT (2). However, to our knowledge any research has investigated the effect of EE on the power-force-velocity relationship. Objective: Evaluate the effectiveness of an 8-week recovery-training program on maximum power (Pmax), and velocity at Pmax (VPmax) in half-squat in athletes with PT.

METHODS: Eight athletes (6 men and 2 women) with PT, performed 8 weeks of EE: 3 sets of 10 repetitions of 25º declined one-leg squat, twice/day. Before and at the end of each session, they performed 30 seconds of static stretching of knee flexors and extensors. In addition, during the first 4 weeks they received shock wave treatment. At the beginning (PRE) and at the end of the 8-week intervention (POST), all the subjects performed a half-squat progressive load test to determine Pmax and VPmax with a linear encoder. Shapiro-Wilk´s test was used for contrasting the normality distributions of the variables. A t-Student test for related samples analyzed the differences between PRE-POST. Effect size (ES) was determined using Cohen’s d, considering values> 0.80 as large, 0.5-0.8 moderate, 0.2-0.5 small, and <0.2 trivial. Statistical significance was set at p<0.05.

RESULTS: At POST we observed a significant improvement in Pmax from PRE (+28%; p0.80), and no differences in VPmax between PRE and POST (p>0.05; ES<0.20).

DISCUSSION: These preliminary results showed that an 8-week EE program in combination with stretching and shock waves, allowed to improve Pmax in half-squat in patients with PT. Further, it seems that the relationship between Pmax and VPmax in half-squat is not affected during recovery in athletes with PT. Our results agree with González-Badillo and Sánchez-Medina (3) in healthy subjects. Practical Application: The relationship between Pmax and VPmax remains constant and the improvements in Pmax production after the recovery of the PT seems to be only due to an improvement in the load displaced and not to changes in the velocity of movement.

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FRIDAY, DECEMBER 17, 2021

17:30 - 18:00 H

Comunicaciones orales 2 / Oral presentation 2

17:30 - 17:45

CROSS-SECTIONAL ANALYSIS OF THE INFLUENCE OF ANTENATAL AND POSTPARTUM PHYSICAL ACTIVITY LEVELS ON STROKE VOLUME

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INTRODUCTION: Increased physical activity levels positively influence cardiovascular adaptations in the antenatal and postpartum periods, leading to decreased risk of pre-eclampsia and hypertension (1). There are marked adaptations in stroke volume (SV) during antenatal/postpartum periods (2), though little is known regarding the influence of PAL on these adaptations. Understanding whether antenatal/postpartum PAL influence SV is required to identify and inform safe physical activity (PA) and exercise behaviours during and following pregnancy. Therefore, this study sought to investigate the influence of PAL on SV in the antenatal and postpartum periods.

METHODS: Sixty-eight pregnant women participating in the 'PE-CAMP' randomised controlled trial underwent physiological assessments at 18-22 (T2) and 33-37 (T3) weeks gestation, and at 12-16 weeks postpartum (PP). Self-reported habitual PAL using the Modified Physical Activity Questionnaire were recorded from three months prior to pregnancy, during each pregnancy trimester and up to three months postpartum. SV was continuously recorded using the Task Force Haemodynamic Monitor at rest (5-mins) and during exercise on a cycle-ergometer at a workload equivalent to 40-60% heart rate reserve (10-mins). Cross-sectional multiple regression analyses investigated the influence of PAL on SV at rest and during exercise at T2 (n=64), T3 (n=55) and PP (n=40). Age and total time spent in minutes in moderate- and vigorous-intensity PA in the time-point specified above were included in the model.

RESULTS: The model explained 21.4% of the variance in rest SV in T3 (F(5, 54)=2.668); p=0.033) and 58.3% of the variance in SV during exercise in PP (F(5, 39)=2.506); p=0.012). The strongest predictors of rest SV during T3 were time spent in moderate and vigorous PA in the third trimester, although they failed to reach significance. The key determinants of SV during exercise at PP were time spent in vigorous PA in the third trimester (β=0.482; p=0.002) and moderate PA three months postpartum (β=0.400; p=0.010).

DISCUSSION: These findings highlight the importance of promoting moderate and vigorous PA for cardiovascular health during and after pregnancy.

PRACTICAL APPLICATION: Moderate and vigorous PA can be safely prescribed to active women in their third trimester of pregnancy and in the postnatal period.

ACKNOWLEDGEMENT: This project received funding from the European Union's Horizon 2020 Research and Innovation programme. Marie Skłodowska-Curie grant agreement No 663830-SU-079.

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USE OF INERTIAL MOTION UNITS TO STUDY MOTOR VARIABILITY DURING RESISTANCE MOVEMENTS

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INTRODUCTION: In recent years, resistance training monitoring has done important advances, which are allowing to improve evaluation and prescription process in strength training. Among different tools that have appeared to monitor resistance training are the Inertial Motion Units for its lower cost and for the possibility to asses in different segments or instruments during strength movements (1). IMU can provide a lot of information from accelerometers or gyroscopes, and it is possible to study motor variability during human movement (2). This study aimed to assess the validity and sensitivity of IMUs to quantify different strength training loads through the analysis of motor variability.

METHODS: Twenty-one healthy active participants performed five sets of five repetitions with different loads of one-repetition maximum in half squat movement (10, 30, 50, 70, and 90% of 1 RM). Executions were done on a force plate (Kistler, Switzerland, Model 9287BA), and an IMU (STT-IWS, STT Systems, Spain) was placed in the bar. The possible relationships between the force plate and IMU signals were evaluated using the Pearson correlation coefficient, and an ANOVA were employed to compare force plate and IMU variables calculated, with the significance level set at 0.05.

RESULTS: Pearson correlation coefficient in different loads were between .716 and .942. ANOVA test did not show any difference when standard deviation or entropy were compared in the different loads for the half squat.

DISCUSSION: Results of the correlational analysis and ANOVA reinforce the possibility to use IMU to describe motor variability during resistance exercises. Keeping in mind the low cost and portability of IMU devices comparing to force plate, coaches can employ IMU to evaluate motor variability during strength sessions and to monitor the changes after training programs.

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SATURDAY, DECEMBER 18, 2021

9:00 - 9:45 H

Comunicaciones orales 3 / Oral presentation 3

09:00 - 09:15

EFFECTS OF THE SET CONFIGURATION IN A CONCURRENT EXERCISE PROGRAM ON THE FORCE-VELOCITY RELATIONSHIP IN FRAIL OLDER PEOPLE

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INTRODUCTION: Concurrent exercise seems to be one of the best approaches to restore and/or maintain functional performance and reverse frailty . Thus, the aim of this study was to analyze Force-Velocity relationship changes in response to training programmes differing in the set configuration (cluster vs traditional), and its impact on physical function and frailty.

METHODS: This was a quasi-experimental, non-randomized controlled intervention study in 44 (pre-) frail (Frailty Phenotype ≥1 criteria) older adults (81.40 ± 5.1 years). Patients were assigned to traditional (TT; n = 13), cluster (CT; n = 11) or control (CON; n = 20) group. TT and CON underwent a 6-week concurrent training program which had the same training volume but not rest (TT: 1 min between sets; CT: 10 s each two repetitions + 1 min between sets) while CON followed usual care. F-V relationship, physical function and Frailty Phenotype were assessed at baseline and after training. Mixed model repeated measures ANOVA with Bonferroni's post-hoc tests were conducted to compare between-group differences over time.

RESULTS: Both groups showed similar improvements in Pmax after training(TT= + 33.8W, d = 0.44; CT:= + 37.7 W, d = 0.49; both p 0.05). TT showed a tendency to improve F0 (+ 125.4 N, d = 0.25, p = 0.06) while no changes were observed in CT (+ 80.2N, d = "0.15", p > 0.05). Finally, CT and TT improved SPPB (CT= + 2.4 points, d = 1.14, p 0.05; Frailty Phenotype= -0.2 criteria, d = 0.05, p = 0.38).

CONCLUSIONS: Altought bot methodologies improved physical function and reduced frailty, cluster set configuration appears to be a more effective method to improve velocity parameters on the F-V relationship, while the traditional one appears to be superior if the goal is to improve strength parameters.

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Saturday, December 18, 2021 **09:15 - 09:30**

ANALYSIS OF PULMONARY FUNCTION AND PHYSICAL CONDITION IN ADULT CYSTIC FIBROSIS PATIENTS

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INTRODUCTION: Improved pulmonary function and physical condition are known to be prognostic variables for the progression of cystic fibrosis , associated with fewer pulmonary exacerbations and lower risk of hospitalization(1–3). Given the increase in life expectancy in these patients over the last decade, there is a need to evaluate these variables and implement interventions to improve them. Furthermore, metabolic and contractile muscular alterations are also present in these patients, thus it is necessary to evaluate their functionality, both at respiratory and peripheral muscle level(4). Therefore, the aim of this study was to analyze the pulmonary function and cardiorespiratory and muscular physical condition of adult patients with CF.

METHODS: Forty-four adult CF patients from Hospital Universitario de La Princesa participated in this study. A descriptive analysis of forced expiratory volume 1s (FEV1) analized by spirometry, peak oxygen consumption (VO2peak) analized by ergospirometry with a treadmill incremental test was performed. Inspiratory muscle strength was measured by maximum inspiratory pressure (MIP) and strength of upper and lower limbs was evaluated by a hand-grip strength test and a 30seconds chair stand test (CS-30), respectively.

RESULTS: Subjects mean age was 31.7±8.75 years old and BMI was 22.33±2.51kg/m2. FEV1 mean was 2404.05±940.84 ml, MIP was 125.10±48.28 cm3H2O. Mean VO2peak was 30.67±9.33ml/kg/min. Right hand grip strength was 30.82±10.04kg and in the CS-30 test 25.43±6.05 repetitions.

DISCUSSION: In this group of subjects, physical exercise has been part of their treatment since childhood, obtaining that 88.6% of the sample remains physically active. 13.6% of patients presented a mild decline of pulmonary function, 20.5% moderate, 9.1% moderate-severe and 27.3% severe. The remaining subjects presented a FEV1 ≥80%. Most of the subjects (72.4%) maintained a normal inspiratory muscle(5). Regardless of their pulmonary pathology, 50% of the patients presented a VO2peak considered as “fit” (≥82% predicted) for healthy populations(6). For peripheral muscles strength, mean results obtained in the sample are close to ¿healthy/normal? reference values.

CONCLUSION: Even though subjects have a decline in pulmonary function typical of CF disease, they manage to maintain cardiorespiratory capacity and muscular strength around normal values. Therefore, it seems recommendable to implement a strength physical training program in addition to cardiorespiratory exercise in order to keep this population in good physical condition.

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RESISTANCE TRAINING IN HYPOXIA IMPROVES THE BONE HEALTH OF OLDER ADULTS

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INTRODUCTION: Resistance training has been recommended as a strategy to prevent osteoporosis and sarcopenia in older adults . Hypoxic training has been suggested as a beneficial therapy that could have an added synergistic effect with resistance training to improve muscle strength and bone health (2). The aim of this study was to evaluate the effects of the resistance training in hypoxic conditions on the bone health of the older adults.

METHODS: A total of 60 older adults (65-75 years) were randomly divided into four groups: NOR: Normoxia without training; RTN: Resistance training in normoxia, HIP: Hipoxia exposure without training; RTH: Resistance training in hypoxia (at a simulated altitude of 2500 m asl; FIO2=16.1%). The resistance training lasted 24 weeks and consisted of a full-body workout with elastic bands and kettlebells (3 x 12-15 reps). Bone mineral density (BMD) and bone mineral content (BMC) were measured by DEXA at baseline and after the intervention. Likewise, sensitive serum biomarkers of bone turnover of bone formation (PINP) and bone resorption (B-CTX) were also analyzed. A two-way ANOVA with Bonferroni post hoc tests were used to investigate the main and interaction effects.

RESULTS: Findings showed that the training factor had a significant main effect on the biomarkers of bone turnover after the intervention. An interaction effect of the training and hypoxia factors on the levels of these biomarkers was also observed. However, no significant change in BMD and BMC values was observed after the training program

Discussion: The effects of hypoxic conditioning on bone health in older adults could depend on the duration of the intervention, severity, and time of exposure (3). Resistance training in hypoxia during 24 weeks causes positive effects on the bone turnover, although changes in BMD and BMC would need longer interventions.

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INFLUENCE OF THE MENSTRUAL CYCLE ON CRAWL PERFORMANCE IN YOUNG FEMALES SWIMMERS

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INTRODUCTION: Hormonal fluctuations during the phases of the menstrual cycle can influence athletic performance . Recently, results have been found that recommend adopting a personalized approach based on each individual's response to exercise performance throughout the menstrual cycle (2). In particular, it has been suggested that in female 200-m swimmers taking a monophasic oral contraceptive can perform equally regardless of their menstrual phase (3).

PURPOSE: To determine the influence of the phases of the menstrual cycle on swimming performance, analyzing variation in performance of the different variables (time, cycle frequency and cycle length).

METHODS: We recruited 11 female swimmers of regional category 20.63 (2.01) years; 169 (0.75) cm; 59.32 (6.69) kg and 20.78 (1.76) kg/m2. The sample went to the pool in the 3 phases of the menstrual cycle (menstrual phase (MP); follicular phase (FP) and luteal phase (LP) to perform a 2 x 50 test with 5 minutes of recovery doing crawl. The 50-meter time (T50), cycle frequency (CF), cycle length (CL), mean velocity (MV) and fatigue index (FI) were analyzed.

RESULTS: The analysis revealed significant differences in performance as a function of menstrual cycle phase. 1) MP vs FP: improvement T50 and CF; 2) MP vs LP: improvement CL; 3) FP vs LP: improvement CL and FI ($p<0.05$).

CONCLUSIONS: The different phases of the menstrual cycle influence on crawl performance in young regional female swimmers. Based on the variables analyzed, FF was the optimal phase. It is not clear whether there is a direct influence on swimming performance depending on the menstrual phase, attributing this fact to possible interindividual differences (2,4).

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PRESENTACIÓN DE PÓSTERES / POSTER PRESENTATION

FRIDAY, DECEMBER 17, 2021

11:30 - 12:00 H

Presentación de pósteres 1 / Poster presentation 1 - PP01

PP01 - MUJER Y EJERCICIO/ WOMEN & EXERCISE 11:30 - 12:00

TESTOSTERONE PROFILE THROUGHOUT THE MENSTRUAL AND THE ORAL CONTRACEPTIVE CYCLE

ROMERO-PARRA N., ALFARO-MAGALLANES V.M., CUPEIRO R., ROJO-TIRADO M.A., BENITO P.J., BENÍTEZ-MUÑOZ J.A., GUISADO-CUADRADO I., PEINADO A.B. ON BEHALF OF THE IRONFEMME STUDY.

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INTRODUCTION: Testosterone fluctuations over the menstrual and oral contraceptive cycle, as well as hormonal differences between eumenorrheic and OC users, may affect performance. In line with that, high testosterone levels are suggested to enhance competitive desire and motivation (1), and to increase risk-related choices during competition (2), especially in high-performance athletes. However, differences between both hormonal profiles have not been previously studied. Therefore, the aim of this study was to examine serum testosterone levels over menstrual and OC cycle phases, and to compare this variable between both hormonal profiles in trained women.

METHODS: Thirty-nine eumenorrheic females (30.0±6.3 yrs; 59.8±15.7 kg; 163.7±6.3 cm) and twenty-four OC users (25.1±4.3 yrs; 56.2±10.9 kg; 163.1±5.5 cm) participated in this study. Testosterone and bioavailable testosterone were measured in the early follicular, late follicular, and mid-luteal phases (EFP, LFP, MLP, respectively) of the menstrual cycle, and in the withdrawal and active pill phases (WP and APP, respectively) of the OC cycle. A mixed linear model was performed to compare cycle phases within each group and between the two hormonal profiles. The significance level was set at $p<0.05$.

RESULTS: Higher testosterone and bioavailable testosterone values were observed in the LFP (0.31±0.22 and 0.07±0.01 ng/dL, respectively) compared to the EFP (0.21±0.02 and 0.05±0.00 ng/dL) and to the MLP (0.24±0.02 and 0.05±0.01 ng/dL) ($p<0.001$). For the same variables, higher levels were observed in the WP (0.33±0.04 and 0.04±0.01 ng/dL) than in the APP (0.27±0.03 and 0.03±0.01 ng/dL) ($p=0.019$). Finally, no significant differences between eumenorrheic and OC users were observed for testosterone, but higher levels of bioavailable testosterone were shown in the LFP in comparison to the APP ($p<0.001$).

DISCUSSION: The LFP of the menstrual cycle and the WP of the OC seem to be key moments when higher testosterone levels might lead to different physiological responses and/ or training adaptations. Additionally, testosterone bioavailability in the LFP in eumenorrheic women in comparison to the APP in OC users, may also confer a potential advantage (3), which could be of interest to coaches in order to gain a better understanding of women's physiology in an attempt to improve performance outcomes.

FUNDING: DEP2016-75387-P

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BONE MINERAL DENSITY IN RESISTANCE AND ENDURANCE-TRAINED PREMENOPAUSAL FEMALES

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INTRODUCTION: Resistance training and endurance training, specifically weight-bearing exercises, have beneficial effects on bone mineral density accumulation and maintenance (1,2). Conversely, reduced energy availability among female endurance athletes is common and it is linked to low BMD (2). This study aimed to compare the BMD of resistance and endurance-trained women while considering their hormonal profile [eumenorrheic vs. oral contraceptives (OC) users]. To classify the participants according to the characteristics of their usual training, Mitchell's (3) classification has been followed: dynamic (DE) and static exercise (SE).

METHODS: Forty-eight eumenorrheic females [SE(n=19): 28.6±5.5 years; 61.8±10.6 kg; 162.8±6.6 cm; DE(n=29): 35±13.7 years; 58.7±11.2 kg; 163.6±6 cm) and thirty OC users [SE(n=9): 25.3±3.7 years; 61.1±5.6 kg; 164± 3.4 cm; DE(n=21): 25.4±4.5 years; 56.6±5.6 kg; 162.1±5.6 cm] participated in this study. BMD was measured by dual-energy X-ray absorptiometry. Independent samples T-test was used to compare BMD according to the type of training (DE versus SE).

RESULTS: Within OC users, a lower spine BMD in DE (1.01±0.07 gr/cm2) was observed compared to SE (1,09±0,09 gr/cm2). Nevertheless, no significant differences were found in total BMD (SE: 1.19±0.07 gr/cm2 versus DE: 1.16±0.06 gr/cm2) or hip BMD (SE: 1.21±0.11 gr/cm2 versus DE: 1.16±0.09 gr/cm2). Likewise, no differences were seen in spine (SE: 1.09±0.09 gr/cm2 versus DE: 1.05±0.11 gr/cm2), total (SE: 1.2±0.07 gr/cm2 versus DE: 1.19±0.08 gr/cm2) or hip BMD (SE: 1.21±0.09 gr/cm2 versus DE: 1.17±0.12 gr/cm2) in eumenorrheic females.

CONCLUSION: OC users who practice DE show lower spine BMD in comparison to SE athletes. This could be explained by the fact that the spine is considered a relatively lower loading site during endurance running compared to the lower extremity (4). Nevertheless, we did not find any other difference in terms of BMD, suggesting that both types of training lead to similar bone health status in most of well-trained premenopausal women. The lack of differences could also be partially explained by concerns with the classification since most of the endurance participants practiced resistance training too. Futures studies with finer control of energy availability and training characteristics are needed to compare the effects of resistance and endurance exercise on BMD.

FUNDING: DEP2016-75387-P

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PP01. Mujer y ejercicio/ Women & exercise

EFFECT OF ACUTE CREATINE MONOHYDRATE SUPPLEMENTATION FOR PERFORMANCE ENHANCEMENT IN A FEMALE HEPTATHLETE-CASE STUDY.

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INTRODUCTION: Creatine supplementation is known for its ergogenic capacity; that is why numerous athletes use it to maximize their performances and achieve an optimal body composition . This study analyzes the effect of acute supplementation during five days with creatine monohydrate (9g/d) in a heptathlete.

METHODS: A high-performance female heptathlete (21 years; weight: 60.5 Kg, and height: 174 cm.) was assessed for diet composition, energy expenditure, body composition and strength performance. Every food item intake was weighed for processing data over five days using a food composition software, Dial Alce Ingeniería®, to determine the three macronutrients and several micronutrients. The athlete wore a SenseWear® accelerometer on her right arm during the same five-day period to estimate energy expenditure. On two occasions (before and after creatine supplementation), anthropometric and strength measures were taken. Anthropometric data were measured following the ISAK protocol. Two strength tests were completed: Repeated Sprint Availability (RSA) and maximal strength (1RM) for half squat and bench press.

RESULTS: Energy intake (2289±198 Kcal) and energy expenditure (2358±317 Kcal) were similar. Energy distribution shows that 50% of energy come from carbohydrates (CHO); 20% from proteins (P), and 30% from fats (F). Specifically the total daily macronutrients intake in absolute value and referred to weight were: CHO (258 g/d ; 4.5g/kg/d); P (118 g/d,; 1.9 g/Kg/d) and F (77.7 g; 1.3 g/Kg/d); we found deficient vitamin D (2.3 ug/d) and calcium (958 mg/d) intakes. More than 50% of total P intake came from animal foods, and more than 90% of the total CHO came from plant foods.
Furthermore, regarding body composition, the outcome shows an increase in muscle mass from 38,9% to 39,4%. The (1RM) tests show an 11% increase in strength for both exercises (half squat and bench press) after creatine monohydrate supplementation, although no significant changes were observed regarding the sprint protocol (RSA).

DISCUSSION: This study shows the relevance of individualization regarding nutritional and supplementation strategies. Although the diet composition was adequate in energy and macronutrients intake, micronutrient intake was suboptimal for Ca and vitamin D, suggesting that a possible supplementation combined with creatine could be considered after a complete diet analysis in female heptathletes.

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INFLUENCE OF FLYWHEEL TRAINING WITH DIFFERENT FORCE-VECTOR EXERCISES ON STRENGTH, JUMPING AND CHANGE OF DIRECTION

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INTRODUCTION: The force-vector theory is increasing its popularity in recent years. Flywheel resistance training is a very useful method to optimize athletic performance1. However, research assesing the force-vector theory during flywheel training is scarce2. The aim of this study was to assess the influence of the force-vector used during flywheel training on athletic performance improvements.

METHODS: Twenty-nine male recreational athletes from different intermittent sports took part in the study. Before participation, each participant provided written informed consent according to Declaration of Helsinki and approved by the Ethics Committee of the University. According to the aim of the study, participants were stratified based on their 1RM/body mass strength and randomly assigned to one of the three different flywheel training programs, using these vertical-directed exercises , horizontal-directed exercises (HR) or mixing vertical and horizontal-directed exercises (MIX) during four weeks with the same training variables between groups in each week. To test 505 agility test, countermovement jump (CMJ) and 1-RM test were measured with a contact platform and a linear position transducer (Chronojump Boscosystem, Barcelona, Spain). All statistical analysis were performed using the SPSS statistical package version 25.0 (IBM, New York, NY, USA). After confirming data normality using K-S test, the effect of group (VR, HR and MIX) and time (pre and post) was analyzed using a two-way repeated measures ANOVA. When appropriate, a Bonferroni post hoctest was used for pairwise comparisons. Statistical significance was set at p 0.8).

RESULTS: There were non-significant group by time interaction for any variable. For 1-RM squat, significant improvements were found in VR ($p = 0.011$) and MIX group ($p = 0.015$). All groups showed significant increases in CMJ height ($p < 0.05$). Regarding 5-0-5 with the dominant leg VR ($p = 0.004$) and MIX group ($p = 0.001$) showed significant decreases in 5-0-5 time. For the 5-0-5 with the non-dominant leg all groups showed significant decreases in 5-0-5 time ($p < 0.05$).

CONCLUSIONS: All groups showed similar improvements in jumping and COD performance, while only groups including vertical-directed exercises significantly improved 1-RM squat. The practical applications indicated will be valued with special relevance, and should allow attendees to use the results and conclusions drawn from each job in their professional development as a coach.

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PRELIMINAR VALIDATION OF A COMPUTER VISION BASED APP TO MEASURE MOVEMENT VELOCITY ON BACK SQUAT

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INTRODUCTION: Monitoring movement velocity is important to determine the real intensity in resistance exercise and allows practitioners to control performance and fatigue during and between sessions, moreover to estimate 1RM . To achieve it, different expensive commercially available devices exist, like linear transducers, camera-based optoelectronic systems or inertial measurement units, but they could be difficult to access for many athletes (2). The aim of this study was to show results of a preliminary validation of Spleeft, an smartphone app that allows practitioners to measure movement velocity cheaply and in real-time relying on a scientifically validated convolutional neural network (machine learning based) for human pose estimation (3).

METHODS: Subject performed 100 repetitions of back squat exercise with loads between 50 to 95% of 1RM, which were recorded at the same time with two mid-range Android smartphones (Xiaomi Redmi Note 6 Pro and Xiaomi Mi A3) running Spleeft and with an Apple iPhone 7 recording slow-motion video with My Lift to measure barbell velocity. The results of My Lift were used as gold standard, as it was previously validated against linear transducer(2).

RESULTS: Comparison between Spleeft and My Lift revealed an intra-class correlation coefficient (ICC) of 0.997, both for Xiaomi Redmi Note 6 Pro (CI=0.962-0.986; p0.001). Inter-devices comparison showed an ICC of 0.976 (CI=0.963-0.984; p>0,001).

DISCUSSION: Spleeft shows valid measures of velocity using My Lift as gold-standard, as well as inter-device reliability when measures are done with two different devices. This results suggest that, in contrast to other devices (2), Spleeft is an affordable solution that allows to measure movement velocity in real-time with similar validity that other technologies using mid-range smartphones. We hypothesize that can be reliable also for 1RM estimation. Furthermore, it means an innovation in the use of computer vision applied to sport because it has been mainly usedin individual sports for detect movements and skills, but few times to collect velocity data from pose detection (4). The main limitation of the study, is we used as gold standard other scientifically validated app instead of a linear transducer.

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EFFECTS OF VELOCITY-BASED RESISTANCE TRAINING ON MUSCLE STRENGTH AND POWER: A SYSTEMATIC REVIEW

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Resistance training has shown to positively influence athletic performance. However, resistance training has presented difficulties when controlling the load intensity and volume; mainly, due to a lack of coherence between the load proposed by the coach and the load perceived by the athlete. Recently, a methodology known as velocity-based resistance training has been used. It allows controlling the training intensity and volume based on the speed of the movement that is executed. The purpose of this systematic review was to evaluate the efficacy of VBRT programs in programming and controlling loads and their effect on one-repetition maximum (1-RM), vertical jump, and sprint performance in trained subjects. Published articles were identified by PubMed/MEDLINE, SPORTDiscus/EBSCO, OVID, Web of Science, Scopus and EMBASE search. The following Boolean algorithms were run independently: velocity based training AND athlete* AND "resistance training" AND strength NOT old NOT elder*; "velocity based" training AND "resistance training" AND strength; and velocity AND based AND training AND athlete* AND 'resistance training' AND strength NOT old* NOT elder*. 437 references were identified after running the search algorithms with Boolean operators and free language terms. After the screening process (filtering by date, type of article and full text availability and duplicates), 174 potentially eligible studies were found. However, after screening abstracts and full texts and analyzing the strict fulfillment of the other inclusion criteria, 154 articles were excluded. A total of 20 studies met the inclusion criteria. This systematic review is reported according to the parameters established in the PRISMA guidelines; and the quality of the evidence was evaluated through the ROB-2.0 tool. Results: VBRT is an effective methodology to program and control loads in resistance training when measuring the effect on one-repetition-maximum (1-RM), vertical jump, and running speed in trained subjects. It is important to highlight that through VBRT, positive results were obtained without approaching muscle failure in the sets, demonstrating that more strength can be gained accumulating less fatigue.

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RESISTANCE TRAINING INTENSITY: WHICH IS THE MOST USED INTENSITY MARKER IN THE MOST CITED STUDIES?

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INTRODUCTION: Resistance training intensity has been traditionally prescribed based on the one-repetition maximum (1). However, throughout the scientific literature, not only the percentage of the 1RM (%1RM) or the maximal number of repetitions a load can be lifted (RMs) methods have been used but also other intensity markers, such as subjective perception of effort (RPE) (2) or movement velocity(3), have been proposed. This study aimed to analyze the presence of the different intensity markers used in the most cited studies in order to identify the most used method.

METHODS: A review of the 100 most cited articles by 5-year bands (2000-2004; 2005-2009; 2010-2014; 2015-2019) was performed in the Web of Science database using the terms "Strength Training", "Resistance Training" and "Weight Training". Studies conducted in humans with a resistance training intervention longer than 4 weeks using external gravitational resistance with an adequately exercise intensity marker description were included. When two or more intensity markers were used in the same study, these markers were counted with a relative value corresponding to the total number of intensity markers.

RESULTS: A total of 89 articles met the inclusion criteria. The RMs method was the most used (44.9%), followed by %1RM (41.6%). Other intensity markers such as RPE (3.9%), percentage of the XRM (3.4%), exercise velocity (2.3%), absolute weight (1.6%), % of body weight (1.1%) or % of maximal voluntary isometric contraction (1.12%) had a lower presence. The marker RMs and %1RM were also the most used intensity markers by year bands (2000-2004: 50.0% and 36.7%; 2005-2009: 50.9% and 41.1%; 2010-2014: 25.0% and 60.7%; 2015-2019: 44.1% and 35.2% respectively).

DISCUSSION: Traditional strength exercise intensity markers, such as RMs and %1RM, have been the most used ones in the most cited resistance training related literature. Despite the development of new strategies, such as velocity-based training or RPE, these alternative intensity markers have been less used in scientific literature. Future research should analyze whether, due to technology expansion, these alternative markers are increasing its presence in science and how they are implemented into practical application.

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FRIDAY, DECEMBER 17, 2021

18:00 - 18:30 H

Presentaciones de pósteres 2 / Poster presentation 2

PP02 - POBLACIONES ESPECIALES / SPECIAL POPULATIONS 18:00 - 18:30

THE ROLE OF POWER OUTPUT IN METABOLIC INFLEXIBILITY IN THE OLDER FEMALE ADULTS

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INTRODUCTION: Power is a key marker of physical function in older adults, with a demonstrated inverse association between this indicator and age . In turn, ageing is characterized by marked mitochondrial dysfunction (2), thus impairing metabolic flexibility (MF) or the ability to switch energy substrates, especially when it comes to the lipolytic pathway (3). The impact of ageing on both, muscular power and MF, seems clear, but little is known regarding their relationship while aging, and the role of this relationship in elderlies' performance. Current literature suggests that well-trained subjects, who present greater physical fitness and power, also present greater ability to oxidize fat (3), with both factors attenuated by ageing (3). Therefore, this study aims to observe the role of power (i.e., neuromuscular capacity) in the alternation of substrates during exercise (assessed at the point of Maximal Fat Oxidation), in a population of elderly females.

METHODS: Sixteen active women (68.61±7.30 years) completed a submaximal incremental cycling protocol (10W/3'15"), with gas analysis by indirect calorimetry (Cosmed K4b2, Rome, Italy), and pre-posttest lacticaemia (3-5 min). Power was registered with Saris H3 roller (Madison, USA). The calculation of MF was performed by applying Frayn's equations (4), with determination of the Maximum Fat Oxidation point (MFO; mg/min/kg Fat Free Mass).

RESULTS: Regarding age, power showed a large negative association (r=-0.85, p<0.05, R2=0.72), while MFO presented a medium negative association (r=-0.54, p=0.04, R2=0.29). A positive significant and medium correlation was found between power and MFO (r=0.71, p=0.04, R2=0.50). In addition, this association remained positive but slightly lower with age as a covariate (r=0.56, p=0.04).

DISCUSSION: The results point to a determinant effect of age on both power and the point of maximum fat oxidation, with higher impact on the neuromuscular indicator. Power confirms to be moderately related to fat oxidation, but this comes to a lower extend when age is considered. Future studies may confirm this role of power in the preservation of MF while aging, reinforcing the need of strength and power training in this population.

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A SELF-ADMINISTERED WEIGHT LOSS PROGRAMME, TRYING TO MAINTAIN STRENGTH LEVELS. A CASE STUDY.

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INTRODUCTION: Overweight and obesity are diseases defined as an excessive fat accumulation which is detrimental to health, and is associated with different metabolic, physical and psychological problems . We know that maintaining high levels of strength is related to an improvement in the physical qualities and a higher quality of life (2). In addition, strength training is the basis for maintaining the muscle mass created, so we can suppose that, after undergoing a weight loss program, it is the best way to avoid a subsequent weight recovery. The purpose of this intervention was to improve body composition, reducing fat-mass levels and maintaining strength levels by applying a weight loss-oriented training, physical activity and nutrition program.

METHODS: A weight loss program was carried out for 16 weeks in a 26-year-old male, 1,86 meters and 109,1Kg of body mass (BMI = 31,54) subject. It has been performed a resistance training combined with a physical activity program and a nutritional intervention (around 600 Kcal calorie restriction). To study body composition, test were performed based on DXA (Lunar Prodigy® Primo) and anthropometry measurements. To evaluate strength levels, 3RM test was performed in the Back Squat, Bench Press and Deadlift exercises, and a maximal repetitions test in the Pull Up exercise.

RESULTS: It has been observed a reduction in body mass of 14,8Kg through DXA and 15,9Kg through anthropometry, being 14,72Kg (99,5% of weight loss) fat-mass. There have been reductions in strength levels of 2.83% and 2.86% in the Squat and Deadlift exercises, respectively. There have been improvements of 2.93% and 3.66% in the exercises of Bench Press and Pull Ups, respectively.

DISCUSSION: As long as it get adapted to the characteristics and preferences of the subject, strength training along with an increasing of the physical activity and a nutritional control are a real alternative in a weight loss program. Being possible to achieve a weight loss goal without compromising strength levels. From a practical point of view, this case would indicate the possibility of weight loss intervention while maintaining muscle mass, which cannot be achieved by calorie restriction alone.

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ENTRENAMIENTO DE ALTA INTENSIDAD EM CIRCUITO (HICT) PARA LA MEJORA DE LA CONDICIÓN FÍSICA EN BOMBEROS FORESTALES

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INTRODUCCIÓN: El trabajo de los bomberos forestales está considerada como una profesión físicamente exigente, la cual demanda una alta condición física para poder llevarla a cabo en condiciones seguridad y salud. La incertidumbre y la necesidad de estar alerta ante una posible emergencia hace que este tipo de operativo disponga de poco tiempo para realizar entrenamientos. En este sentido, el entrenamiento en circuito de alta intensidad (HICT) ha demostrado ser un método de entrenamiento eficaz, ya que mediante entrenamientos de corta duración y una elevada intensidad, induce mejoras en la condición física.

OBJETIVO: Crear un programa de entrenamiento específico de corta duración en el que se combine el ejercicio físico HICT junto con tareas específicas de los BBFF para mejorar su condición física.

METODOS: 10 BBFF en activo (28,8 ± 3,7 años), experimentados (7,4 ± 4,5 años de experiencia) y con una alta condición física (52,1 ± 8,2 ml · kg-1 · min-1), realizaron un programa de entrenamiento HICT (2 sesiones/semana, una hora de duración durante ocho semanas). Los ejercicios estaban ideados para tener transferencia a las acciones específicas de los BBFF. Se llevaron a cabo diferentes test de valoración, pre y post entrenamiento, de la condición física (fuerza explosiva del tren inferior mediante salto vertical con contramovimiento (CMJ), resistencia a la fuerza de la musculatura del core (Test Sörensen y Plank Test), resistencia a la fuerza del tren superior (Push up Test), fuerza máxima de agarre (Dinamometría manual)), y de la condición física aeróbica (prueba de esfuerzo máxima ergoespirométrica).

RESULTADOS: La programación de entrenamiento ha provocado mejoras significativas en CMJ (7.1%), Push up Test (10.8%), Plank Test (45.6%) y mejora en el Test Sörensen (55.3%). Además, se han producido mejoras significativas del 5,1% en la velocidad correspondiente al umbral ventilatorio anaeróbico (VT2), y del 7,4% en el VO2 correspondiente al mismo (VO2-VT2), y del 15% en la velocidad correspondiente al umbral ventilatorio aeróbico (VT1).

CONCLUSIÓN: Implementar un entrenamiento supervisado tipo HICT durante 2 días a la semana es un método que en 8 semanas ha logrado mejorar la condición física y aeróbica de los BBFF.

FINANCIACIÓN: Ayudas destinadas a la contratación predoctoral de personal investigador de la Junta de Castilla y León: ORDEN EDU/556/2019, de 5 de junio

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THE MOST USED EXERCISES IN THE MOST CITED RESISTANCE TRAINING RELATED STUDIES (2000-2019)

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INTRODUCTION: The benefits of resistance training on health and sports performance (2) are widely known. Exercise selection is a key aspect to consider when designing any given resistance training programme (3). Whether previously evidenced benefits desire to be replicated, priority in exercise selection should be given to those exercises that have been used in the most cited studies. Therefore, this study aimed to analyze which exercises were commonly used in the most cited strength exercise-related studies.

METHODS: A review of the 100 most cited studies regarding strength exercise training was performed. A search on an electronic database (Web of Science) using the terms “Strength Training”, “Resistance Training” and “Weight Training” was conducted to identify all publications related with resistance training interventions. Studies had to be performed on humans’ beings, employing external gravitational resistance and with an intervention duration longer than 4 weeks. Only the exercises adequately described were compiled. Data was processed grouping exercises variants in such a way that the final result would give a clear picture of the issue.

RESULTS: 72 studies satisfied the inclusion criteria. A total of 442 exercises were reported, resulting in an amount of a105 different exercises, where 48 were used in at least two different studies. The exercises most frequently mentioned in the literature were the leg extension (11.8%), leg press (11.3%) and leg curl exercise (7.0%). The most used upper limb exercises were the lat pulldown (6.3%), biceps curl (4.8%) and bench press exercise (3.8%).

DISCUSSION

The most utilized exercises were weight-stack (i.e., guided) lower limb exercises. This may be due to an easier standardization of the execution. Nevertheless, scientific considerations given by researchers may differ from those obtained by a strength and conditioning coach or a certified professional. Therefore, methodological considerations limit the use of certain sport-specific exercises in experimental research, although they are highly used in the applied field. Which in turn means a gap between both dimensions, that should be addressed to effectively prescribe exercise for any given resistance training programme.

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FUNCIONES BÁSICAS DEL CORE: UNA PROPUESTA MÁS ALLÁ DE LA ANATOMÍA Y LA BIOMECÁNICA.

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INTRODUCCIÓN: El entrenamiento del core es uno de los contenidos más frecuentes en el ámbito del fitness, aunque sigue existiendo discrepancia sobre su definición. Anatómicamente, el core es un conjunto de estructuras osteomusculares, situado habitualmente en la zona central del cuerpo . En biomecánica, la estabilidad central se define como la “capacidad de las estructuras osteoarticulares y musculares, coordinadas por el sistema de control motor, para mantener o retomar una posición o trayectoria del tronco ante las perturbaciones” (2). Otras funciones relevantes, como por ejemplo la respiración, han sido obviadas en dichas definiciones. El objetivo de este trabajo es realizar una propuesta justificada de las funciones básicas del core.

MATERIAL Y MÉTODOS. Búsqueda bibliográfica en PubMed, y Web of Science, utilizando los términos core stability, trunk stability, urinary incontinence, diastasi recti, breathing exercise y neuromuscular control, así como su combinación con los términos performance, strength, injury y/o low back pain. Filtros empleados: abstract y fecha de publicación 2000-2021.

RESULTADOS Y DISCUSIÓN: Se proponen de cinco funciones básicas del core: postura y ergonomía (1); respiración (3); continencia urinaria y fecal (4); contención visceral (5); estabilidad central (2).

APLICACIONES PRÁCTICAS: Atendiendo al contexto particular de cada cliente (p. ej. edad o historial lesivo), sugerimos que los programas de core incluyan contenidos de entrenamiento específicos para cada una estas funciones.

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IS INFLUENCED THE MAXIMAL FORCE CAPACITY ON ISOKINETIC ASSESSMENT BY BLOOD FLOW RESTRICTION?

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INTRODUCTION: Blood Flow Restriction training has emerged as an effective alternative to conventional training (1). Recently, it has been suggested that BFR does not generate any neuromuscular benefit on the force-velocity profile (2-4). These studies included multijoint exercises (i.e., squat and bench press) monitored with linear encoders. And it has been suggested that the effects of BFR could be induced by a "rebound" effect generated mainly by the cuff pressure. To our knowledge, the influence of BFR on maximal force production in isokinetic tests has been little studied.

PURPOSE: The aim was to evaluate changes in the ability to generate maximal force in knee extension at different velocities using an isokinetic device during the application of low-intensity BFR (40% of maximal pressure occlusion [MPO]).

METHODS: A total of 37 physically active adults [33.73 (10.96) years; 172.19 (9.65) cm; 65.72 (10.55) weight; 22.11 (2.79) kg/m2] participated in the study by performing knee extension exercise with isokinetic dynamometry in three conditions (120º/s, 210º/s and 300º/s), applying BFR at 40% of maximum arterial occlusion (BFR40) and without BFR (BFR0). The isokinetic variables analyzed were peak torque, average torque and mean power.

RESULTS: No significant differences were found for any of the neuromuscular variables in any velocity condition ($p<0.05$). Peak torque (N-m) BFR0: 120º/s= 158.92 (46.39), 210º/s= 123.11 (37.93), & 300º/s= 120.8 (136.19); versus BFR40: 120º/s= 175.83 (151.95), 210º/s= 120.81 (36.87), & 300º/s= 104.11 (31.05).

CONCLUSIONS: Superimposed application of low-intensity BFR (40% MPO) on knee extension of the dominant leg of healthy young men did not generate any change on the ability to generate maximal force in isokinetic tests. Given the benefits attributed to these loads on neuromuscular gains, the use of RFS with low loads may be an applicable tool in situations of low contractile capacity and/or recovery phases of the athlete aimed at maintaining maximal strength levels.

KEYWORDS: resistance training, partial vascular occlusion, acute responses, muscle performance.

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MUSCULOSKELETAL REGENERATION AFTER EXERCISE-INDUCED DAMAGE: THE ROLE OF GLUCOSE-6-PHOSPHATE DEHYDROGENASE AND PHYSICAL PRECONDITIONING

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INTRODUCTION: Physical exercise induces mild musculoskeletal injuries that need rapid and efficient repair in order to preserve muscle homeostasis and glucose-6-phosphate dehydrogenase plays an important role in the regeneration of skeletal muscle . The objective was to study the role of glucose-6-phosphate dehydrogenase and physical preconditioning in musculoskeletal regeneration.

METHODS: To monitor myofiber response to localized damage, we studied musculoskeletal samples obtained from both young C57Bl/6J mice (n=20) and humans (n=15) after performing one bout of eccentric exercise. Myofibers were isolated 5, 24 and 48 hours after exercise and stained for Filamin C and Hsp27, two markers of sarcomere damage (2,3). To better characterize myofiber repair, we examined the effects of 5-days eccentric training in young C57Bl/6J mice (n=40). After testing for normality, One-Way ANOVA test was conducted to compare means between groups. Data are expressed as mean (standard deviation). A value of $p<0.05$ was considered statistically significant.

RESULTS: Myofibers isolated at 5 and 24 hours post-exercise displayed Filamin C–enriched regions (termed scars hereafter), whereas scarring was absent in unexercised myofibers or reduced in those obtained 48 hours post-exercise. Filamin C scars also occurred in human muscle fibers after a single eccentric exercise session, indicating that this physiological mechanism is conserved across species. After an acute bout of exercise, we observed the presence of Filamin C protein and the increased expression of Flnc and Hspb1 mRNA transcripts as early as 30 minutes after eccentric exercise. Compared to untrained mice, in mice trained on eccentric exercise for 5 days, the repair damage response to acute exercise was clearly diminished. Finally, this repeated bout effect induced a robust increase both in the mRNA levels (2.33 (0.65) vs rest mice 1.02 (0.23) fold change, $p<0.05$) and the glucose-6-phosphate dehydrogenase activity (1.41 (0.78) vs rest mice 0.46 (0.16) nmol / min x mg protein, $p<0.05$) in skeletal muscle in trained mice.

DISCUSSION: In conclusion, exercise-induced increase in the endogenous antioxidant protection may generate a cellular hyper-defensive state, one of the molecular bases of the reported beneficial effects of exercise, as well as physical preconditioning attenuates the myofiber repair response.

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ANÁLISIS DEL RENDIMIENTO DEL CAMBIO DE DIRECCIÓN Y NIVEL COMPETITIVO EN JUGADORAS DE BALONCESTO FEMENINO

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INTRODUCCIÓN: En baloncesto femenino las jugadoras llegan a realizar más de mil acciones de cambios de dirección durante un partido (1). Los objetivos del estudio fueron: (i) evaluar si el nivel competitivo influye en el rendimiento del CD; (ii) examinar la relación entre el tiempo de ejecución del CD a diferentes angulaciones con el resto de variables de rendimiento deportivo analizadas.

MÉTODO: La muestra se compuso por 27 jugadoras de baloncesto pertenecientes a los equipos CDH (n = 14; 21.3 ± 4.35 años; peso 63.6 ± 7.85 kg; altura 173.4 ± 7.33 cm) y CBL (n = 13; 19.7 ± 1.55 años; peso 65.0 ± 8.19 kg; altura 167.0 ± 6.83 cm). Se evaluaron tanto el salto vertical como el horizontal, la aceleración en 10 metros y los CD 5+5 con diferentes angulaciones (45º, 90º y 180º). Se compararon a las jugadoras en base al nivel competitivo y se utilizó la mediana del tiempo de ejecución de cada CD como puntuación de corte para diferenciar a las jugadoras entre "rápidas" y "lentas". El coeficiente de correlación de Pearson determinó las asociaciones entre los diferentes CD y las variables de rendimiento deportivo analizadas.

RESULTADOS: El nivel competitivo mostró ser significativo para el rendimiento de los diferentes CD a 45º (p=0.003), 90º (p<0.001) y 180º (p<0.001) siendo las de mayor nivel competitivo las que mejor rendimiento mostraron. El salto horizontal fue la variable de fuerza que mayor relación mostró con todas las pruebas de CD (p<0.05). Finalmente, los CD a 90º fueron los que mayor asociación mostraron con todas las variables de rendimiento analizadas (p<0.05).

CONCLUSIÓN: El presente estudio demuestra la influencia directa de las variables de rendimiento analizadas sobre el CD, siendo el salto en un vector horizontal la que mayor relación mostró. Finalmente, el test CD 5+5 fue capaz de discriminar entre diferentes niveles competitivos en jugadoras de baloncesto, por ello se recomendaría su uso para evaluar el nivel de una deportista.

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INFLUENCIA DEL GÉNERO EN EL PERFIL FUERZA-VELOCIDAD EN CICLISTAS DE RUTA PROFESIONALES

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INTRODUCCIÓN: El perfil fuerza-velocidad relaciona la fuerza máxima que se puede producir a una velocidad mínima (F0) y la máxima velocidad a la que las extremidades inferiores pueden realizar una extensión sin carga externa (V0). Atendiendo a la propuesta de Samozino (1), de esta relación se extrae la potencia máxima (Pmax) (1–2), ayudando a individualizar los entrenamientos (3). Dado que su implementación se ha extendido en deportes como fútbol (4), atletismo (5) o rugby (6), donde predominan los cambios de ritmo, los sprints y la fuerza, el objetivo de este trabajo es analizar el sfv en el ciclismo de ruta, atendiendo a posibles diferencias relativas al género.

MÉTODO: Treinta y siete ciclistas profesionales (14 hombres: edad: 19.71±1.94 años, altura: 181.64±5.35 cm, peso: 69.52±7.49 Kg; y 23 mujeres: edad: 21.52±4.57 años, altura: 165.56±6.86 cm, peso: 58.18±9.09 Kg) completaron este estudio. Se evaluó su sfv según el protocolo de Samozino et al.(1). Tras comprobar la normalidad de la muestra, las diferencias entre grupos se analizaron mediante el test U de Mann Whitney.

RESULTADOS: Peso y altura mostraron diferencias significativas atendiendo al género ($p<0.001$ en ambos casos). Pmax (hombres: 1542.98±307.12 W; mujeres: 1148±359.50 W) y F0 (hombres: 1832.72±297.07 N; mujeres: 1471.85±366.56 N) mostraron diferencias significativas ($p=0.01$) cuando no se consideró el peso del ciclista. Sin embargo, al calcular las variables relativas al peso, desaparecieron estas diferencias en Pmax (hombres: 22.16±4.57 W·kg-1; mujeres: 19.76±6.00 W·kg-1) y en F0 (hombres: 26.32±4.71 N·kg-1; mujeres: 25.28±5.17 N·kg-1).

DISCUSIÓN: Frente a lo señalado tradicionalmente, las diferencias entre hombres y mujeres en el perfil de fuerza-potencia se atenúan en deportistas de alto nivel (7), también en ciclismo de ruta. Por otro lado, el hecho de ser un deporte de larga duración podría explicar esta similitud por la menor dependencia de los valores del sfv en hombres. Se confirma que el sfv tiende menos hacia la fuerza que en los deportes citados anteriormente.

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DIFFERENT INTRAGROUP ACTIVATION PATTERNS IN MALE AND FEMALE PROFESSIONAL SOCCER PLAYERS: PRELIMINARY RESULTS

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INTRODUCTION: There are differences between the competition of males and females, and therefore, the incidence of injuries is not the same between the two groups. For males, the most frequent injuries have minor severity level , while for females have moderate level (51%) [1]. Cowling and Steele [2] reported sex differences in muscle activation strategies of hamstrings musculature. Moreover, the interlimb differences in muscle recruitment patterns, muscle strength, and muscle flexibility tend to be greater in females than in males [3]. Therefore, the main objective of this study was to determine the differences in muscle activation patterns between female and male professional soccer players during the execution of a Bulgarian squat.

METHODOLOGY: Muscle activation was recorded with surface electromyography in 8 professional soccer players divided in two groups by sex. The players performed 5 repetitions of the Bulgarian squat with an external load of 30% of the body weight. VM, VL, RF, ST, and BF were analysed.

For the statistical analysis, SPSS 23.0 software was used, the dependent variable of the study was the percentage of electrical activity of each muscle belly (RMS) in relation with the total activation of hamstring muscle group. A comparison of means was performed using the sample t-test for independent samples, setting the significance value at 0.05.

RESULTS: Significant differences were found between males and females in the dominant side of VM in eccentric phase ($t_5=3$; $p=0.018$), VM in isometric phase ($t_7=4$; $p=0.01$), ST in eccentric phase ($t_6=2$; $p=0.04$), and ST in isometric phase ($t_{14}=2$; $p=0.02$). There were also significant differences between sex in the non-dominant side of VM in eccentric phase ($t_8=2$; $p=0.04$), VM in isometric phase ($t_{11}=3$; $p=0.01$), BF in eccentric phase ($t_7=3$; $p=0.01$)(see Figure 1). For the rest of the muscles and phases no significant differences were found ($p>0.05$).

CONCLUSIONS: It seems there are differences in the intragroup muscle activation patterns between female and male professional soccer players, predominating eccentric and isometric phases in dominant leg for VM and ST,and non-dominant for VM,as well as eccentric phase and non-dominant leg for BF.

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EFFECTS OF DIFFERENT CROSSFIT WODS ON COUNTERMOVEMENT JUMP AND THE RELATIONSHIP WITH BACK SQUAT

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Crossfit (CF) has been categorised as high-intensity training with different strength demands. Different training modalities are used in every workout of the day (WODs), such as weightlifting, gymnastics, and endurance; which can lead to different responses in athletes (1). The measures of this responses can be done by different methods. In strength training it has been verified that velocity loss is a good marker of neuromuscular fatigue (2).

AIM: This study examined acute effects in CMJ after performing two opposite WODs: "Fran" and "Cindy".

METHODS: A total of 11 subjects (8 men; 3 women) aged 29.88 years, relative 1RM squat> 1.58 ± 0.85 kg · BW-1 and two years of CF training experience at least. Subjects performed each WOD seven days apart. The CMJ assessment was carried out after warm-up and immediately ending WOD.

RESULTS: CF athletes lost jump ability after "Fran" (-6.06%, $p < 0.02$) whilst they increased it after "Cindy" (5,92%, $p < 0.03$). In addition,we found a moderate correlation between the improvement in the CMJ height after "Cindy" and the SQ/BW ratio ($r = 0.65$; $p<0.05$).

DISCUSSION: Controversial evidence is shown in this study. Several authors (1,3) showed a CMJ height decreasing regardless of WOD although the height jump loss could depend on the kind of WOD performed. Our results appear to suggest that the performance loss in CMJ after gymnastic kind WOD may be influenced by the 1RM level in the squat. Besides, the performance increase founded indicates that we have to know the level of the athlete when prescribing a WOD in order to achieve the desired adaptations. Therefore, the athlete's performance level would predetermine the suitability of WOD. In conclusion, "Cindy" WOD bred an acute improvement in jump height of athletes stronger whilst "Fran" drive a performance loss regardless of athlete's level.

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11:30 - 12:00 H

Presentaciones de pósteres 3 / Poster presentation 3

PP03 - MUJER Y EJERCICIO / WOMEN & EXERCISE 11:30 - 12:00

ONE-YEAR EVOLUTION OF FORCE-VELOCITY PROFILE IN ELITE FEMALE PLAYER

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INTRODUCTION: Force-velocity profiling has gained popularity in recent years in order to identify an athlete's force-power-velocity characteristics [1]. Nevertheless, since a long time ago Bosco´s Index has been used with a similar purpose [2], having been recently shown a relationship with different specific actions in team sports such as field hockey [3]. The aim of the study was to analyse the evolution of the FVP during one year of training in elite female field hockey players based on Bosco´s Index.

METHODS: Twelve elite female field hockey players participated in the study carried out during the 2018-19 and 2019-20 seasons. All the players performed every week a specific strength training session (25-40 min), which consisted of four main exercises (squat, squat jump, single leg deadlift and clean) in a maximal strength or maximal power regimen, depending on the season's periods. In addition, the jumping ability of the players was periodically assessed using a countermovement jump (CMJ) and a CMJ50 (CMJ with external loads of 50% bodyweight) tests. The FVP was calculated with Bosco´s Index (FVP50=CMJ50/CMJ*100) [2]. Participants gave their informed written consent to participate in the study which was carried out in accordance with the Declaration of Helsinki.

RESULTS: There were significant improvements ($p<0.05$) between the 2018-19 and 2019-20 seasons in CMJ (30.1±3.7 vs 31.9±4.0 cm), CMJ50 (15.8±3.1 vs 18.2±2.7 cm) and FVP50 (52.2±7.5 vs 57.2±4.9 cm). However, the percentage of improvement was greater ($p<0.05$) in CMJ50 (17.7%) than in CMJ (6.3%) and FV50 (11.2%).

DISCUSSION: The implementation of a weekly strength training session was sufficient to improve the values in the three variables which were tested (CMJ, CMJ50 and FV50). Moreover, the greatest impact shown in the maximal strength test (CMJ50) would be critical to improve Repeated Sprint Ability (RSA) related variables like maximal speed and fatigue index [3]. Therefore, this strength training program can be an adequate alternative to perform in many clubs to achieve a high impact on their physical performance. In addition, the FVP test was shown to be a simple and practical method to improve performance.

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IMPACT OF TIME-OF-DAY AND CHRONOTYPE ON NEUROMUSCULAR PERFORMANCE IN SEMI-PROFESSIONAL FEMALE VOLLEYBALL PLAYERS

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INTRODUCTION: Circadian rhythms refers to the biological variations that occur in each living being in periods around 24-hours . Thus, diurnal variations in physical performance have been reported in athletes (2). The purposes of this study were to determine if time-of-day (morning vs evening) could play a role in female physical volleyball performance and to explore associations between chronotype and sports performance in semi-professional volleyball female players.

METHODS: Fifteen young females (age: 22.33 ± 7.18 years, height: 1.72 ± 0.04 m, body mass: 64.53 ± 5.89 kg) in a randomized counter-balance order, realized a neuromuscular test battery consisted in spike test (standing and jumping), straight leg raise test, dynamic balance, vertical jump tests (squat jump, countermovement jump test and maximal spike jump test), isometric handgrip test and modified agility T-test in the morning (9.00 h) and evening (19.00h). The level of body hydration, body temperature, diet and the usual time of training were controlled for the correct preparation of this study. The morningness-eveningness questionnaire (3) was used to determine the participants' chronotype (morning, intermediate or evening).

RESULTS: All variables presented a normal distribution in the test ($p < 0.05$), hence, differences between experimental condition (morning vs. evening) were assessed using a t test. Compared to the morning, in the evening an increments in neuromuscular performance was reported in spike test (4.47%; p= 0.002; ES= 0.59), straight leg raise test (i.e., dominant-limb) (6.48%; p = 0.012; ES = 0.41), dynamic balance (non-dominant- limb) (4.97%; p = 0.010, ES=0.57) and modified T-test (2.13%; p = 0.049; ES = 0.45) while no differences were reported in vertical jump test (0.43-0.67%; p = 0.610-0.756, ES = 0.02-0.11) and isometric handgrip strength (1.39-5.19%; p = 0.095-0.714, ES = 0.08- 0.20).No associations were found between chronotype and neuromuscular performance (r = 0.003-0.435, p = 0.052-0.457).

DISCUSSION: Female volleyball players reported enhanced neuromuscular performance in the evening compared to morning schedules, while chronotype does not seem to have an influence on volleyball specific performance. Therefore, evening training/matches schedules could benefit performance in semi-professional female volleyball players.

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SEX DIFFERENCES IN RELATIVE STRENGTH FOR WELL-TRAINED WEIGHTLIFTERS

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INTRODUCTION: Specific sex-differences in one repetition maximum have been reported in weightlifters for the back squat, overhead press and split jerk, separately (1,2). However, the lower-, upper-body and weightlifting performance have not been compared in the same study in this population. Objective: Explore the differences in relative strength of the lower-, upper-body and weightlifting performance for well-trained weightlifters.

METHODS: Twenty male and 13 female well-trained weightlifters voluntarily participated. The relative strength (1RM/body mass) of the back squat, overhead press and split jerk were assessed for all participants. All tests were conducted in a randomized order and performed on separate days with > 72h of rest between assessments. An analysis for independent samples was used to determine between-group differences. Furthermore, Hedges' g effect sizes (ES) were analyzed and interpreted (3). An a priori alpha level was set at $p < 0.05$.

RESULTS: Males had significantly greater back squat 1.9 ± 0.2, overhead press 0.9 ± 0.1 and split jerk 1RM performance 1.5 ± 0.3 kg·kg-1 compared to women (1.4 ± 0.1, 0.6 ± 0.1 and 1.1 ± 0.1 kg·kg-1, $p < 0.001$). The greatest difference was revealed in the overhead press (ES = 2.6 [very large]), followed by back squat (ES = 1.7 [large]) and split jerk 1RM performance (ES = 1.4 [large]).

DISCUSSION: The overhead press exhibited the greatest difference in relative strength followed by back squat and split jerk 1RM performance between males and females well-trained weightlifters. These findings are in line with those found in the scientific literature for the lower-body (4) and upper-body strength (2), separately. However, in this study all components (lower-, upper-body strength and weightlifting performance) were analyzed between males and females well-trained weightlifters. This information may help practitioners to program specific exercises and workloads according to specific sex-differences in well-trained weightlifters.

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INFLUENCE OF FOOTBALL MATCH-PLAY ON ISOMETRIC KNEE FLEXION STRENGTH AND HIP ROM IN FOOTBALL REFEREES

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INTRODUCTION: Football is an explosive team sport, where referees and assistant referees covers around 11–12 km of which approximately 10% is performed at high intensity(i.e.,.>18 km) (1). Elite referees and assistant referees may officiate up to 40 matches per season, thus the combination of acute and chronic loads in elite football refereeing may lead to fatigue and to a high risk of injury, particularly during congested calendars (2).The aim of this study was to examine the acute effect of officiating a football (soccer) match on isometric knee flexion strength and passive hip flexion range-of-motion (ROM) in referees and assistant football referees.

METHODS: Twelve referees (25.3 ± 3.3 years) and twenty-three assistant referees (25.1 ± 4.8 years) underwent measurements on isometric knee flexion strength and passive hip flexion ROM before and after officiating an official football match. Referees' and assistant referees' running patterns were monitored during the match using GPS technology.

RESULTS: In comparison to pre-match values, referees reduced their isometric knee flexion strength (-12.36%, p= 0.046, Effect size [ES]=-0.36) in the non-dominant limb while no significant differences were reported in the dominant limb (-0.75%, p=0.833, ES= -0.02). No effect of the match was found in hip flexion ROM values in dominant (-4.78%, p=0.102, ES=- 0.15) and non-dominant limb (5.54%, p=0.544, ES= 0.19). In assistant referees, the pre-to-post-match changes in isometric knee flexion strength (dominant limb -3.10%, p=0.323, ES= -0.13; non-dominant limb -2.18%, p=0.980, ES= 0.00) and hip flexion ROM (dominant limb 1.90% p=-0.816, ES= 0.13; non-dominant limb 3.22% p=0.051, ES=0.23) did not reach statistical significance.

DISCUSSION: Officiating a match provoked a reduction of isometric knee flexion strength in the non-dominant limb of football referees while no differences were reported in assistant referees. Thus, the present data reflect hamstring muscle fatigue in football referees when officiating a match which may lead to an increased risk of hamstring muscle injury.

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EFFECTS OF A HORIZONTAL PLIOMETRIC PROGRAMME ON THE ASYMMETRIES OF YOUNG FOOTBALLERS

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INTRODUCTION: The integration of plyometric training programs, according to the specificity of the sport, is recommended when the objective is the reduction of asymmetries . For the implementation of this work, special attention was paid to the orientation of the force vector. The aim was to compare the effects of a horizontal and vertical pleometric component programme with a horizontal pleometric component programme on the asymmetries of young footballers

METHODS: Two groups were established randomly, the first group (n = 10) performed a pleometric program composed of exercises with vertical and horizontal force component (V + H), the program of the second group (n = 10) only included exercises with vertical component (V). The duration of the program was 6 weeks, with 2 weekly workouts of 15-20 minutes each. The unilateral jump test with countermovement (UCMJ), the unilateral triple horizontal jump (Triple) were recorded and the corresponding asymmetry indices of both tests, UCMJASY and TripleASY were calculated respectively (1).

RESULTS: The training programs reduced the asymmetries of UCMJASY (DM = 18.25 % 95 CI [6.38, 30.12];P = 0.005) but not those of TripleASY (DM = 0.41 % 95 CI [-2.08, 2.89]; P = 0.735). After the intervention, the V+H group obtained a lower index of asymmetry in the UCMJASY (11.88 4.21 % vs. 25.25 4.44 %, p = 0.045).

DISCUSSION: The main finding was a reduction in the asymmetries of UCMJASY after interventions with a more pronounced effect in the V+H group. This finding coincides with previous studies (3,4) which emphasize that plyometric programs can be effective in minimizing these differences. The results of this paper suggest that, combining exercises with vertical and horizontal components, could be more effective in reducing the asymmetries of vertical jumps with countermovement in young footballers. The combination of vertical and horizontal exercises could be an optimal strategy for planning performance improvement programmes in footballers (5).

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CAN FLOSSING USING A PNEUMATIC TOURNIQUET IMPROVE BILATERAL JUMPING ABILITY IN ELITE BASKETBALL PLAYERS?

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INTRODUCTION: Flossing is a technique that consists of applying pressure on the peri-joint structures induced by an elastic band while performing movement . Previous researches has reported benefits on range of motion (1,2). There are few studies that analyze the effects of the application of elastic bands to induce flossing in unilateral jumping tests (2). It's unknown whether the use of pneumatic tourniquets with control manometer applied to generate flossing can influence performance in bilateral countermovement jumping tests (CMJ).

PURPOSE: To record the acute effects induced by a flossing protocol with a pneumatic tourniquet placed at the intermalleolar level on bilateral jumping ability in elite basketball players.

METHODS: 24 basketball players (17.16 (1.27) years; 194 (0.06) cm; 83.9 (7.55) kg; 22.23 (1.99) kg/m2) from a professional club were recruited. After a familiarization phase, a pressurized cuff (continuous pressure at 180 mmHg) was placed at the intermalleolar level for 2 minutes performing plantar and dorsal flexion movements without load. Prior to the intervention, 5 bilateral CMJ jumps were performed on a force platform and repeated 5 min post flossing intervention.

RESULTS: The intervention showed no significant difference ($p>0.05$) in jumping performance in mean PRE 32.45 (4.66) cm / 1011.62 (91.69) w versus POST 33.07 (4.95) cm / 1022.11 (97.96) w and in best record PRE 33.76 (4.66) cm /1032.62 (94.01) w versus POST 34.24 (5.19) cm / 1040.21 (97.18) w in the CMJ jump.

CONCLUSIONS: The application of intermalleolar flossing using pneumatic tourniquet in elite basketball players did not generate any significant change on jumping ability. These findings suggest that the use of the pneumatic tourniquet applied to the ankle joint could be used in basketball players without affecting their jumping ability and could enjoy other previously demonstrated benefits such as increased range of motion (2).

KEYWORDS: bilateral jumping, flossing, power.

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