



2022 NSCA *NATIONAL* CONFERENCE

July 6-9, 2022 | New Orleans & Online
#NSCACon22

› *KNOWLEDGE*
› *ADVANCEMENT*
› *COMMUNITY*

CONFLICT OF INTEREST STATEMENT

I currently have no conflict of interests for this lecture

GARY A. DUDLEY LECTURE

The Challenges of Player Development in Collegiate Sports



Dr. Gary A. Dudley (1952–2006)

William J. Kraemer, Ph.D., CSCS,*D, FNSCA, FACSM
Senior Advisor- Sports Performance and Sports Sciences/Athletic Department
Retired OSU Professor/Adjunct Professor Department of Human Sciences
The Ohio State University
Columbus, OH

He was one of the most “creative thinkers” and brilliant experimentalists in the field of exercise physiology



The University of Georgia®

Dr. Dudley's interest in resistance training was a constant throughout his career in the study of the neuromuscular system, from the use of the muscle biopsy technique to using magnetic resonance imaging (MRIs) to understand activation of muscle tissue and adaptations with training

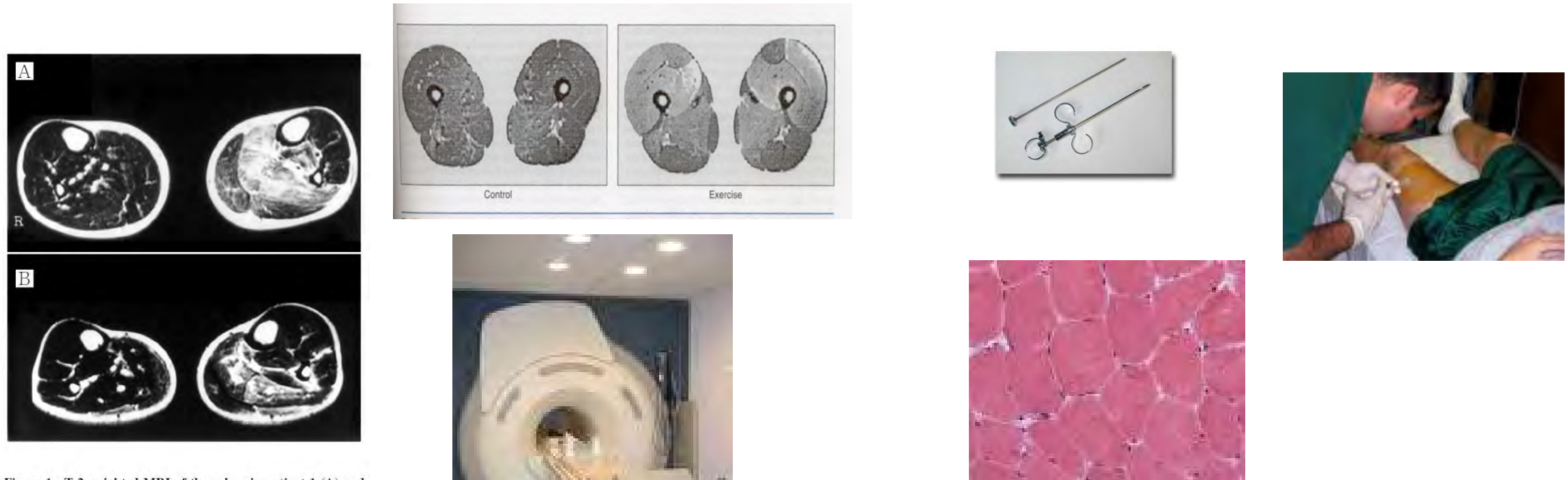


Figure 1. T 2-weighted MRI of the calves in patient 1 (A) and patient 2 (B), with high intensity lesions in the affected muscles.

NSCA Certification Committee 1985

First Meeting



photos courtesy of the NSCA



JASSR to JSCR 1987...

First Editorial Board of the JASSR



photos courtesy of Dr. Kraemer's library

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Player Development

The concept of player development has been around for a long time and increased from the 1960s and 1970s on with the development of Olympic Training Centers around the world!

However, in the world of collegiate athletics player development was left up to of the **Strength and Conditioning Coach**

The basis of player development started with the use of strength training to develop the athlete's body for improved sport performance and injury prevention.

Player development in then collegiate sports along with the field of strength and conditioning evolved from the sports of football and track and field.

Strength and Conditioning Coaches were really the first to be directed at an athlete's physical development

NSCA 1978 Searching for answers !

- Used modalities, most dramatically, resistance or weight training to develop the athlete's physical strength, power and to prevent injuries.
- Eventually looked at conditioning programs and drills as it related to the demands of the sport.
- Interfaced with athletic trainers and sports medicine physicians to address injuries and the concept of "pre-hab" started to play a role in practices.
- Looked to science to help in the understanding of their programs
- Evaluation of players beyond the typical measures and was a forerunner of sport analytics, player potential and player development.

NSCA Played a big role in this professional process in 1978 it all started in Lincoln, NE.



Bob Devaney, Head Football Coach and Athletic Director at the University of Nebraska at the first meeting of the then National Strength Coaches Association meeting July 29, 1978

Photos courtesy of the NSCA



William J. Kraemer, PhD, CSCS,*D, FNSCA
Gary A. Dudley Lecture: The Challengers of Player Development in Collegiate Sports

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For the Strength and Conditioning Coach
Player Development..... got more complicated as time went on.....



Circa 1978

THEN AND NOW



Circa 2016

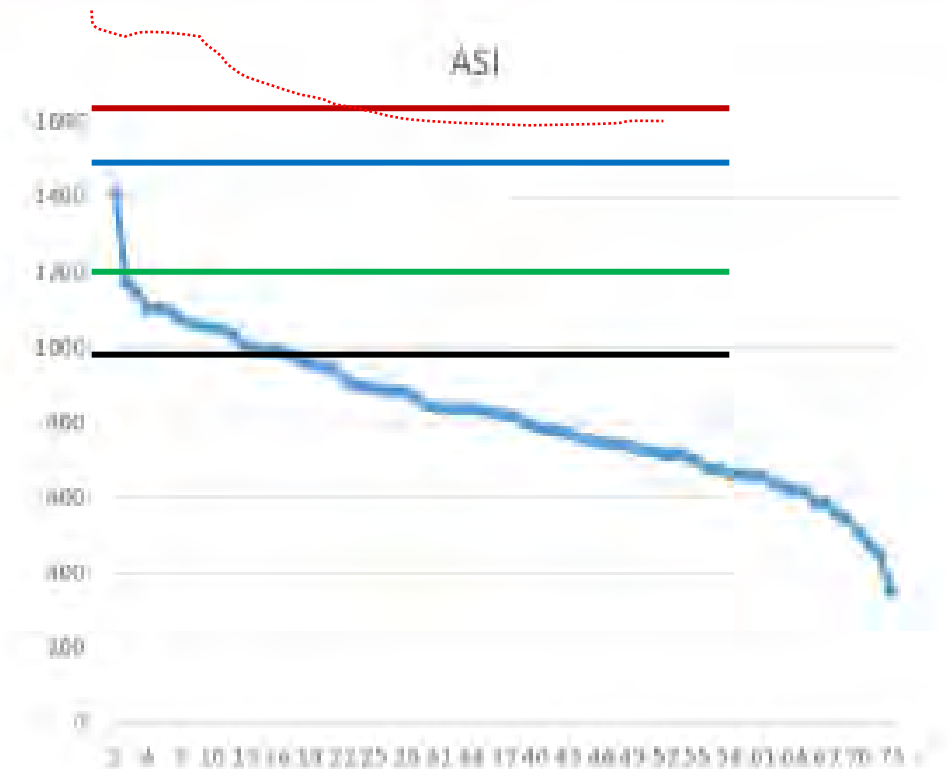


Photos courtesy of Dr. Kraemer

One Metric Athletic Sport Index

Fundamental Physical Structure/Function of the Athlete Needed for Success!

You must know
the level of
your athlete
and what level
you expect
them to
compete at



Player Development Program Alignment

Historically Important and Vital

Athlete

Friends

Family

University Administration

Athletic Director

Head Sport Coach

Sports Medicine Director

“COMUNICATION”

Strength and Conditioning Professional

Athletic Trainer

Academic Support Team

Faculty – e.g., Exercise Sport Science

Was it started from the Top Down or Bottom Up ??????

Define The Player Development Program

The development of a player/athlete is tied inevitably to the desire to win in a competition.

Therefore, the player development process has evolved as a multi-focal and multi-variate effort to enhance a player's potential for success in a sport.

The Major Challenges of Player Development in Collegiate Sports



Who makes up the ideal player development team of professionals

Strength and Conditioning/Sports Performance/Sports Science
(Accredited Certifications)

Sports Nutrition
(Accredited Registered Dietitian
and sports Nutrition Certifications)

Athletic Training
(Accredited Certifications and Licenses)

Physical Therapy
(Accredited degree DPT and (Licenses)

Sports Psychology/Sociology
(Certification)



Sport Coach

Sports Science/Sports Analytics
(Accredited Certifications)

Sports Medical Professional
(Licenses)

Exercise and Sports Science Advisor
(Professor/Educator
University Resource)

Photo Courtesy of Dr. Kraemer's Laboratory

Important Issues that must be dealt with

- Power-Controls
- Who oversees the program
- Role delineation
- Decision making process
- Point person in each area
- Gender equity
- Sport Allocations
- Numbers of Athletes
- Individualization
- Testing



photos courtesy of Dr. Kraemer

Areas of Influence for Player Development



IT is all about Working developing the Individual Composite Athlete

- The influence of positive and negative factors that lead to a “**COMPOSITE**” athlete who arrives at a competition at any given point in time over a career with the intent to “win”!



Photo Courtesy of LWW
Kraemer WJ, Fleck SJ, Deschene, MR. Exercise Physiology,
Integrating Theory and Application, 3rd Ed Wolters Kluwer, 2021

Player Development is About the Individual Athlete

- This is the major challenge today
- Programming
- Monitoring
- Testing
- Meeting the profile for competitive viability



Photo Courtesy of LWW
Ratamess, NA. ACSM's Foundations of Strength Training and Conditioning, 2nd
Ed Wolters Kluwer, 2022

Decision Making on Programmatic Questions: EBP

- Develop a question that includes a population, novel intervention, comparison, outcome and time variable (acronym “PICOT”).
- Search the peer-reviewed research literature, using databases such as PubMed or Google Scholar, for supporting peer-reviewed evidence to answer the question.
- Evaluate the evidence for its design, quality, and bias resulting in a ranking based on its merit and relevance.
- Incorporate (or do not) the evidence into practice. By evaluating the strength of the research evidence in conjunction with his or her own practical experience, the sport scientist determines if the intervention warrants incorporation into an athlete’s programming.
- Confirm the evidence in the individual athlete. With a systematic testing routine already in place, the sport scientist can monitor the effectiveness of the new intervention and continue or discontinue accordingly.
- Reevaluate the evidence. By nature, the evidence-based approach implies the need to regularly reassess the literature. With thousands of papers published each month, it is possible that the answer to a question may change over time on the basis of emerging research.

Development of a Player Profile

- For each Sport
- Internal/External
- Division Level
- Mutable versus Non-mutable characteristics
- Impact on recruiting



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Photo Courtesy of LWW
Ratamess, NA. ACSM's Foundations of Strength
Training and Conditioning, 2nd Ed Wolters Kluwer, 2022

Examples For the Development of Player Profile for The collegiate Athlete

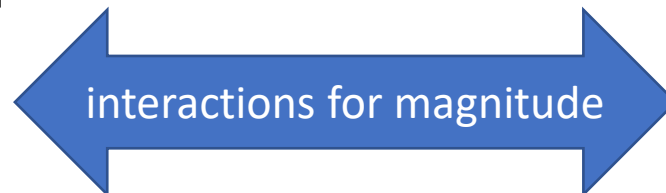
Know the level of competition your athlete will be competing against

Mutable Characteristics (Examples)

- Strength
- Power
- Endurance
- Body Composition
- Flexibility
- Density of Tissues
- Anaerobic Function

Competitive Profile Limited by largely Non-Mutable Characteristics (examples)

- Height
- Wingspan
- Hand Width
- Muscle Fiber Number and type
- bone girth
- Tendon length
- Insertion and origins of connective tissues



Offensive Line

PLAYER	HEIGHT	WEIGHT (LBS)	HAND SIZE	ARM LENGTH	WINGSPAN
6-4 to 6-7	305 to 330	91/2 to 11	31 to 35	81 to 86	

Vertical jump: 35 to 40.25 inches. Broad jump: 10 feet or more (or more than 1.7 times their height)

Examples to create a

D-I football

Recruiting and target training profile

Squat 2 X body mass

Power Clean 1.25 X Body Mass

Bench press 1. 5 X body mass

Position Time

Wide receiver 4.48

Cornerback 4.48

Running back 4.49

Free safety 4.53

Strong safety 4.55

Outside linebacker 4.60

Tight end 4.70

Inside linebacker 4.76

Fullback 4.80

Defensive end 4.80

Quarterback 4.93

Defensive tackle 5.06

Center 5.30

Offensive tackle 5.32

Offensive guard 5.37

Create A Player Profile

External to Internal Standards

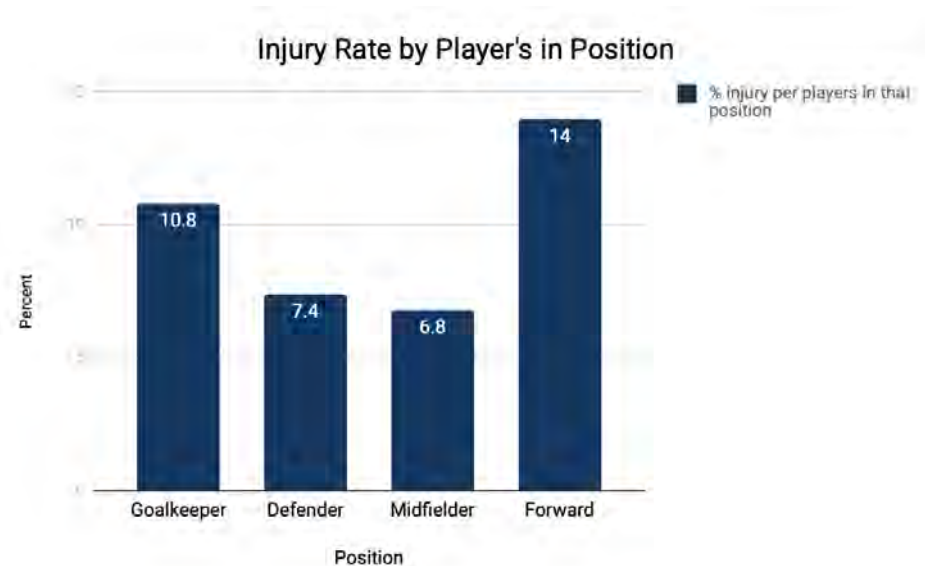


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Look for a Sport INJURY Profile to gain Insights

Injury Frequency by Position in Professional Soccer



Most common injury categories:

Muscle strains (25.8%)

Ligament sprains (25.3%)

Contusions (20.3%)

Concussions (5.5%)

Majority of injuries happened between the 60th to 90th minutes of the game when athlete is fatigued. Athletes who strength train will be stronger if contact and collisions happen.

Testing/Monitoring Program

Reflect the Athlete Composite Goals

- Strength - 1RM
 - Power - Vertical Jump
 - Endurance type - Yo-Yo
 - Speed - Sprints
 - Agility – Pro, sport specific
 - Flexibility -
 - Advanced monitoring
 - Body Composition
 - Saliva, blood, urine
- ❖ Workout tracking
 - pre- during and post
 - ❖ Sport and Practice Loading
 - GPS
 - Perception
 - ❖ Sleep
 - ❖ Soreness
 - ❖ Fatigue

Performance and Sports Science Professional A few Notes

- ❑ Must be an accountant for individual workout performances
- ❑ Train and engrain competency of athletes for understanding, intentionality, and accountability
- ❑ Acceptable level of starting strength before the advance training
- ❑ Understanding training competency, intentionality, and effort in training



Photo courtesy of Dr Kraemer

A few basic scientific principles of exercise and resistance training.

Specificity

SAID Principle

Progressive Overload

Size Principle

Variation

Periodization

Overreaching/Overtraining

Workouts

ACUTE PROGRAM VARIABLES



Photos courtesy of Ohio State

Football

Standard Training Phases

Preparatory

Competitive

Transition

Workout #

1

2

Pre-Season

In-Season

Off Season

Individualization

Some need to Train in order to be able to TRAIN
(General Preparation) sequence

Time available

varies each phase
for each session and
can be modified by
external demands

photo courtesy of Coach Tom Newman

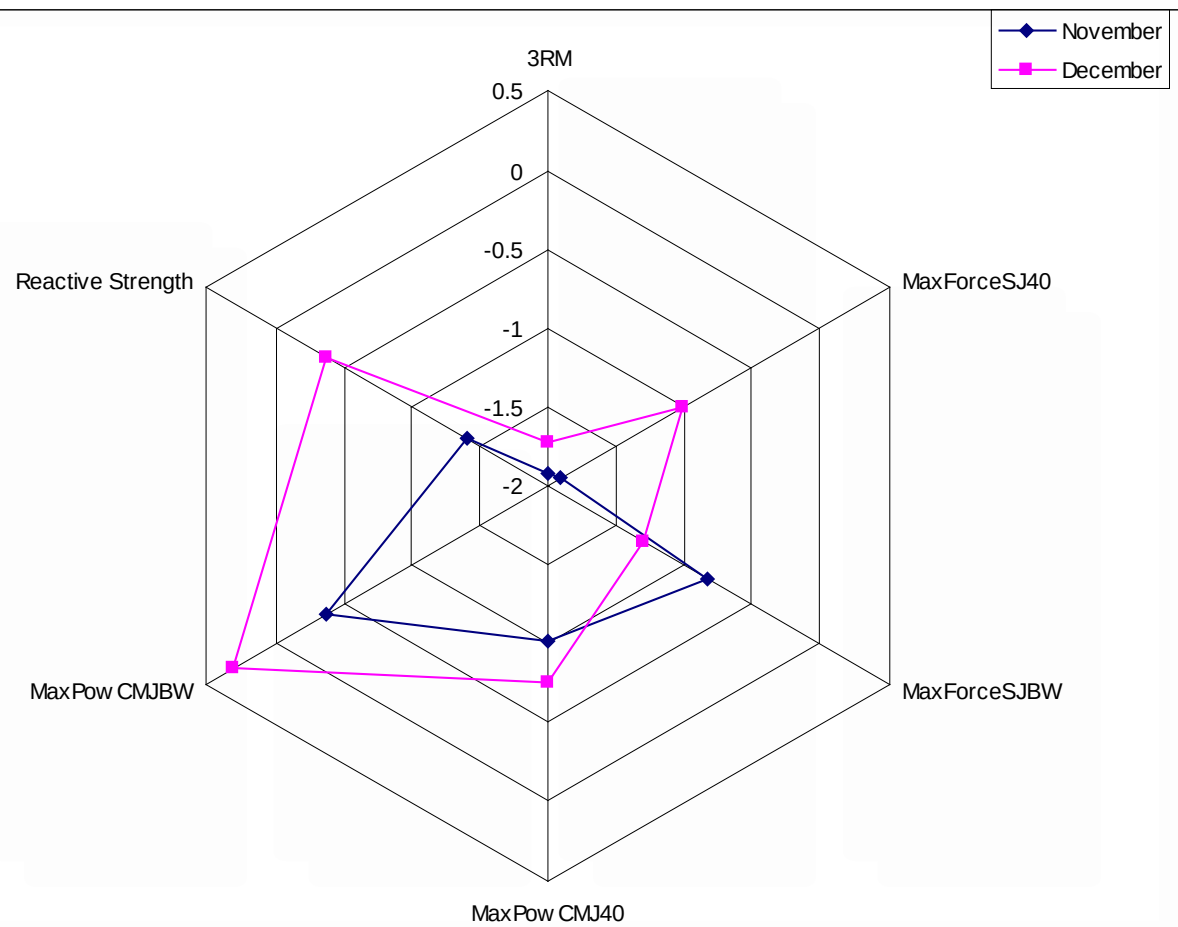


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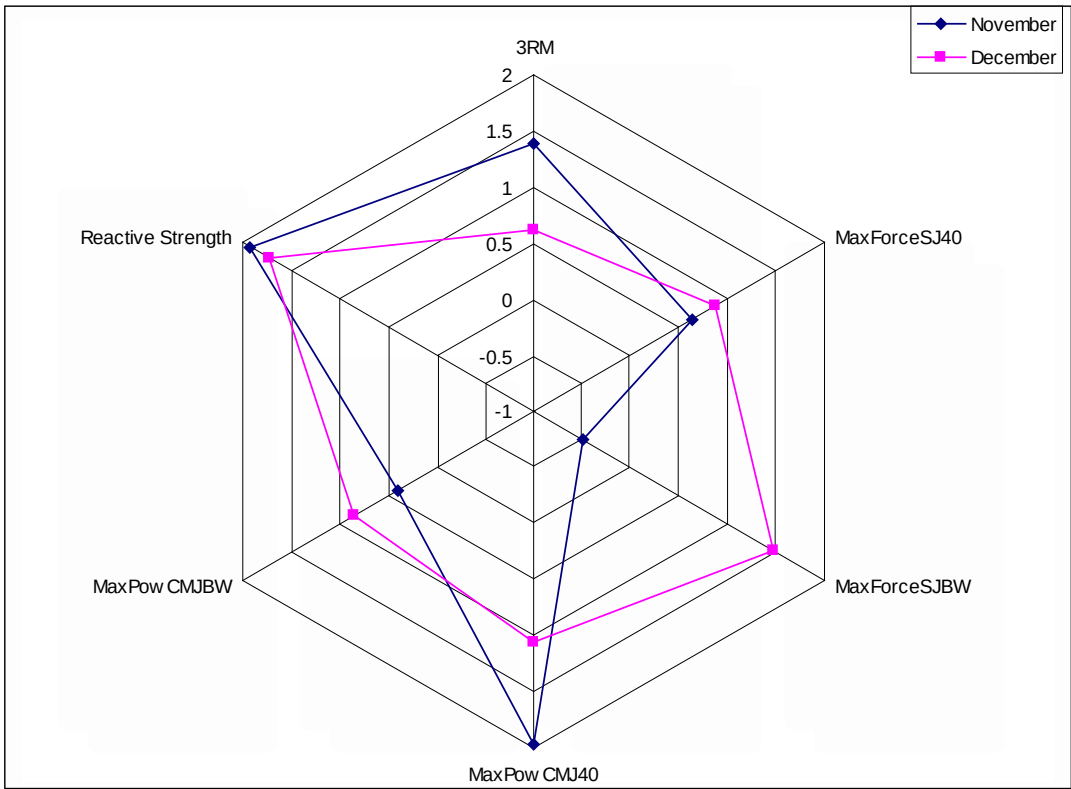
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IndividualizationTODAY is needed in exercise prescriptions

Athlete 1



Athlete 2



D, CSCS,*D, FNSCA

of Player Development in Collegiate Sports

Strength Training is the Base for Player Development

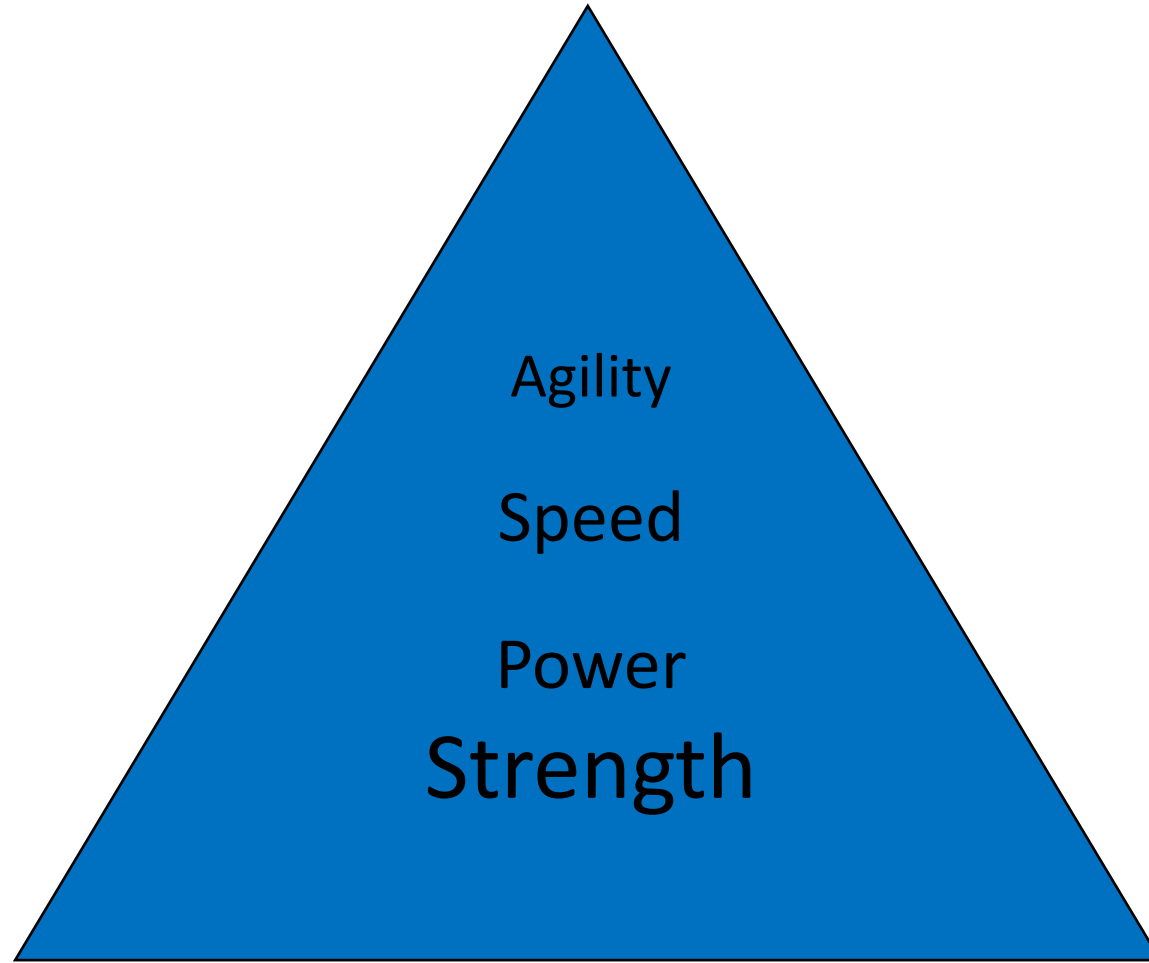


photo courtesy of Dr Kraemer

How Much Strength to Optimize Power Training?

- Optimal strength for optimal power training...
- To be powerful, force must be applied at a fast velocity
- Explosive, powerful movements involve application of force - fraction of a second
- For high power sports squat theoretically
- 2 X BW men
- 1.75 X BM women



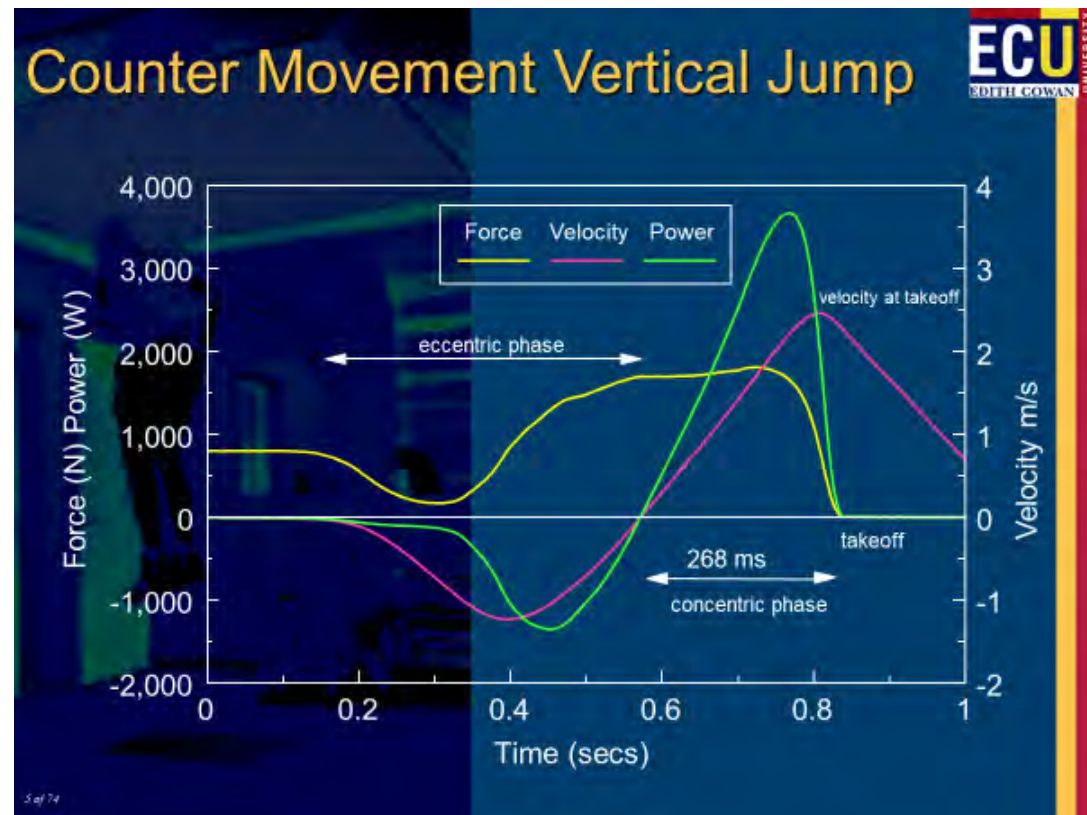
photo courtesy of Dr Robert Newton

Power at 1 meter
per second
concentric phase
using body mass



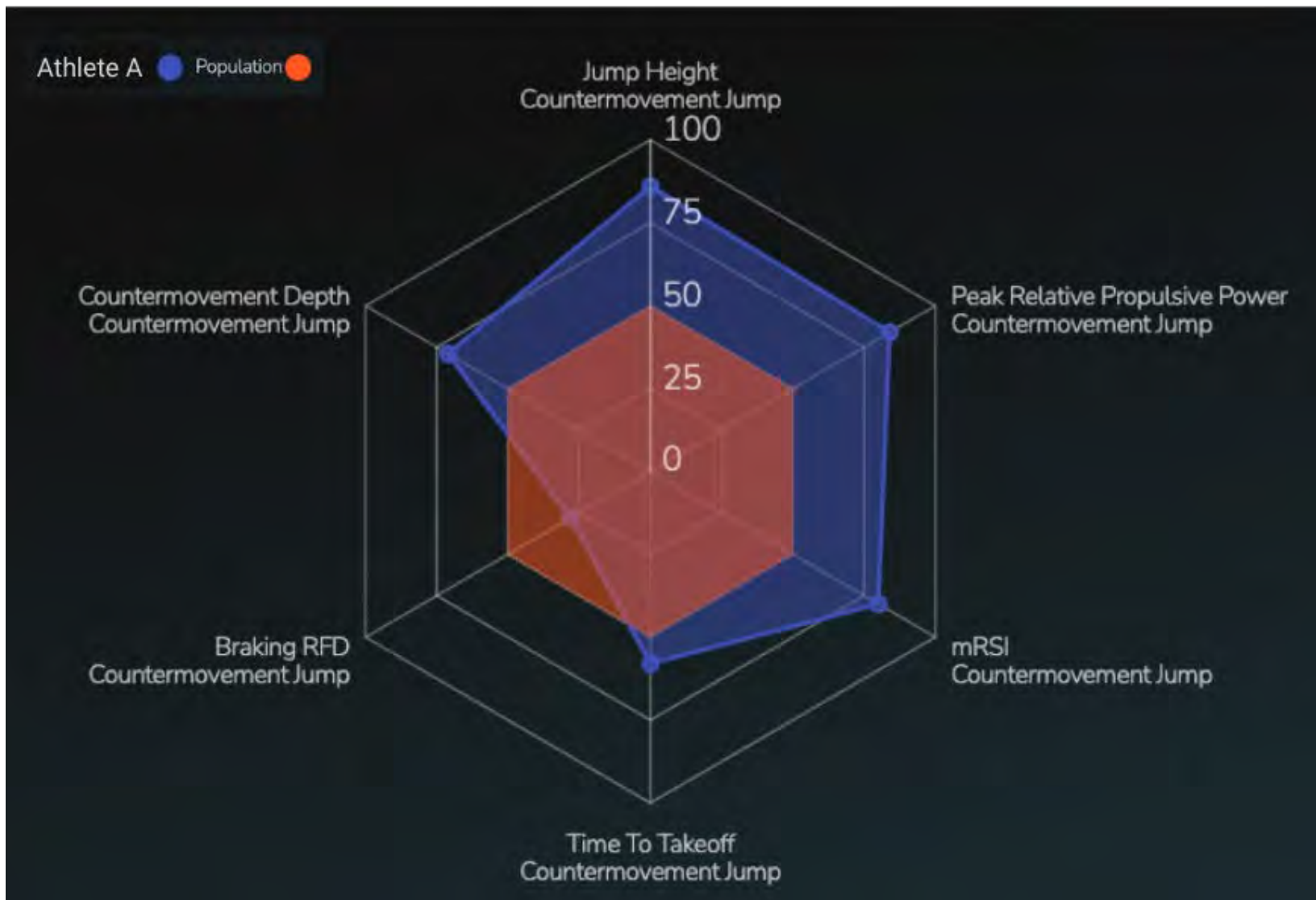
photo courtesy of Dr. Kraemer

Power is key BioMarker in all our testing athlete profiles



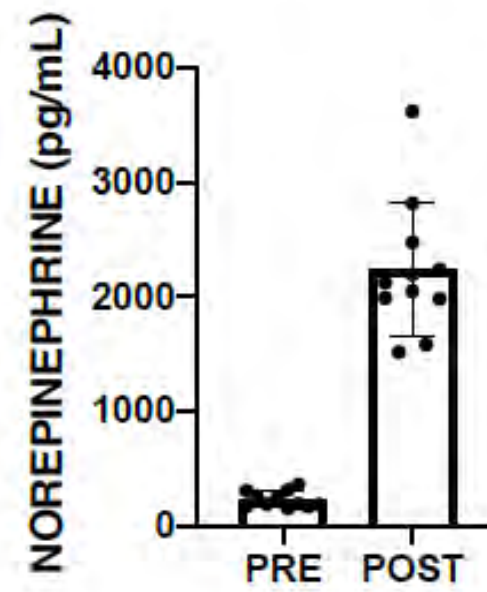
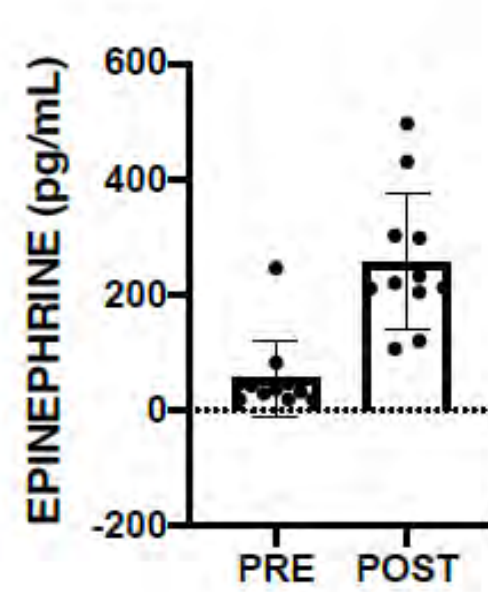
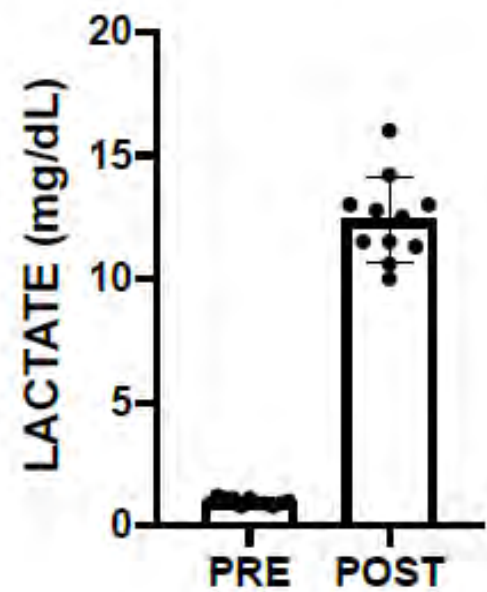
Courtesy of Dr Rob Newton

Photos courtesy of Dr. Kraemer



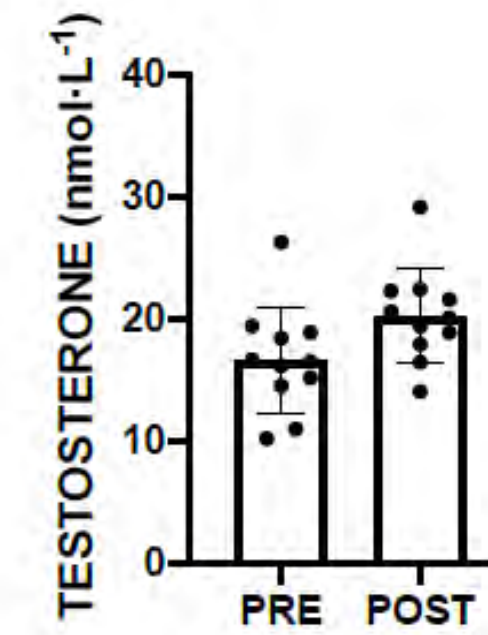
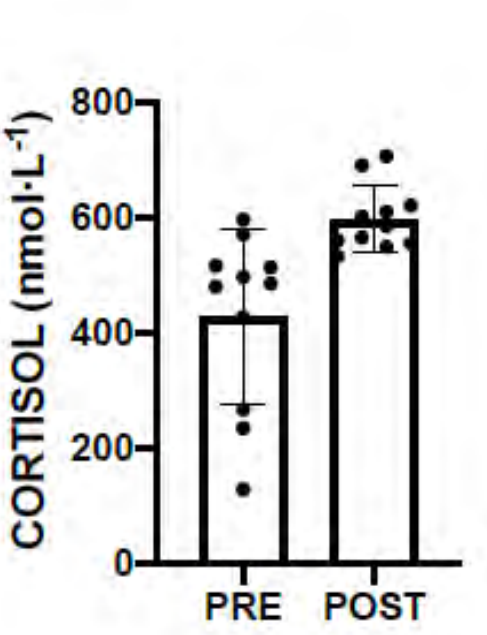
Individual Athlete Analysis and Monitoring of Progress is Needed

Photo Courtesy of Coach Tom Newman

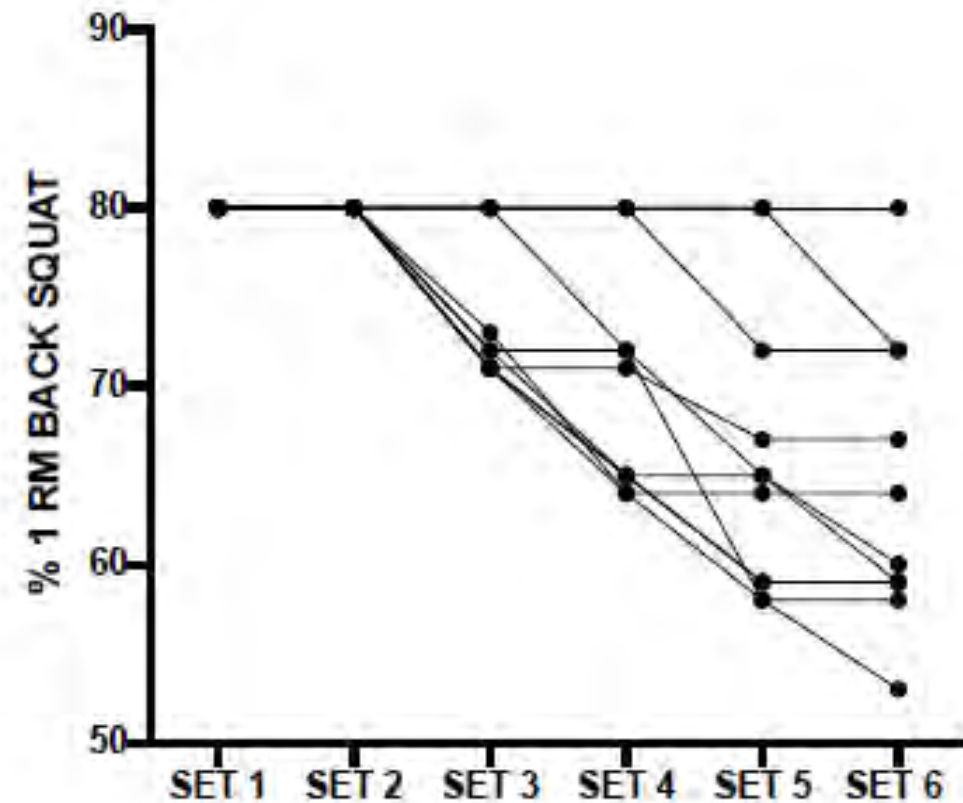
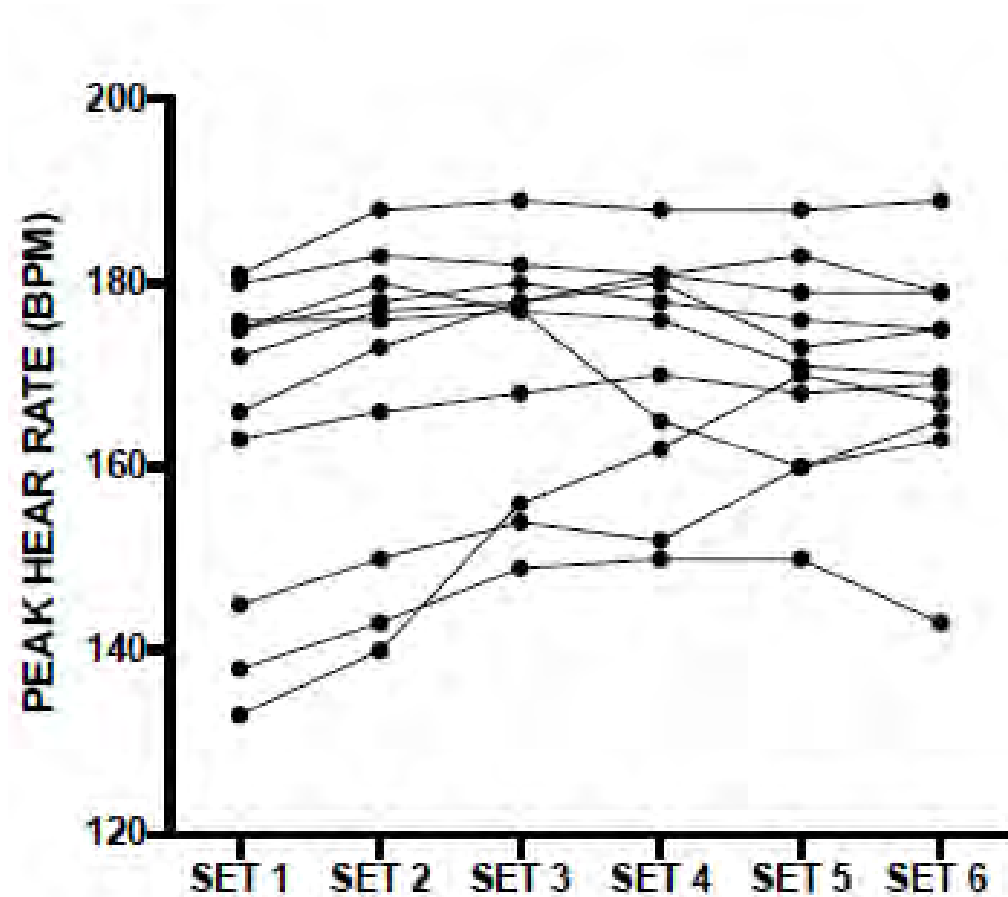


6 X 10
80% 1 RM
2 Min Rest

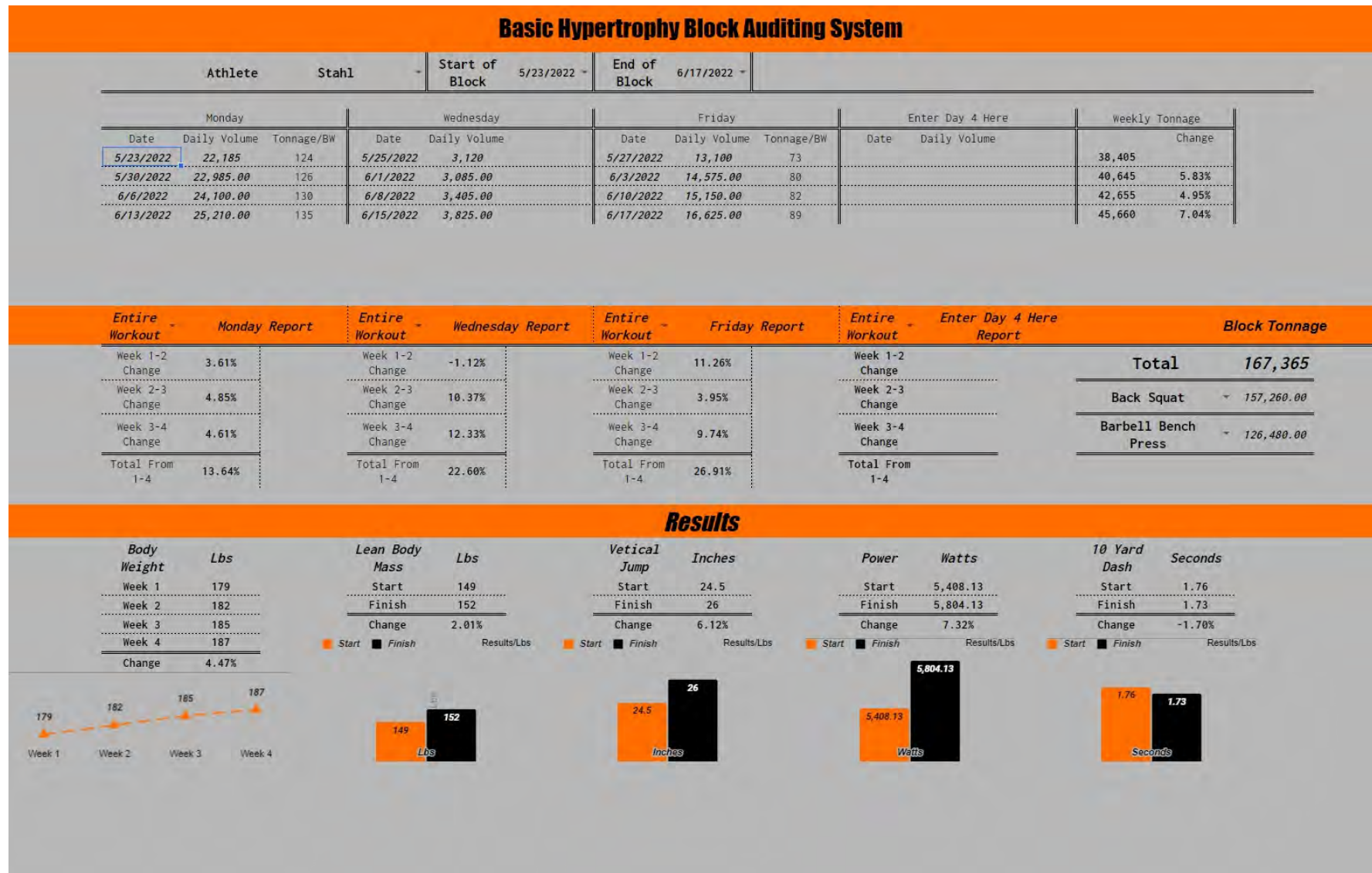
Classic Test for
Strength Endurance



6 X 10 repetitions at 80% of 1 RM Barbell Squat Test – 2 minutes rest between sets



Individual Auditing is Needed for each Athlete



Individual Auditing is Needed for each Athlete

Basic Strength Auditing System

Athlete		Stahl		Date 4/18/2022		Entire Workout		Week 1 Phase 1							
Exercise Name	Result 1	Reps 1	Result 2	Reps 2	Result 3	Reps 3	Result 4	Reps 4	Result 5	Reps 5	Result 6	Reps 6	Result 7	Reps 7	Volume Load
Back Squat	210	3	225	5	225	5	245	5	265	3					4900
Barbell Bench Press	170	8	170	6	185	6	190	8							5010
Barbell Bent Over Row	135	5	140	5	150	5									2125
DB Split Squat	35	3	35	3	50	3									720
Weighted Dips	5	7	10	5	10	5									135
Pull-Ups		8		7		5									0
Percentage of Max actually preformed on 04/18/22															
What % Prescribed?	70% ▾ Set 1		80% ▾ Set 2		80% ▾ Set 3		80% ▾ Set 4		85% ▾ Set 5		▾ Set 6		▾ Set 7		Current Max
Back Squat ▾	70.00%		75.00%		75.00%		81.67%		88.33%						300 <i>Leave Max</i>
Barbell Bench Press ▾	72.03%		72.03%		78.39%		80.51%				▾ Set 6		▾ Set 7		236 <i>Increase Max</i>
Barbell Bent Over Row ▾	75% ▾ Set 1		80% ▾ Set 2		85% ▾ Set 3		▾ Set 4		▾ Set 5		▾ Set 6		▾ Set 7		186 <i>Decrease Max</i>
	72.58%		75.27%		80.65%										

Athlete		Stahl		Date 4/25/2022		Entire Workout		Week 2 Phase 1								
Exercise Name	Result 1	Reps 1	Result 2	Reps 2	Result 3	Reps 3	Result 4	Reps 4	Result 5	Reps 5	Result 6	Reps 6	Result 7	Reps 7	Volume Load	Weekly Change
Back Squat	210	3	245	5	245	5	265	5	270	3					5215	6.43%
Barbell Bench Press	195	6	205	3	205	3	195	6							3570	-28.74%
Barbell Bent Over Row	145	5	155	5	165	5									2325	9.41%
DB Split Squat	45	3	50	3	55	3									900	25.00%
Weighted Dips	25	10	25	8	30	6									630	366.67%
Pull-Ups		10		8		8									0	
Percentage of Max actually preformed on 04/25/22																
What % Prescribed?	70% ▾ Set 1		80% ▾ Set 2		80% ▾ Set 3		85% ▾ Set 4		85% ▾ Set 5		▾ Set 6		▾ Set 7		Current Max	
Back Squat ▾	66.67%		77.78%		77.78%		84.13%		85.71%						315 <i>Leave Max</i>	
Barbell Bench Press ▾	80% ▾ Set 1		85% ▾ Set 2		85% ▾ Set 3		80% ▾ Set 4		Set 5		▾ Set 6		▾ Set 7		245 <i>Leave Max</i>	
	79.59%		83.67%		83.67%		79.59%									
Barbell Bent Over Row ▾	75% ▾ Set 1		80% ▾ Set 2		85% ▾ Set 3		▾ Set 4		▾ Set 5		▾ Set 6		▾ Set 7		195 <i>Leave Max</i>	
	74.36%		79.49%		84.62%											

+

■

Auditor ▾

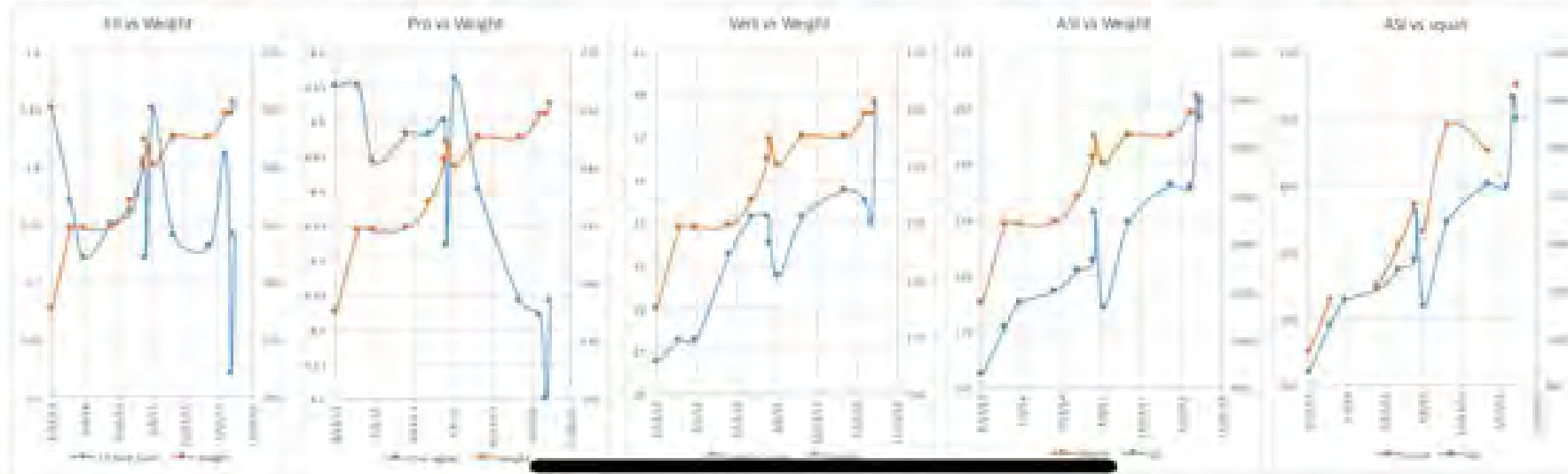
CSV Upload ▾

Maxes ▾

A football player's four-year tracking of progress



Test Date	10 Yard C-Weight	Test Date	Pro-Agility	Weight	Test Date	Vertical J-Weight	Test Date	ASI	Weight	Test Date	ASI	squat
8/17/13	1.80	180	8/17/13	4.55	180	8/17/13	26.5	180	8/17/13	804	275	
12/9/13	1.77	208	12/9/13	4.55	208	12/9/13	27.5	208	12/9/13	8054	315	
2/26/14	1.72	208	2/26/14	4.44	208	2/26/14	27.5	208	2/26/14	8158		
8/14/14	1.75	209	8/14/14	4.48	209	8/14/14	31.5	209	8/14/14	8201	325	
12/5/14	1.76	218	12/5/14	4.48	218	12/5/14	33.25	218	12/5/14	8266	355	
2/23/15	1.8	232	2/23/15	4.5	232	2/23/15	33.25	232	2/23/15	8326	385	
3/4/15	1.72	239	3/4/15	4.32	239	3/4/15	32	239	3/4/15	8323		
4/15/15	1.85	230	4/15/15	4.56	230	4/15/15	30.5	230	4/15/15	8133	365	
8/16/15	1.74	240	8/16/15	4.4	240	8/16/15	33.25	240	8/16/15	8484	445	
3/15/16	1.73	240	3/15/16	4.24	240	3/15/16	34.5	240	3/15/16	8668	425	
6/23/16	1.81	248	6/23/16	4.22	248	6/23/16	34	248	6/23/16	8627		
7/25/16	1.62	248	7/25/16	4.1	248	7/25/16	33	248	7/25/16	8609		
8/13/16	1.74	252	8/13/16	4.24	252	8/13/16	35.5	252	8/13/16	8915	475	



Courtesy of Coach Tom Newberry, William J. Kraemer, PhD, CSCS,*D, FNCSA

Gary A. Dudley Lecture: The Challenges of Player Development in Collegiate Sports

Creation of the Collegiate Play Development Model

Founder

Organization of Player Development Team Professionals

Buy in and Alignment with Athletics and Appropriate Academic Departments

Initiation origin typically within Strength and Conditioning and linked to Sports Medicine

Build out to Full Team and Implementation for each Sport and Athlete

Is it started from the Top Down or Bottom Up ??????

Who makes up the ideal player development team of professionals

Strength and Conditioning/Sports Performance/Sports Science

(Accredited Certifications)

Sports Nutrition
(Accredited Registered Dietitian
and sports Nutrition
Certifications)

Athletic Training
(Accredited Certifications and
Licenses)

Physical Therapy
(Accredited degree DPT and
(Licenses)

**Sports
Psychology/Sociology**
(Certification)



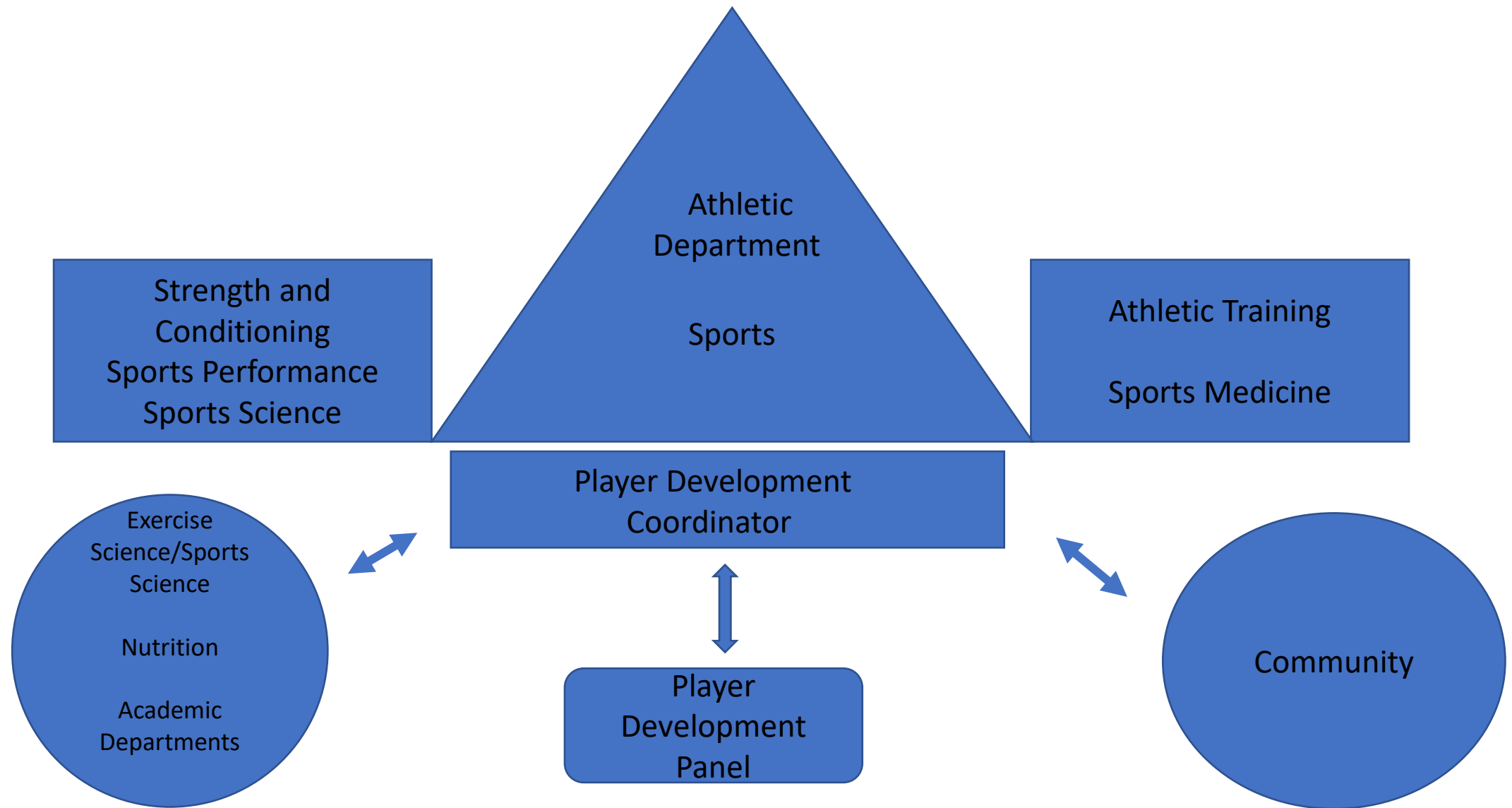
Sport Coach

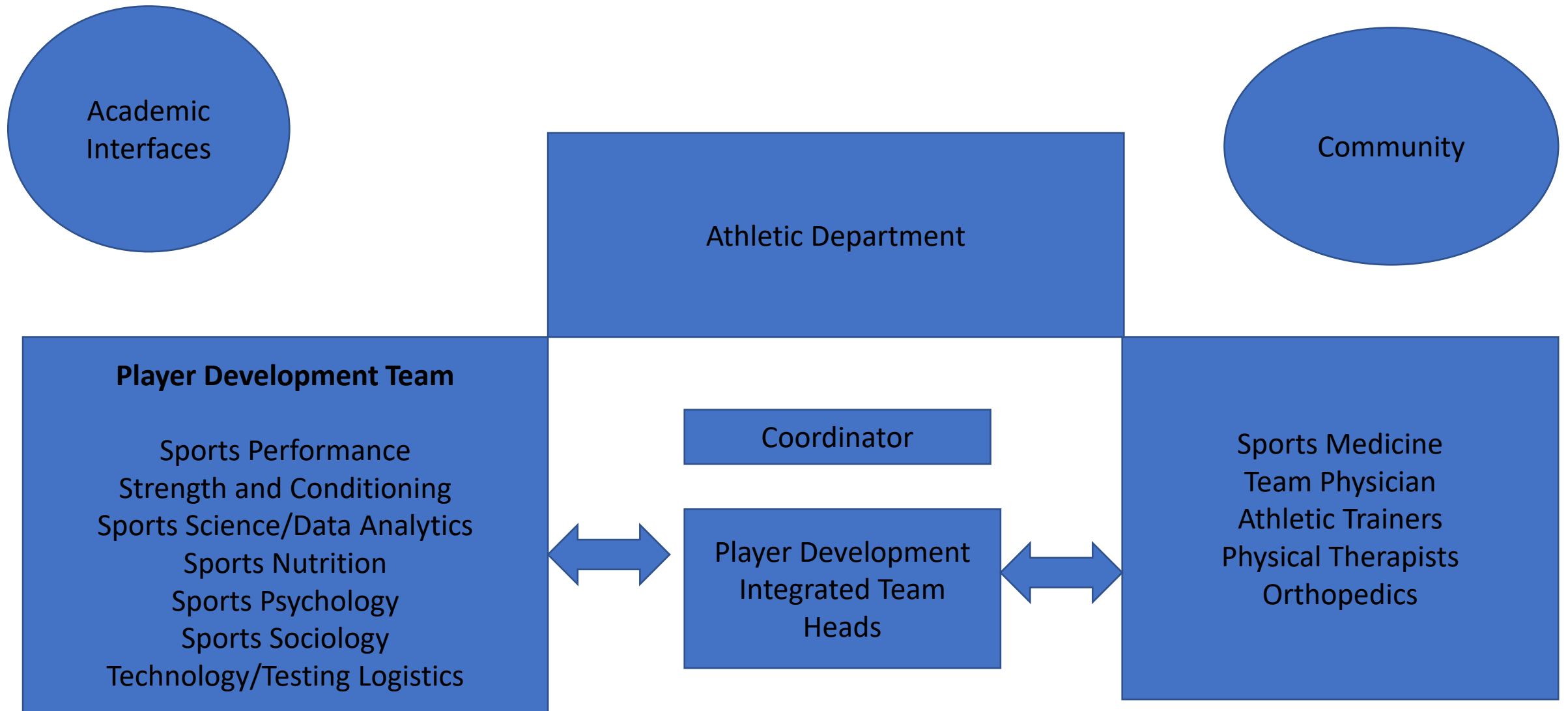
Sports Science/Sports Analytics
(Accredited Certifications)

Sports Medical Professional
(Licenses)

**Exercise and Sports Science
Advisor**

(Professor/Educator
University Resource)





The Ohio State University

Coach Michael Marotti
Dr. Josh Hagen

Sport Performance/Sport
Science Group

Human Performance
Consortium



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Coach Teofe Ziemnick -Head of Sport Science for TeamBuildr.
Coach Rachel Hodgson- University of Louisville

Dr. Nicholas A. Ratamess – Professor – The College of New Jersey
Dr. Robert U. Newton – Edith Cowan University – Australia
Dr. Steven Fleck, Fleck Corporation.com, Colorado
Dr. Michael Deschenes, College of William and Mary.
All of my former Doctoral Fellows – Thank you.....



Human Performance Lab

Dr. Jeff Volek
Dr. Carl Maresh



William J. Kraemer, PhD, CSCS,*D, FNSCA
Gary A. Dudley Lecture: The Challenges of Player Development in Collegiate Sports





Thank You
Dr. Gary A. Dudley
for your inspiration and many
contributions

see below

Journal of Strength and Conditioning Research, 2007, 21(1), 6–9
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IN MEMORIAM: DR. GARY A. DUDLEY (1952–2006) **A MODERN PIONEER IN THE STUDY OF MUSCLE AND** **RESISTANCE TRAINING**

ABSTRACT. In memoriam: Dr. Gary A. Dudley (1952–2006). A modern pioneer in the study of muscle and resistance training. *J. Strength Cond. Res.* 21(1):6–9. 2007.—Dr. Gary Alton Dudley was a modern pioneer in the study of muscle. His work encompassed almost 30 years of study with dramatic discoveries in the

fibers and that these changes were fiber-specific (10, 26, 32). He continued using animal models to investigate the influence of exercise on muscle and changes in ammonium metabolism, lipid metabolism, and histochemical pro-