

BME 473

Applied Biomechanics
Course Project

Performance Mouth Guards

Presented by Hunter Vickers and Devin Mosley

Outline

1. Movie clip
2. What are mouth guards?
3. How they work
4. Previous investigations
5. Our new investigation

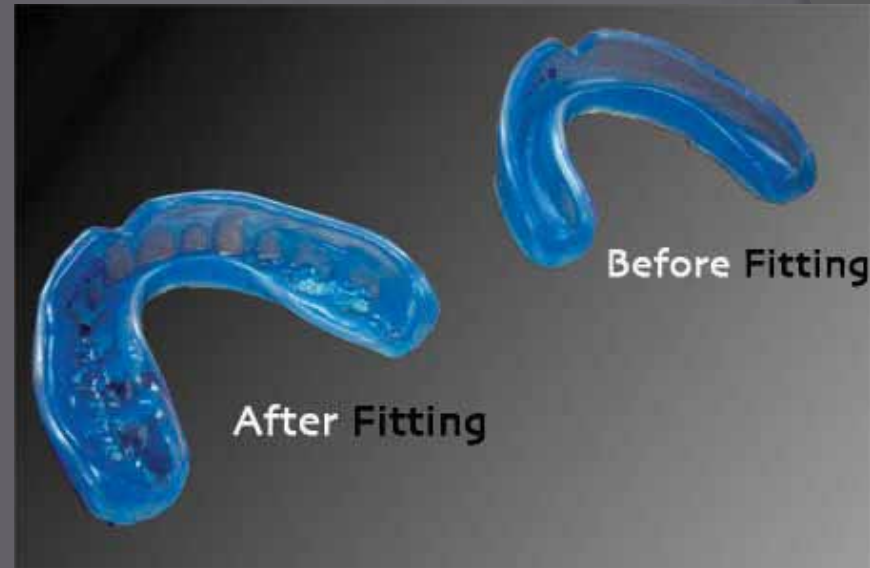
Under Armour Performance Mouthpiece



Traditional



Boil and Bite



PERFORMANCE





Jon Gruden (Retired NFL Coach)



Washington Redskins lineman Kedrick Golston

 An advertisement for Makkar PPM golf equipment. It features a photo of PGA Tour player Scott McCarron in a blue shirt and white cap, swinging a golf club. The text includes the brand name "Makkar" and "PURE POWER UNLEASHED".

Looking to Improve Your Game?

Find out what several PGA pros and a growing number of golf enthusiasts already know - the Makkar PPM works, and it works instantly!

"I have better balance when I'm wearing the PPM ... Plain and simple, the PPM is the most important piece of equipment in my golf bag. I will never play without it again."

Scott McCarron, PGA Tour Player

Makkar
PURE POWER UNLEASHED

Game-changing benefits include:

- Increased Clubhead Speed
- Improved Driving Accuracy
- Greater Balance & Flexibility

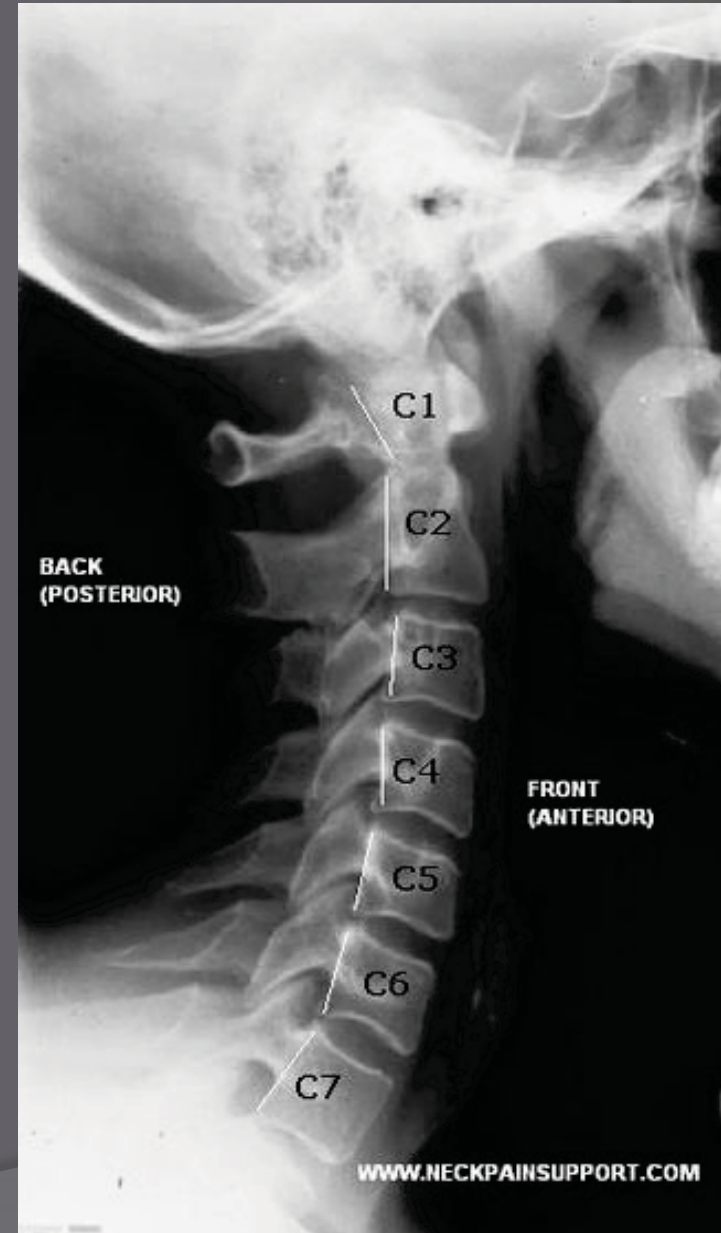
Makkaradvantage.com

PGA Tour Player
Scott McCarron

So, what's going on?

- 1-Teeth Clenching
- 2-Restricted Airways
- 3-Release of Performance Sappers(cortisol and lactic acid)
- 4-Stress, Fatigue and Distraction

The dentist takes an impression of your teeth and sends it directly to Bite Tech's lab where your Mouth Guard is constructed and personalized.



Previous Investigations



The Effects of Mouthpiece Use on Gas Exchange Parameters During Steady-state Exercise in College-aged Men and Women

*Results-*wearing a performance mouthpiece would inhale 29 percent more oxygen and exhale 21 percent more carbon dioxide compared to a person not wearing the mouth piece.

The Effects of Mouthpiece Use on Cortisol Levels During an Intense bout of Resistance Exercise

Results- reduce the amount of the cortisol by 51 percent at 10 minutes post-exercise in the participants wearing the mouthpiece versus those who did not.

Results:

The use of the mouthpiece elicited an average of 2 mph increase in pitching velocity among all subjects



An advertisement for Armourbite mouthpiece and mouthguard. At the top, a man with glasses and a mustache, identified as Tom House, Pitching Coach at the University of Southern California, is shown. Below him, the text reads 'WHAT IS ARMOURBITE?'. The ad lists three benefits: 'INCREASED STRENGTH (Up to 20% Stronger)', 'INCREASED ENDURANCE (Up to 20% Less Tired - Less Build Up)', and 'IMPROVED REACTION TIME (Up to 1.5x Faster)'. It also includes a 'BUY NOW!' button and a list of features: 'FITS ON LOWER TEETH' and 'DESIGNED FOR OPTIMAL FIT & COMFORT'. The ad shows images of the yellow mouthpiece and mouthguard.

Results-Vertical Jump increased by 2 centimeters

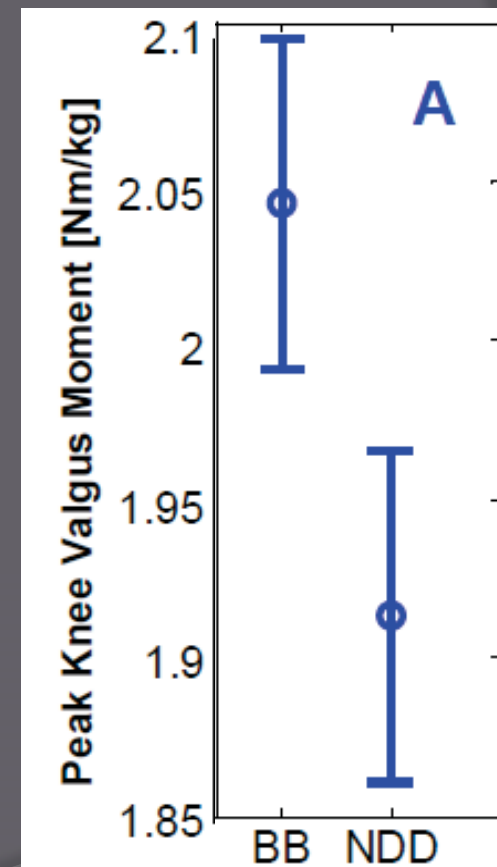
WaNT-Peak Power was 12 Watts/Kg for those who wore performance mouth gaurd vs 11.4 W/kg for those who did not

ACL TEAR

EFFECT OF A NEUROMUSCULAR DENTISTRY-DESIGNED MOUTHGUARD ON PEAK KNEE VALGUS MOMENTS DURING SINGLE LEG LANDING

Peak knee valgus moments (pKVM) have been identified as a potential risk factor for ACL injury.

A 170lb person is equivalent to 80 kg, which would result in a decreased pKVM of 12Nm.



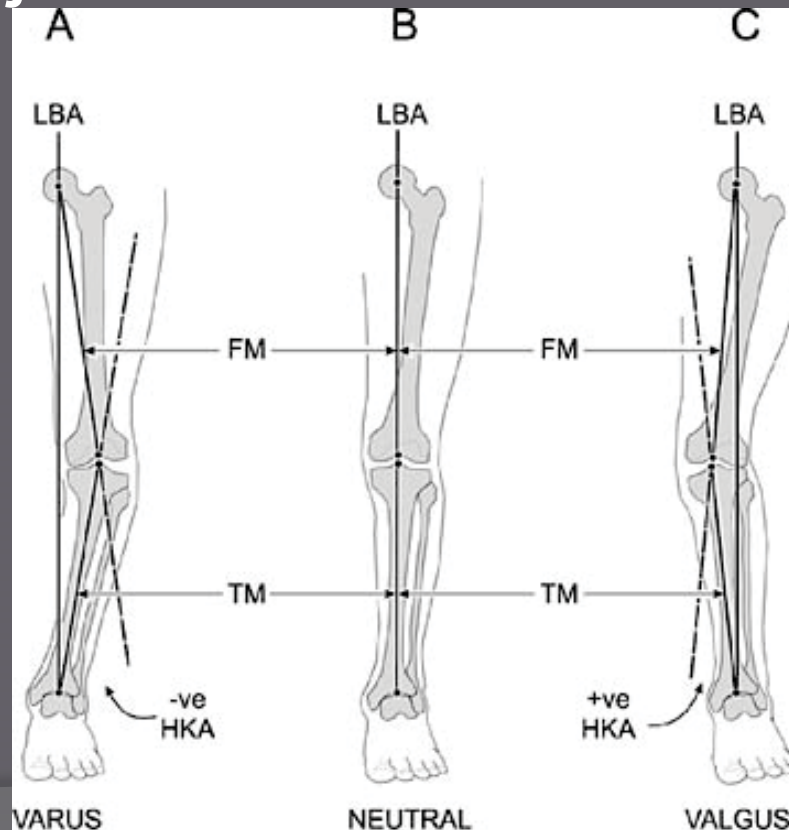
Sport related injuries

- Over \$18 billion dollars spent on medical expenses
- Most Injuries:
 - Bicycling
 - Basketball
 - Baseball
 - Running



Proposed Research Questions

- Effects of valgus knee moments
 - Does it reduce the moment significantly?
- Can ACL injuries be reduced?



Research Criteria

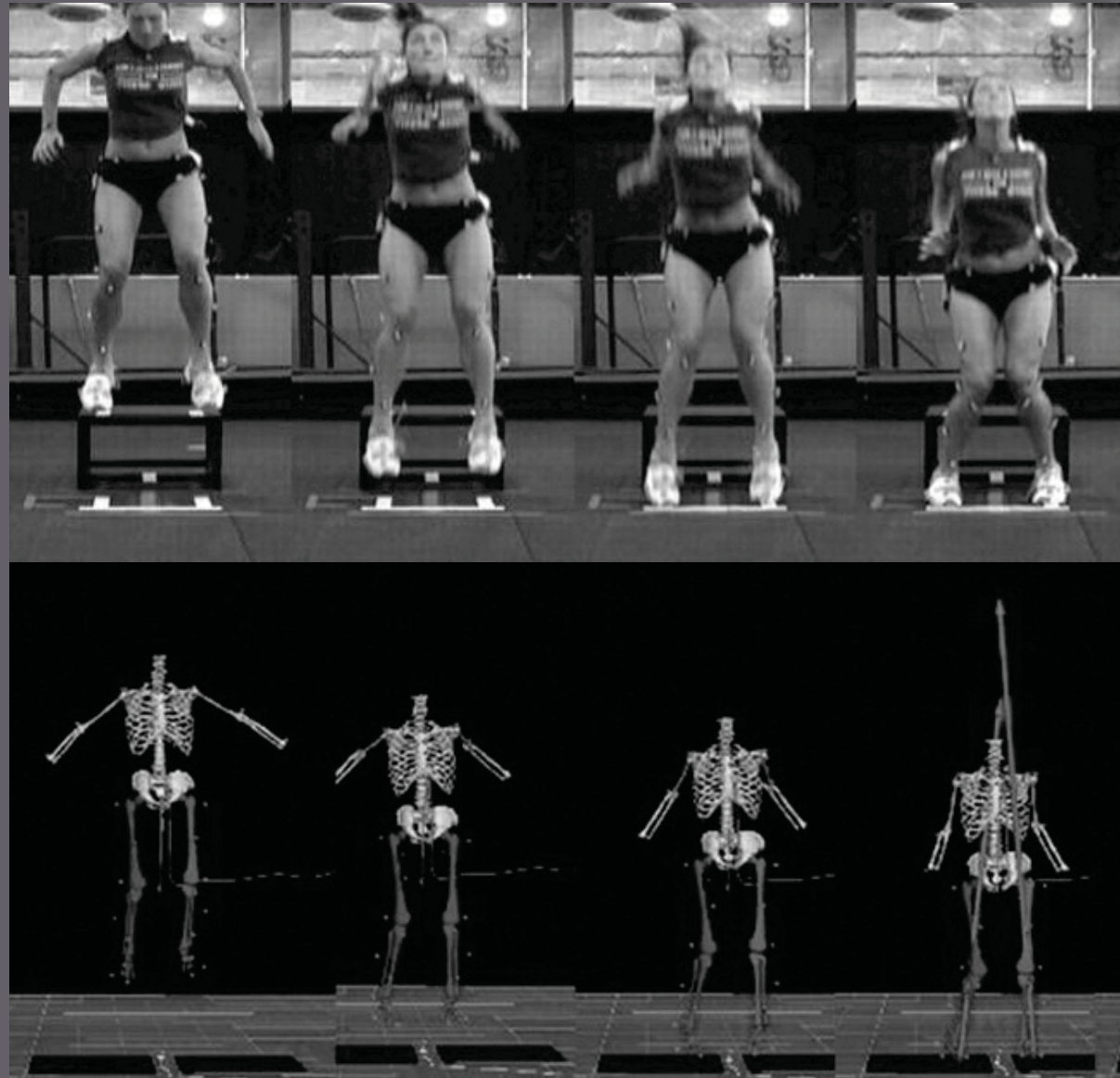
- ⦿ 20 participants
 - Half athletic team participants
 - 5 Male and 5 Female
 - Half non-athletic team
 - 5 Male and 5 Female
- ⦿ Age range: 17 – 23
- ⦿ 5 week testing process

Testing Criteria

- First week: Fitting
- Second week: All males perform task with mouth guard
- Third week: All females perform task with mouth guard
- Fourth week: All males perform task without mouth guard
- Fifth week: All females perform task without mouth guard

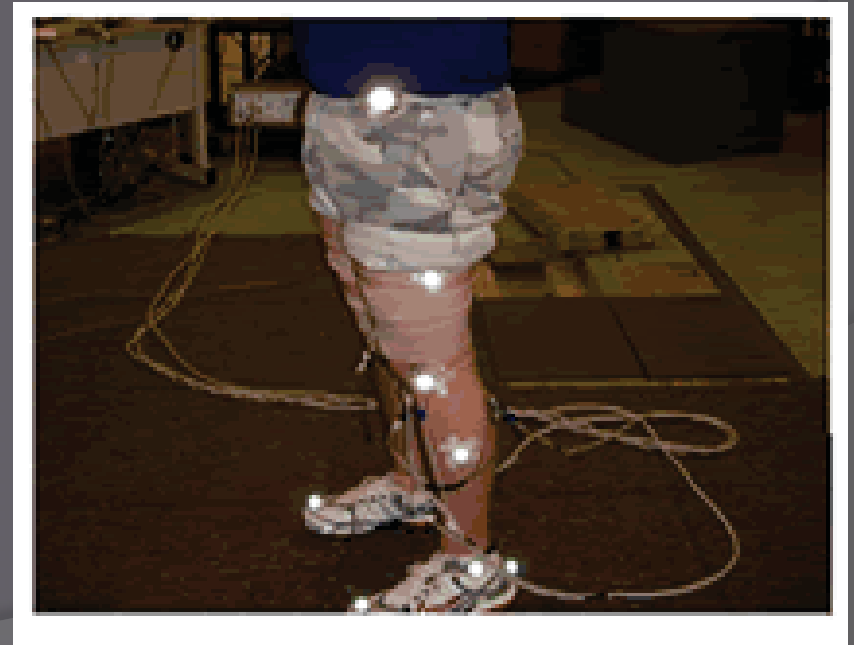
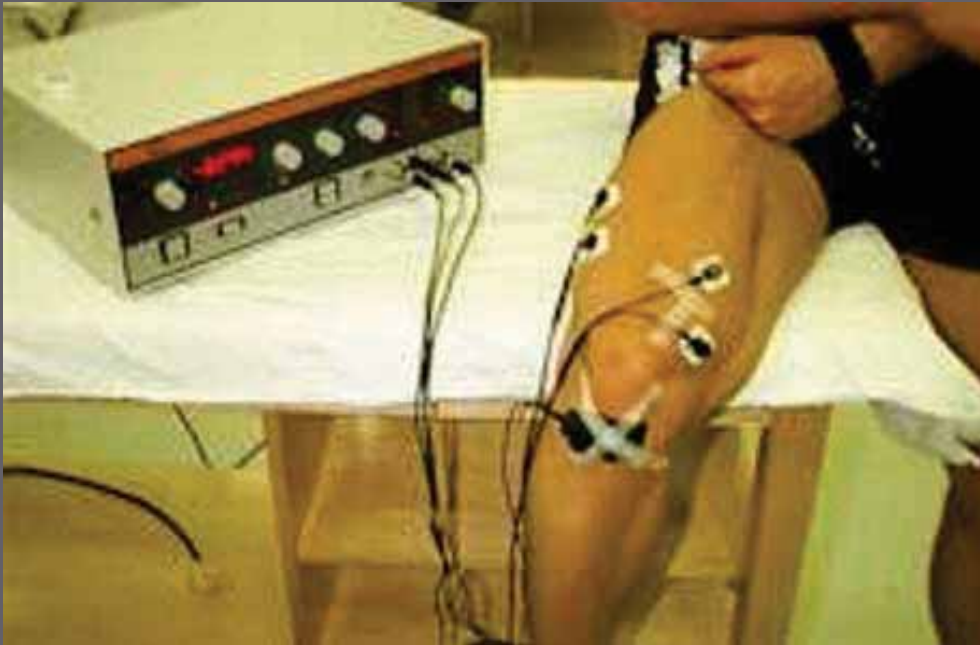
Data Collection

- Jump off 46 cm (~1.5ft) box
- An 8-camera optical motion analysis system with reflective markers placed on the pelvis and lateral knee, ankle, and foot



Data Collection

- An EMG would also be connected to the participant
 - This would help measure responsiveness



Results/Benefits

- ⦿ Responsiveness
- ⦿ Understand if psychosomatics play a role
- ⦿ Bone injuries (breaks) will not be prevented.
- ⦿ Research would be used to help everyone, not just athletes

Questions?

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