Dedication to Dr. Milton Eugene Davis
NFL All-Pro Baltimore, 30 yr NFL Scout
Professor of Zoology, Field Ornithology & Natural History, May 31, 1929 – September 29, 2008
GOALS

1. Provide a small sample of some of Dr. Davis’ work on sports medicine injuries in NFL Combine players. We will focus on ~5-yr injury history of 314 players from 2004.

2. Describe prevalence, anatomical sites & diagnoses with an emphasis on player position in attempt to develop an injury-diagnoses-player position continuum.

3. Provide suggestions to minimize injuries & maximize NFL longevity & ultimately quality of life after retirement.

4. Help younger athletes who play football & their coaches & allied health & medical practitioners.

5. Provide impetus to move from descriptive to more causal mechanistic & integrative research with input from biomechanists, physiologists, physicians, NATA & PT.
Medical Evaluation
2 Orthopedists MD
1 Internist MD, 1 ATC, 1 Asst
Routine & Individualized Exams

Medical History & Surveys
Family History, Psychological Questionnaires, IQ Test, Team-Specific Surveys

Day 2
Follow-up X-Rays MRIs

Anthropometrics, Strength, Agility & Speed Tests
Ht, Wt, Strength Testing, 40-yd Dash, General Agility Drills

Specific Agility Drills Based On Position
Specific Agility Drills Conducted By Preselected Position Coaches

Day 3
Follow-up Medical Tests
Medical History, DL Major University

- 3/04 L Ankle Arthroscopy, Removal Symptomatic Os Trigonum, 10/03 L High Ankle Sprain, MRI Peroneal Tendonosis, Split in Peroneus Brevis, 10/02 R Foot 5th Metatarsal Jones Fracture, ORIF, 02/03 R Wrist Chronic Pain, Surgical Cyst Removal, 02/00 R Lunotriquetral Ligament Tear, Surgical Debridement, 8/99 L Knee Patellar Tendonitis, Probable Grade 2

- **4/2 ORTHO, MED 0**
  CODED: 17,9, 17,3, 17,7, 17,4, 11,9, 18,5, 11,4, 15,7
726 Documented Injuries in 314 Players
2.3 Injuries/Player
Range: 0 – 10 Injuries
63% of Players ≥ 1 Injury
7% 1 Injury
9% 2 Injuries
29% 3 or 4 Injuries
18% ≥ 5 Injuries

NB: 3 yr prior, 1.4 Injuries/Player
58% of Players ≥ 1 Injury
INJURIES/PLAYER BY PLATOON
NFL COMBINE 2004, N = 314

INJURIES/PLAYER

*P = 0.04  *P = 0.02  *P = 0.04

OFFENSE  DEFENSE  KICKER
N=162  N=141  N=11
INJURY FREQUENCY/PLAYER BY POSITION
NFL COMBINE 2004, N = 726/314, 2.3/PLAYER

INJURY FREQUENCY/PLAYER

2.3 = $\bar{X}$
INJURY DIAGNOSES
NIC 2004, 314 PLAYERS
726 INJURIES OVER 5 YR

NB: 1st time in top 3!
139 of 314 or ~ 44% had 228 surgeries ≡ 0.73 surgeries/player for all 314 players:

1 Surgery: 25%
2 Surgeries: 13%
3 Surgeries: 5%
4 Surgeries: 2%
SURGERY FREQUENCY/PLAYER BY POSITION
NFL COMBINE 2004, N = 228/314, 0.73/PLAYER

[SURGERY FREQUENCY/PLAYER graph with bars for different positions (RB, OL, DL, TE, LB, DB, WO, QB, PK) and error bars. The graph shows the surgery frequency per player for each position, with RB having the highest frequency and PK having the lowest. The average surgery frequency is marked as 0.73.]
12% of All Players & 22% of Injured Players Have Significant DJD or Arthritis
% PLAYERS WITH ARTHRITIS BY PLATOON
NFL COMBINE 2004, N = 68/314, 22%

27%
22% Average

OFFENSE
N=44/162

DEFENSE
N=23/141

KICKER
N=1/11

% ARTHRITIS
% PLAYERS WITH ARTHRITIS BY POSITION
NFL COMBINE 2004, N = 68/314, 22%

% ARTHRITIS

38%  33%  32%  30%
RB   TE   OL   DL

23%
WO   LB   PK

11%  9%
DB   QB

6%  5%

22% = \bar{X}
No NFL player ever has collected interceptions at a faster rate than Baltimore’s Milt Davis.
TAKE-AWAY POINTS FROM DR. DAVIS:

1. Over 3 yr, the surgery rate remained relatively constant (0.7 surgeries/player) while the injury rate increased from 1.4 to 2.3 injuries/player (↑ 64%).

2. An injury rate continuum spans from highest near the point of attack -- RB (3.4/player), OL (3.1/player) & DL (2.9/player) – to lowest further from the point of attack: PK (1.1), DB (1.3) & QB (1.4).
3. The knee, shoulder & ankle are primary sites of injury, while primary diagnoses include tears, sprains & degenerative joint disease.

4. Over 3 yr, the % of injured players with documented degenerative arthritis increased from 8% to 12% (↑ 50%) which seems to mirror the increased injury rate.

5. While anatomical sites of injury appear identical to earlier results, diagnoses appear to be shifting toward more arthritis. We suspect that this trend is likely to impact NFL participation and longevity. We hope to continue Dr. Davis’ work with this as a focus for future investigations.
DISCUSSION
Medical History, DB, 8th Round!

- No significant injuries on arrival to NFL
- 1956 L Hand 1\textsuperscript{st}, 2\textsuperscript{nd}, 3\textsuperscript{rd} Metacarpal Fracture
- 1957 R Hand 2\textsuperscript{nd}, 3\textsuperscript{rd}, 4\textsuperscript{th} Metacarpal Fracture
- 1957 Nose Fracture
- 1957 R Hand 1\textsuperscript{st} Metacarpal Fracture
- 1957 R Knee ACL Sprain
- 1958 L Knee ACL Sprain
- 1958 L Foot 3\textsuperscript{rd} Metatarsal Fracture
- 1959 L Hip Fracture

Participation 95-100\% for all yr
MEDICAL STATUS OF PLAYERS PRIOR TO NFL?

1

MULTIPLE VARIABLES:

MEDICAL

PHYSICAL

PERFORMANCE

2

Participation

Longevity

Productivity
LONGEVITY?

1. 15% of players in the NFL (275/1889) are rookies in the NFL, that is with no prior experience. Only 2.9% (55/1889) have 1 year experience, while 15% (284/1889) have 2 years experience, indicating a significant cut-point/longevity threshold > rookie yr.

2. ≤ 7% of players make it longer than 10 yr in the NFL, and < 2% 13 yr or longer. Player position rather than any significant medical variable with the exception of RB, WO, and LB, appears to be more of a determinant in longevity. Of course, there are many other intrinsic variables which may prove difficult to measure.
1. For offensive players, only for RB and WO do any of the medical variables make a difference in predicting future participation. Orthopedic Grade and Total # of Injuries provide a small degree of predictability (8-11%).

2. For defensive players, only for LB do total number of injuries & total number of surgeries offer a marginal degree of predictability (11%).
Running Backs
Orthopedic Grade
8% of Participation Variance*
P<0.05
Wide Receivers
Orthopedic Grade*
10% of Participation Variance*
P<0.05*
Linebackers
Total Injuries* & Total Surgeries*
Each 11% of Participation Variance*
P<0.05*
%O/D PLAY TIME VS DRAFT #, YR 2001

R = 0.0340, NS

8% (30/384) > 75%
National Football League salaries

Chart NFL salaries by position
Average annual salary in the 2003 season by position (includes bonuses):

- Wide receiver $1.27 million
- Offensive lineman $1.32 million
- Defensive tackle $1.30 million
- Defensive end $1.41 million
- Linebacker $1.34 million
- Cornerback $1.18 million
- Tight end $884,000
- Quarterback $2.14 million
- Running back $992,000
- Kicker $888,000
- Punter $785,000

Source: USA TODAY research

By Sam Ward, USA TODAY
BMI Silhouettes

QB  RB  28  31
WR  K  TE  26  29  31
OL
DB  LB  DE  27  31  34  38
DT

Men

< 25
MOST RECENT INJURY DIAGNOSIS

- None: 42%
- Tear: 18%
- Dis/Sublux: 9%
- Fracture: 7%
- Rep Trauma: 7%
- DJD: 6%
- Sprain: 6%
- Infl not DJD: 3%
- Other: 2%
- None: 2%
QUALITY? OF PARTICIPATION OVER BOTH YEARS

- **Minimal/Dwindlers**: 62%
- **Trans Down**: 4%
- **Trans Up**: 10%
- **Late Bloomers+**: 19%
- **Major Impact 1st yr**: 3%
- **Major Impact Both yr**: 2%

Diagram showing the distribution of participation types.