

SLEEP AND CIRCADIAN SCIENCE- IMPLICATIONS FOR PROFESSIONAL ATHLETES PERFORMANCE AND HEALTH

Meeta Singh MD
 Section head and Service chief
 Henry Ford sleep disorders clinic
 MI

Ben Potenziano, M.Ed, L-ATC
 Assistant Athletic Trainer
 Pittsburgh Pirates
 Former Strength and Conditioning Coach
 San Francisco Giants

Conflict of Interest Disclosures for Speakers

1. I do not have any relationships with any entities **producing, marketing, re-selling, or distributing** health care goods or services consumed by, or used on, patients, OR

2. I have the following relationships with entities **producing, marketing, re-selling, or distributing** health care goods or services consumed by, or used on, patients.

Type of Potential Conflict	Details of Potential Conflict
Grant/Research Support	
Consultant	NFL, MLB, NHL, NBA, WTA, LPGA, UEFA
Speakers' Bureaus	
Financial support	
Other	

3. The material presented in this lecture has no relationship with any of these potential conflicts, OR

4. This talk presents material that is related to one or more of these potential conflicts, and the following objective references are provided as support for this lecture:

- 1.
- 2.
- 3.

Conflict of Interest Disclosures for Speakers

1. I do not have any relationships with any entities **producing, marketing, re-selling, or distributing** health care goods or services consumed by, or used on, patients, **OR**
2. I have the following relationships with entities **producing, marketing, re-selling, or distributing** health care goods or services consumed by, or used on, patients.

Type of Potential Conflict	Details of Potential Conflict
Grant/Research Support	
Consultant	
Speakers' Bureaus	
Financial support	
Other	

3. The material presented in this lecture has no relationship with any of these potential conflicts, **OR**
4. This talk presents material that is related to one or more of these potential conflicts, and the following objective references are provided as support for this lecture:

- 1.
- 2.
- 3.

This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of The American Academy of Sleep Medicine and The Virginia Academy of Sleep Medicine. The American Academy of Sleep Medicine is accredited by the ACCME to provide continuing medical education for physicians.

ACCREDITATION STATEMENT

OBSERVATIONS FROM MLB

MLB- 162 GAMES DURING THE
REGULAR SEASON

SLEEP LOSS IS WIDESPREAD AND
CIRCADIAN DISRUPTION IS
COMMON

INDIVIDUAL ATHLETES STRUGGLE
WITH SLEEP



SCOPE OF THE PROBLEM



Variable practice
times
Variable game times
Grueling schedules
Limited availabilities of
facilities



Work obligations
Family obligation



Jet lag
Travel
Circadian
misalignment
Time of day



HOW DID THE SPORTS LEAGUES DECIDE HOW MANY GAMES TO PLAY IN A SEASON?



- ▶ **Starting 1876 - National league of professional baseball- 8 teams 70 games per season**
- ▶ **1920 -16 teams 6 games per season- 154 games**
- ▶ **1962- 18 games against each rival- 162 games per season**
- ▶ **Minor league baseball- 240 teams affiliated with the mlb clubs**
- **Spring training- Mid Feb to first week of April**
- **Regular season –first Sunday April to first Sunday in Oct**

SCHEDULE DETROIT TIGERS 2016



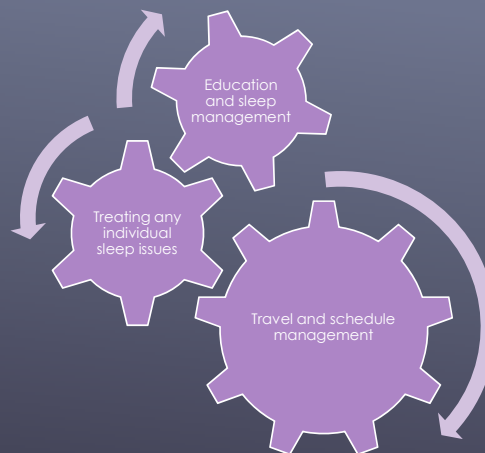
Detroit Tigers 2016 Schedule



Date	Opponent	Time	Date	Opponent	Time	Date	Opponent	Time	Date	Opponent	Time
Apr. 5	at Miami	7:10	May 21	Tampa Bay	4:10	Jul. 5	at Cleveland	7:10	Aug. 23	at Minnesota	8:10
Apr. 6	at Miami	4:55	May 22	Tampa Bay	1:10	Jul. 6	at Cleveland	12:10	Aug. 24	at Minnesota	8:10
Apr. 8	NY Yankees	1:10	May 23	Philadelphia	7:10	Jul. 7	at Toronto	7:07	Aug. 25	at Minnesota	1:10
Apr. 9	NY Yankees	1:10	May 24	Philadelphia	7:10	Jul. 8	at Toronto	7:07	Aug. 26	LA Angels	7:10
Apr. 10	NY Yankees	8:00	May 25	Philadelphia	1:10	Jul. 9	at Toronto	1:07	Aug. 27	LA Angels	7:10
Apr. 11	Pittsburgh	1:10	May 27	at Oakland	10:05	Jul. 10	at Toronto	1:07	Aug. 28	LA Angels	1:10
Apr. 12	Pittsburgh	1:10	May 28	at Oakland	4:05	Jul. 15	Kansas City	7:08	Aug. 29	Chicago Sox	7:10
Apr. 13	at Pittsburgh	7:05	May 29	at Oakland	4:05	Jul. 16	Kansas City	7:10	Aug. 30	Chicago Sox	7:10
Apr. 14	at Pittsburgh	12:35	May 30	at LA Angels	9:05	Jul. 17	Kansas City	1:10	Aug. 31	Chicago Sox	1:10
Apr. 15	at Houston	8:10	May 31	at LA Angels	10:05	Jul. 18	Minnesota	7:08	Sept. 2	at Kansas City	8:15
Apr. 16	at Houston	7:10	Jun. 1	at LA Angels	7:05	Jul. 19	Minnesota	7:10	Sept. 3	at Kansas City	7:15
Apr. 17	at Houston	2:10	Jun. 2	NY Yankees	7:40	Jul. 20	Minnesota	1:10	Sept. 4	at Kansas City	2:15
Apr. 19	at Kansas City	7:15	Jun. 3	Chicago Sox	7:10	Jul. 21	at Chicago Sox	8:10	Sept. 5	at Chicago Sox	4:10
Apr. 20	at Kansas City	7:00	Jun. 4	Chicago Sox	4:10	Jul. 22	at Chicago Sox	8:10	Sept. 6	at Chicago Sox	8:10
Apr. 21	at Kansas City	7:15	Jun. 5	Chicago Sox	1:10	Jul. 23	at Chicago Sox	7:10	Sept. 7	at Chicago Sox	2:10
Apr. 22	Cleveland	7:10	Jun. 6	Toronto	7:10	Jul. 24	at Chicago Sox	2:10	Sept. 9	Baltimore	7:10
Apr. 23	Cleveland	1:10	Jun. 7	Toronto	7:10	Jul. 25	at Boston	7:10	Sept. 10	Baltimore	7:08
Apr. 24	Cleveland	1:10	Jun. 8	Toronto	1:10	Jul. 26	at Boston	7:10	Sept. 11	Baltimore	1:10
Apr. 25	Oakland	7:10	Jun. 10	at NY Yankees	7:05	Jul. 27	at Boston	1:35	Sept. 12	Minnesota	7:10
Apr. 26	Oakland	7:10	Jun. 11	at NY Yankees	7:15	Jul. 29	Houston	7:10	Sept. 13	Minnesota	7:10
Apr. 27	Oakland	7:10	Jun. 12	at NY Yankees	2:05	Jul. 30	Houston	7:10	Sept. 14	Minnesota	7:10
Apr. 28	Oakland	1:10	Jun. 13	at Chicago Sox	8:10	Jul. 31	Houston	1:10	Sept. 15	Minnesota	1:10
Apr. 29	at Minnesota	8:10	Jun. 14	at Chicago Sox	8:10	Aug. 2	Chicago Sox	7:10	Sept. 16	at Cleveland	7:10
Apr. 30	at Minnesota	2:10	Jun. 15	at Chicago Sox	8:10	Aug. 3	Chicago Sox	7:10	Sept. 17	at Cleveland	4:10

Practices
Workouts
Team meetings
Dress for games
Game
Post game press sessions
Off days – medical work ups
Travel immediately after a game
Family consideration

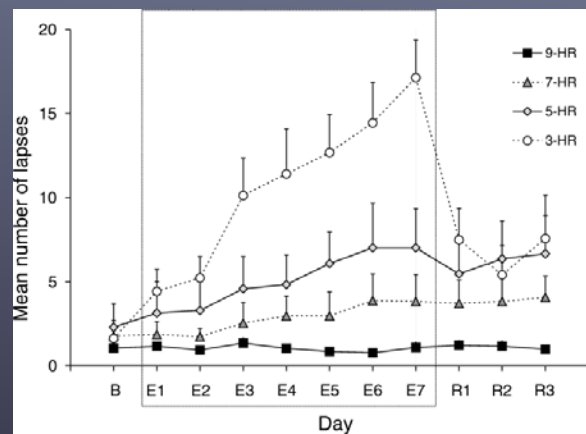
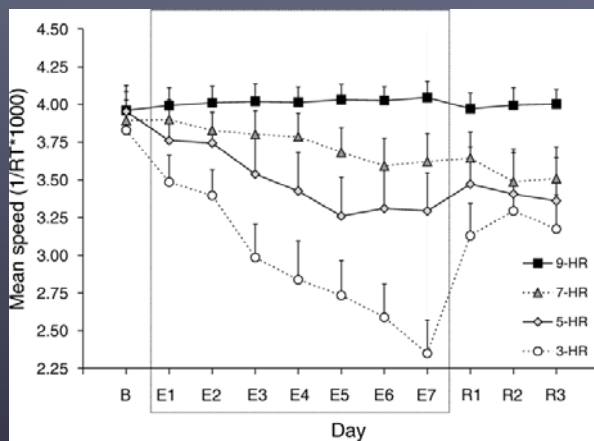
WHAT THIS MEANS FOR THE TEAM MEMBERS



ROLE OF THE SLEEP DOCTOR

► Why sleep is important for the athlete

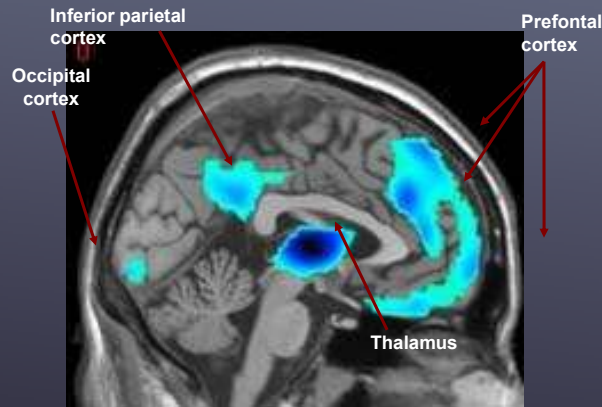
DEFICITS ARE CUMULATIVE AND NON RECOVERABLE



VAN DONGEN 2003

PLAYING THE INTELLIGENT GAME

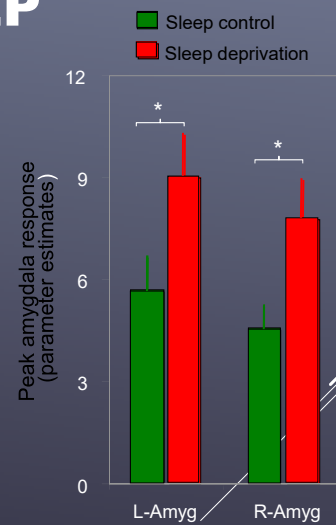
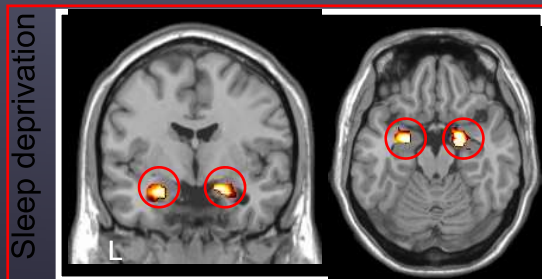
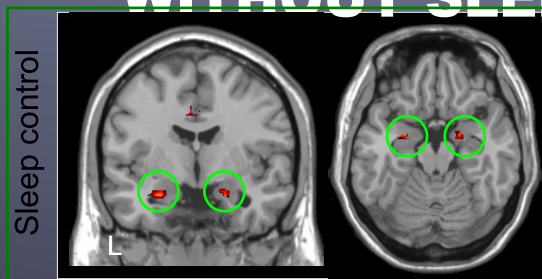
¹⁸FDG PET Study of Healthy, Sleep-Deprived Adults, Showing Decreased Metabolism in the Thalamus, Prefrontal Cortex, and Inferior Parietal Cortex



FDG, fluorodeoxyglucose; PET, positron emission tomography. Thomas M et al. *J Sleep Res.* 2000;9:335.

Buysee 2008

THE EMOTIONAL BRAIN WITHOUT SLEEP



MRI analysis: SPM2, RFX, uncorrected
 $P < 0.001$, > 5 voxel cluster



STRIKE ZONE ASSESSMENT WORSENS OVER BASEBALL SEASON POTENTIALLY DUE TO FATIGUE.

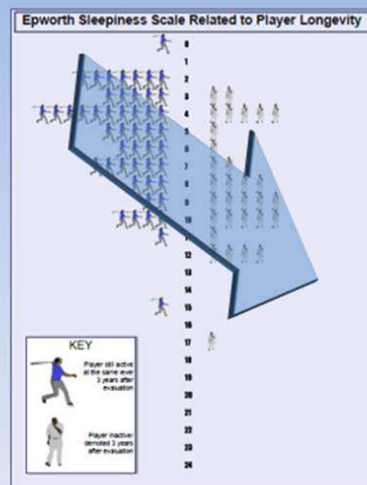
Kutcher S. Sleep 2012 astract supplement.

Sleep and Prediction of Decline

Presented at APSS 2013 in Baltimore, MD

Uses ESS data to predict player longevity at 3 years.

“Profoundly” significant results



Potenziano B, Winter, WC, et. al. Predicting Major League Baseball Player Career Longevity With Sleepiness Data. Sleep 2013 (abstract).

MORE SLEEP = LESS LIKELY TO GET INJURED



SLEEP LOADING IMPROVES VISUAL SEARCH RESPONSE TIME AND REDUCES FATIGUE IN PROFESSIONAL BASEBALL PLAYERS MAH CD, ANGUERA JA , GAZZALEY A, LUKE A

RANDOMIZED CONTROL TRIAL
17 MLB PLAYERS DURING SPRING TRAINING

-faster cognitive processing,
-reduced fatigue,
-decreased daytime sleepiness

SLEEP NEEDS A SEAT AT THE MENTAL HEALTH TABLE

Insomnia is one of the most well-established risk factors for psychiatric disturbance, especially depression . BAGLIONI ET AL 2011

Poor sleep is a reliable risk factor for suicide ideation, suicide attempts, and death by suicide PIGEON ET AL 2017

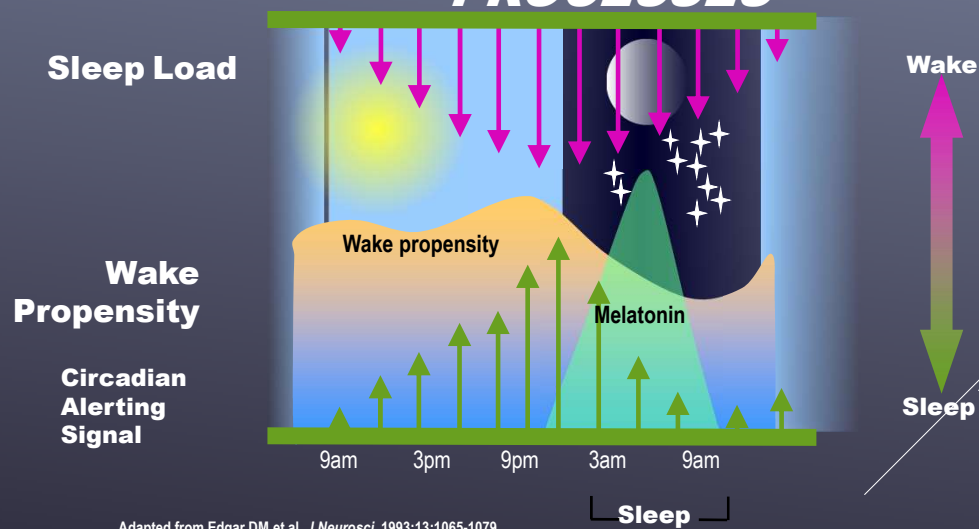
Poor sleep may outperform depressed mood

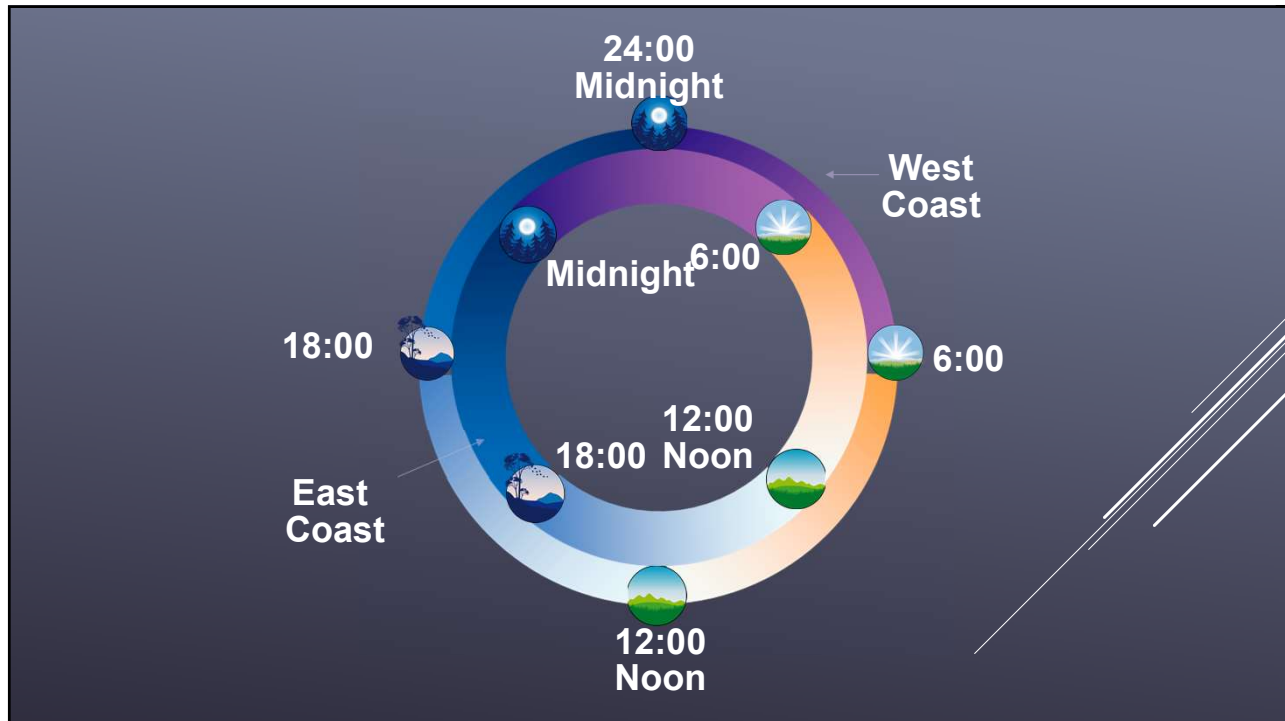
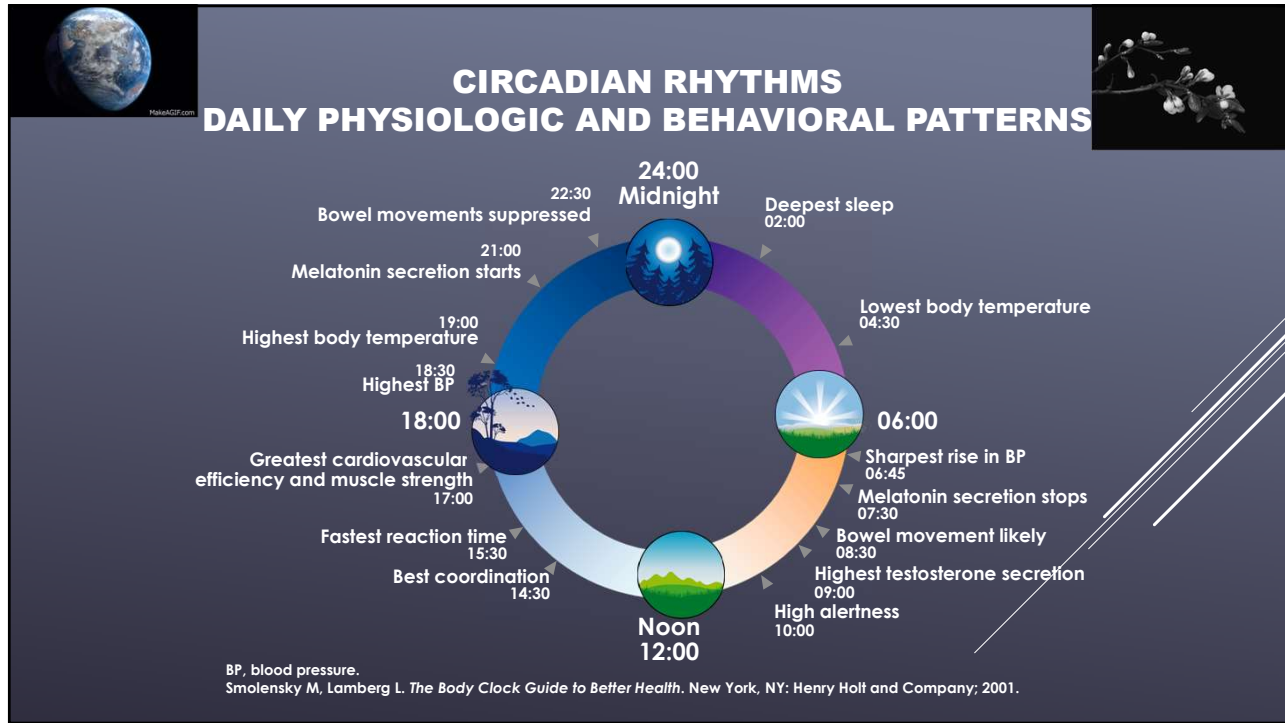
Being awake during the night itself may be a suicide risk factor PERLIS ET AL 2016

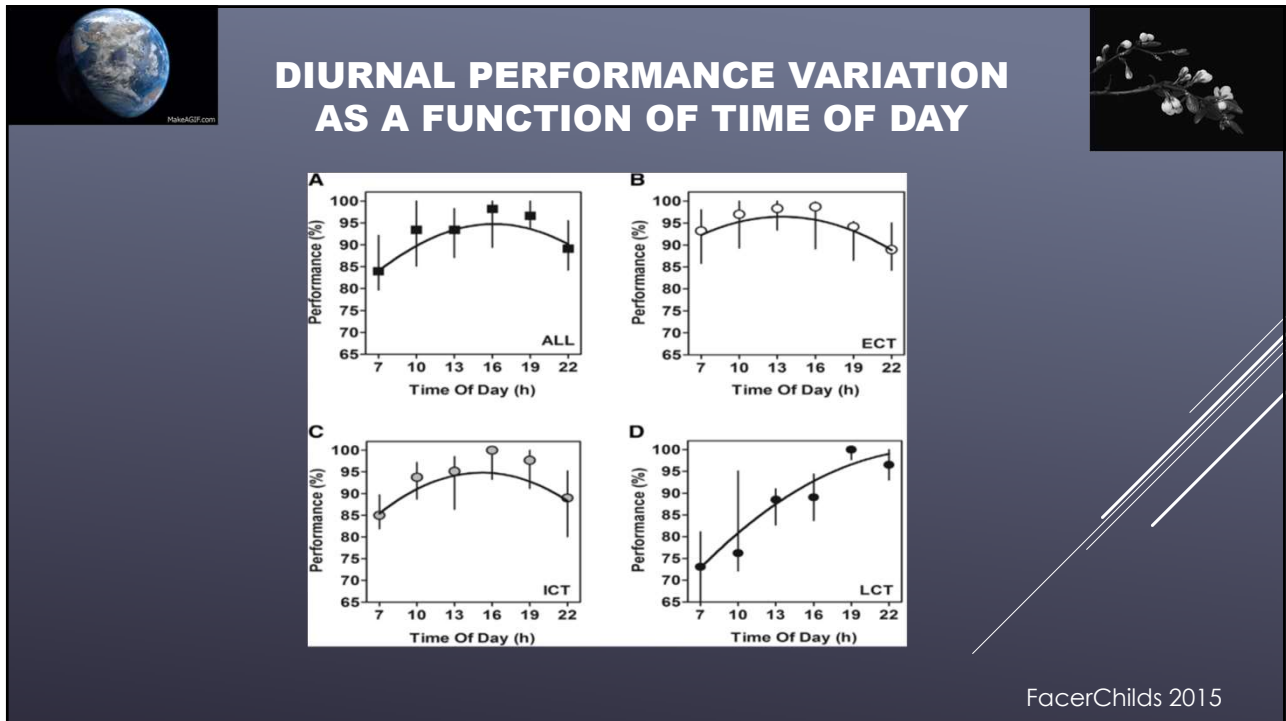
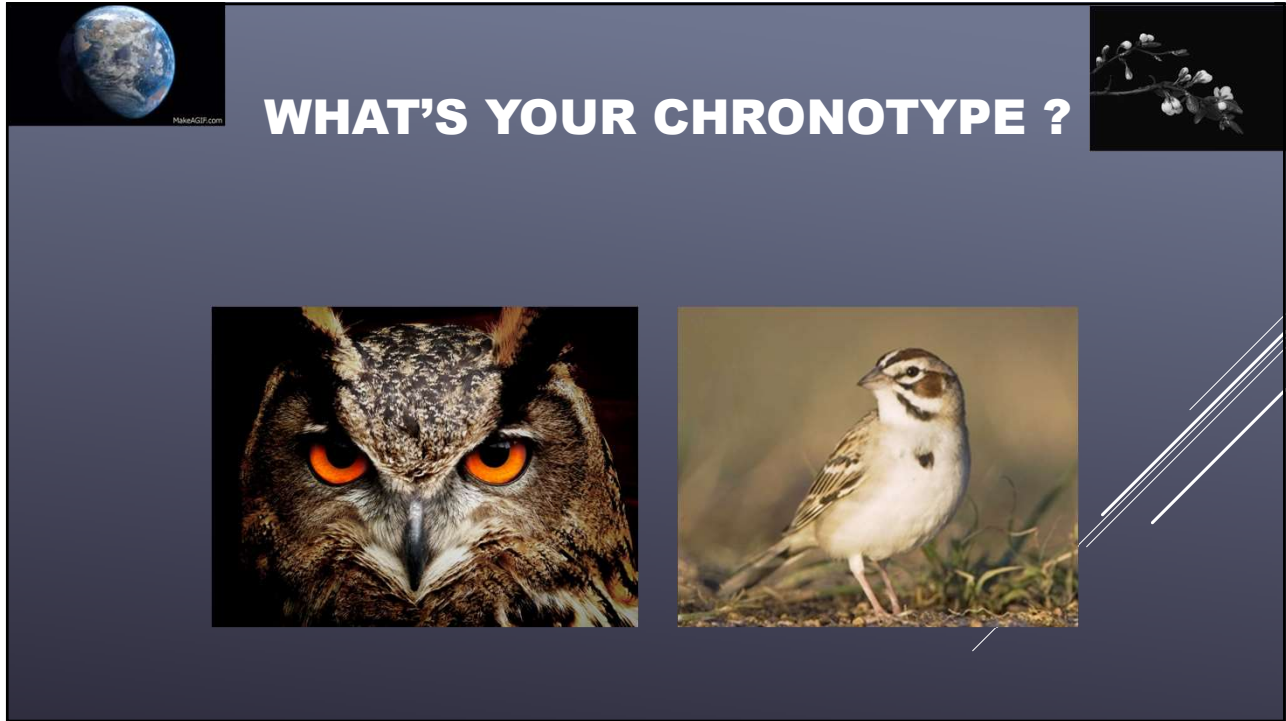
Poor sleep increases discomfort, impairs mood, and reduces the capacity to cope with stressors and increases bodily pain



REGULATION OF SLEEP AND WAKE CIRCADIAN AND HOMEOSTATIC PROCESSES



















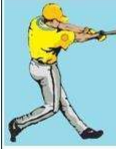







FacerChilds 2015

CHRONOTYPE DATA ADJUSTED

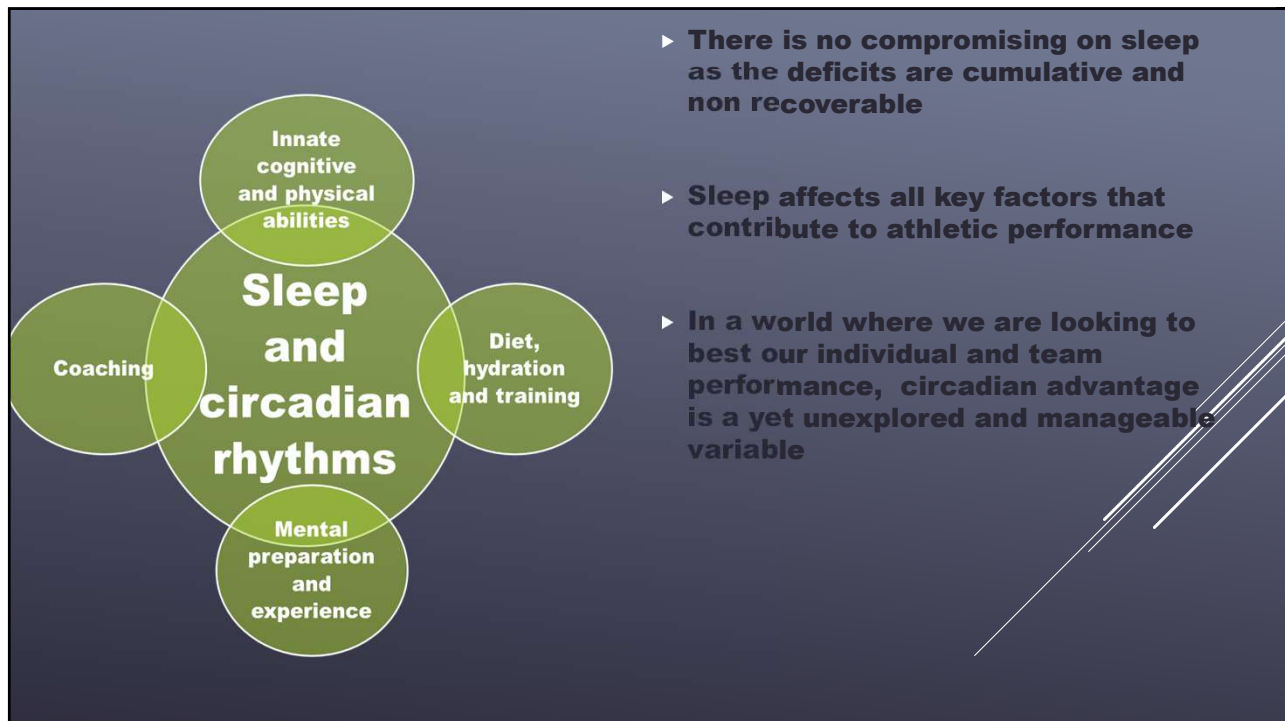
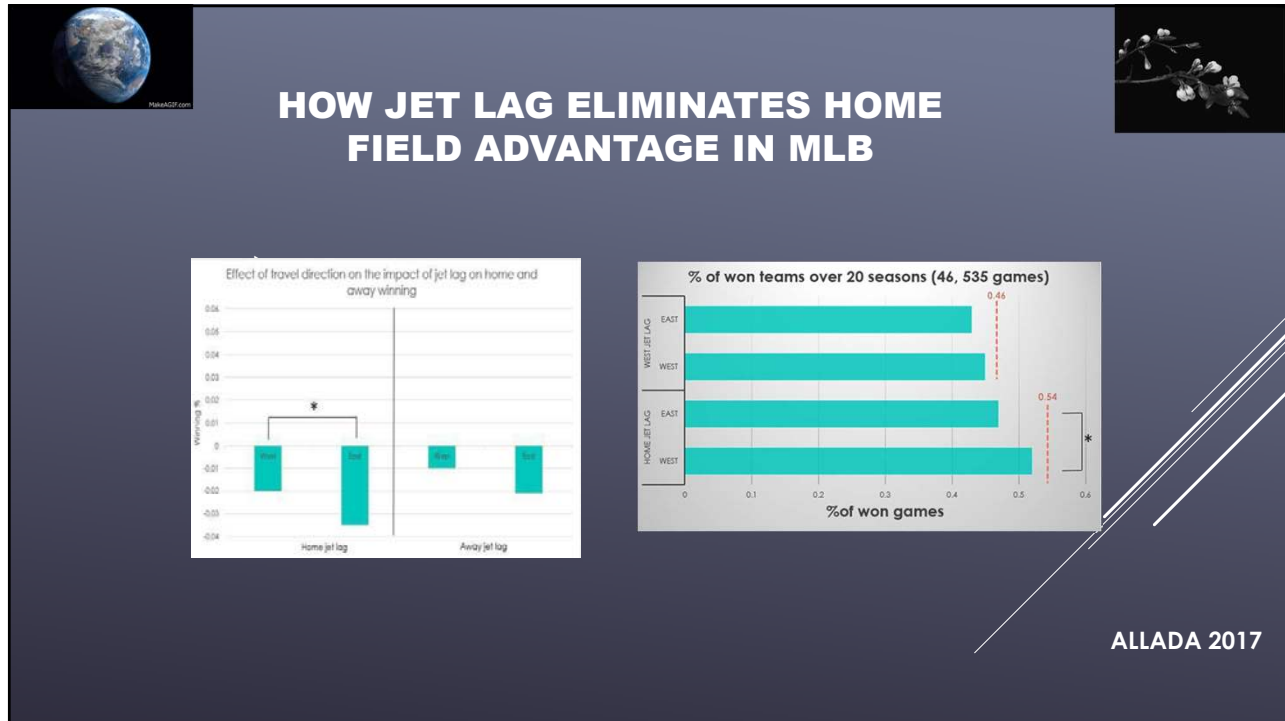
Morningness/Eveningness Pitching ERA by Time of Game		
	Morning-Type (M-Type) (n=10, mMEQ 19-34)	Evening-Type (E-Type) (n=8, mMEQ 9-18)
Early Games (before 19:00) 727.7 innings	  3.29	  4.14
Late Games (19:00 or after) 845.2 innings	  5.15	  4.52

Winter WC, Potenziano BJ, Zhang Z, Green NH, Hammond WR. Chronotype as a Predictor of Performance in Major League Baseball Pitchers. Sleep 2010; 33: 188-9.

CHRONOTYPE DATA ADJUSTED

Morningness/Eveningness Bating Average by Time of Game		
	Morning-Type (M-Type) (n=7, mMEQ 24-33)	Evening-Type (E-Type) (n=9, mMEQ 12-23)
Early Games (before 14:00) 2148 innings	  .267	  .259
Mid Games (before 14:00-19:00) 4650 innings	  .252	  .261
Late Games (20:00 or after) 750 innings	  .252	  .306

Winter WC, Potenziano BJ, Zhang Z, Green NH, Hammond WR. Chronotype as a Predictor of Performance in Major League Baseball Batters. Sleep 2011; 34.



- ▶ Dr Chris Winters
- ▶ Justin Perline Pittsburgh Pirates
- ▶ Manath Mohindra

ACKNOWLEDGEMENTS