FIRSTBEAT
SPORTS

FIRSTBEAT SPORTS:
THE LEADING SPORTS PERFORMANCE MONITORING SYSTEM

- Prevent injuries and overtraining

- Optimize game day performance

- Individualize training load in real time

- Understand players recovery and readiness

- Optimize the performance 24/7

FIRSTBEAT SPORTS KEY FEATURES

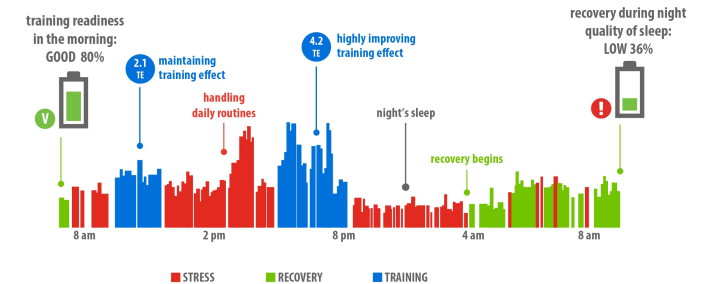**Real time training load monitoring for individualized training**

Coach friendly reporting for better decision making

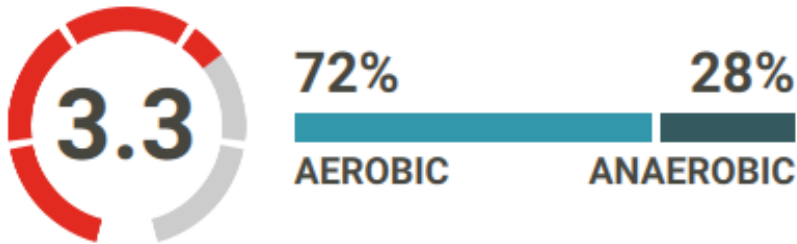**Stress & recovery assessment to optimize performance 24/7**

INFORMED TRAINING DECISIONS THROUGHOUT THE SEASON

Off-season:
Follow players training progress and fitness development remotely.

Preparation season:
Group training and recovery monitoring to identify individual adaptations to training loads.

Regular season:
Ensure players recover from games and are preparing optimally for the next game.

Guide players back to game-ready status safely when injuries do occur.

Final plays:
Keep team performance high throughout the season to enjoy the fruits of hard work & well balanced recovery!

Performance

| Off-Season | Preparation | Regular season | Final plays |

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KEY PERFORMANCE INDICATORS

TRAINING EFFECT

3.3

72% AEROBIC   28% ANAEROBIC

TRAINING LOAD

410 LOW

%HRMAX 68 %

TRIMP TODAY 155

RECOVERY STATUS

76 % GOOD

7 DAYS AVERAGE 47%

GOOD RECOVERY TODAY

Training Effect, TE (1.0-5.0)
- See the physiological impact of the session?
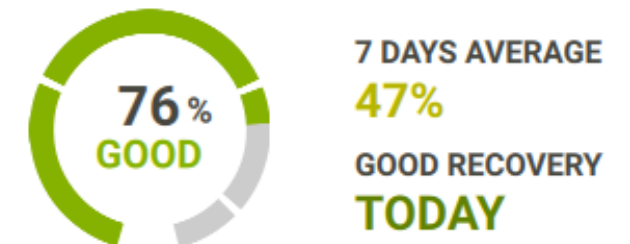- To what extent were aerobic and anaerobic energy systems impacted?

Training Impulse, TRIMP
- Single session TRIMP
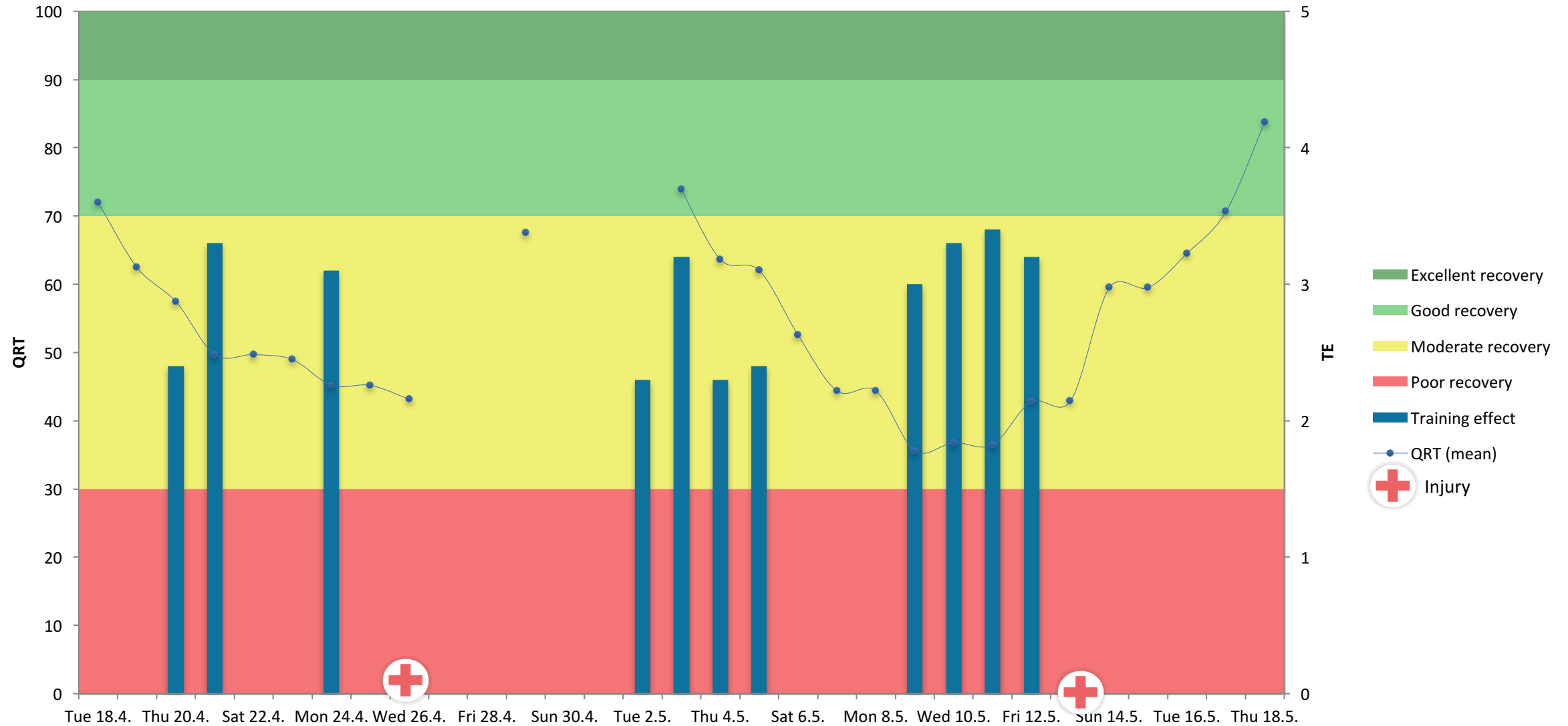- TRIMP for each drill/lap of the session
- Weekly Training load (7d TRIMP sum)

RECOVERY (0-100%)
- Daily score
- 7-day average
- Days since the last good recovery (>70%)

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IDENTIFY INDIVIDUAL TRAINING RESPONSES AT A GLANCE
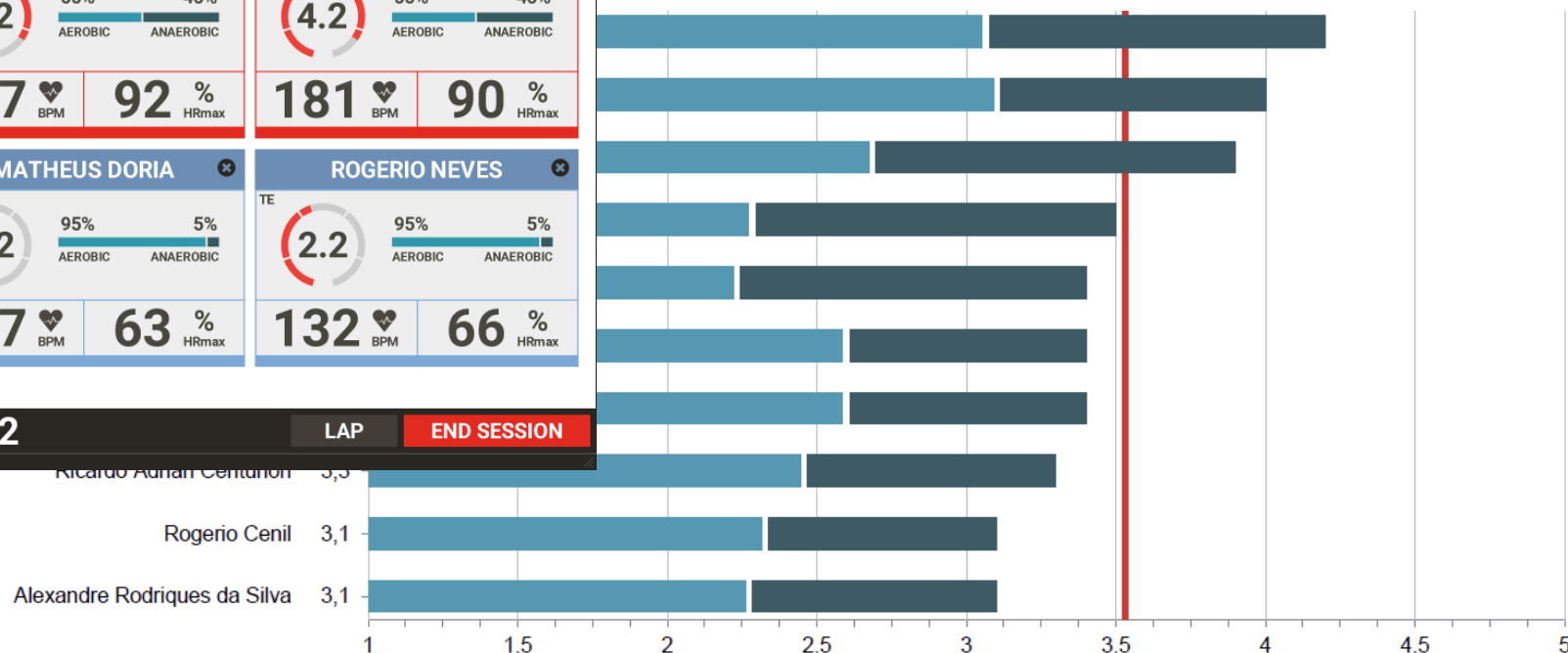
TRAINING EFFECT SUMMARISED

Intensity: %VO2max	EPOC modeling	Aerobic load
High-intensity interval detection	Anaerobic work modeling	Anaerobic load

TRAINING EFFECT

3.4

55% AEROBIC   45% ANAEROBIC

Training Effect Distribution
= The degree to which training adaptations will support aerobic vs anaerobic performance

≠ **Distribution of energy provided by aerobic vs anaerobic systems during the session**
≠ **Distribution of heart rate zones during the session (i.e., time spent in Anaerobic zone)**

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"We want to answer questions beyond how a player is doing today, but how they will be doing in two weeks. Load quantification is a big part of this future.

Because Firstbeat Sports provides feedback in real-time the team's coaches and sport scientists can respond immediately to problem situations."

- Stuart Graham, Head of Sports Science, Port Adelaide FC

EXAMPLE TRAINING WEEK IN SOCCER

	Easy training	Rest day	Moderate training	High intensity training	Game – 2d	Game -1d	Game
Total distance	951	0	6250	5890	4499	3142	12000
Mod. Intensity running	33	0	883	816	447	352	2000
High intensity running	0	0	210	51	40.1	21	500
Accelerations	4	0	94	154	30	41	200
Deccelerations	3	0	97	163	38	45	180
Training Effect	1.2	0	3	4.2	2.1	2.2	5
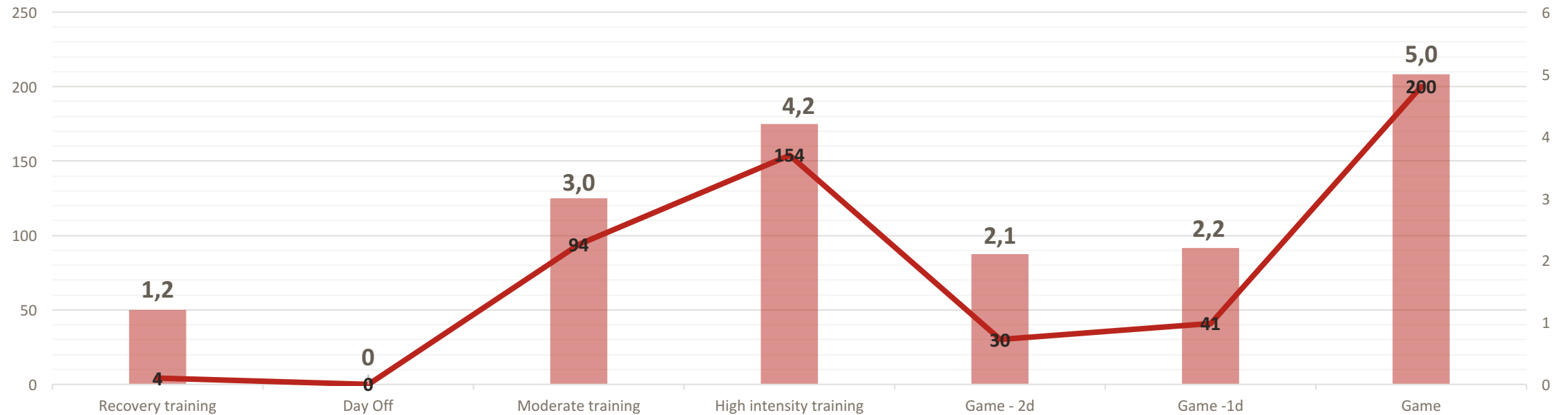
Data received from the professional soccer club using both Firstbeat and GPS tracking system simultaneously

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"*If the players can take home a little bit of how hard you have to train, how much attention to detail you have to pay, I think it is a benefit to us and to them.*"

- Jeff Blashill, Head Coach, Detroit Red Wings

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INTERNAL VS. EXTERNAL TRAINING LOAD

A)

TE vs Player load

$R^2 = 0.6535$
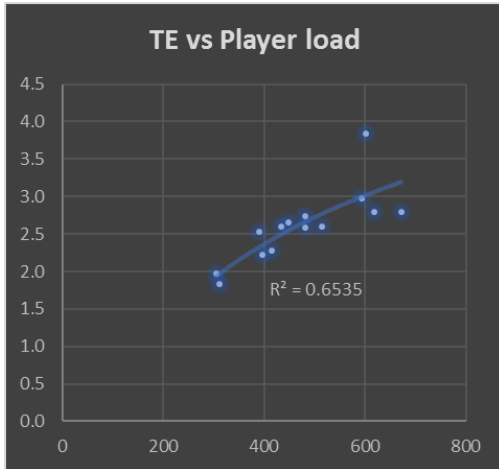
Combining external and internal training load data allows coaches to examine **dose – response** relationships. **Training Effect (TE)** captures how an athlete's body responds to training prescriptions and reports that response the form of a single, easily interpreted number.

A) Team average player loads and TE scores from a typical week
B) Total distance and TE scores from a single session (Game -3)
C) High-intensity distance and TE from a single session (Game -3)

B)

Training Effect vs. Total distance

RESPONSE (TE)
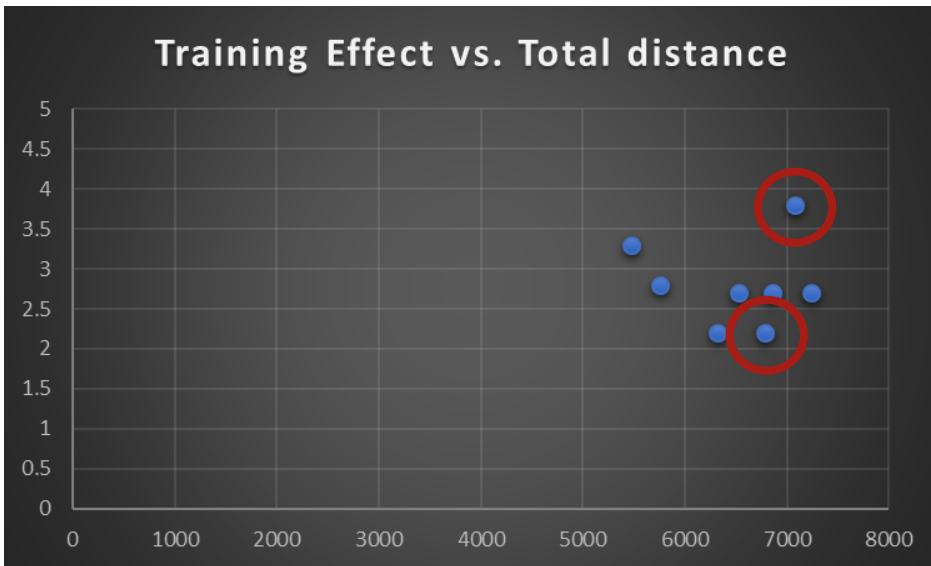
DOSE (Total distance in meters)

Training Effect vs. High intensity distance

DOSE (High intensity distance in meters
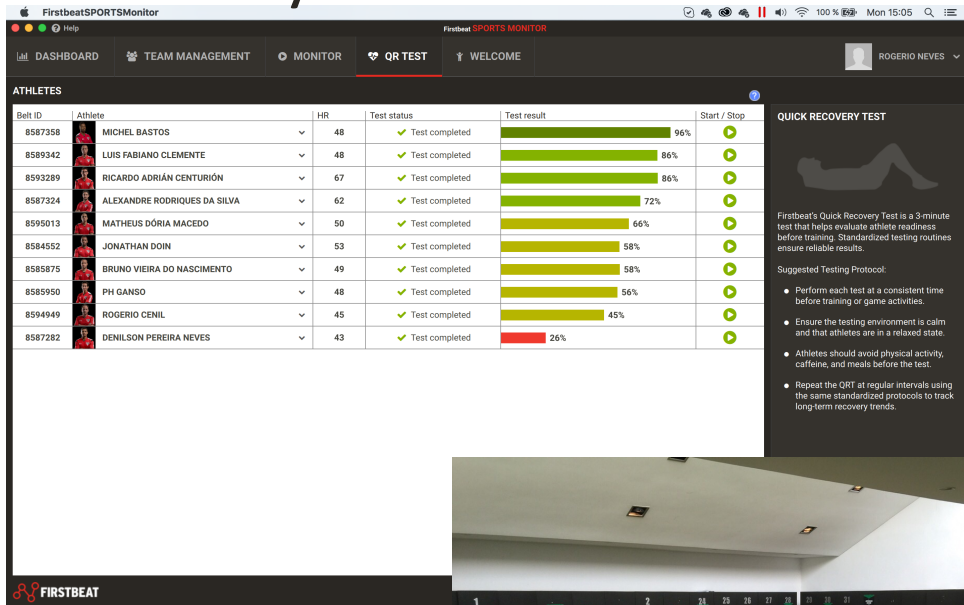
FIRSTBEAT

RECOVERY MONITORING

QUICK RECOVERY TEST

Assess your entire team's recovery levels in 3 minutes - Onsite or remotely!

QRT: RECOVERY CALCULATIONS

- **Data filtering:** The test will start when the HR has settled down. Artifact correction is used, and the best 1min sample is utilized to calculate the recovery score. This procedure clearly decreases the bias compared to 1min test without any filters.

- **Innovative algorithms:** We utilize both HRV (modified RMSSD) and HR data to calculate the QRT Score. This provides inputs from both ANS branches, is more sensitive than HR alone, and brings more stability compared to HRV alone.

- **Intelligent scaling:** Recovery scores are based on standard deviation of each individual athlete as some are more reactive than the others. Creating the unique scaling requires five (5) measurements and scaling is constantly updated based on the most recently recorded data. (Single biased scores do not ruin the scale).

- **Easy to interpret:** Each recovery score is compared to the athletes 7-day rolling average and warning signals in case of accumulated fatigue state.

- **Easy to perform:** No extra hassle for athletes, just relax for 3 minutes. Instant feedback motivates athletes to repeat the test as a part of morning and/or pre-training routines.

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"*It is really about trying to be as individualized as possible and working out what's best for each player.*

How a player was doing on this Monday compared to a normal Monday? Are they up or down? Are they recovering effectively?"
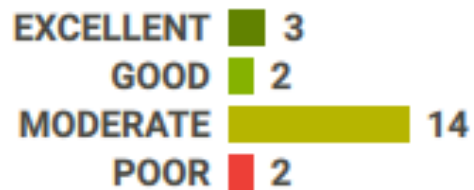
- **Lachlan Penfold**, Head of Physical Performance and Sports Medicine, Golden State Warriors
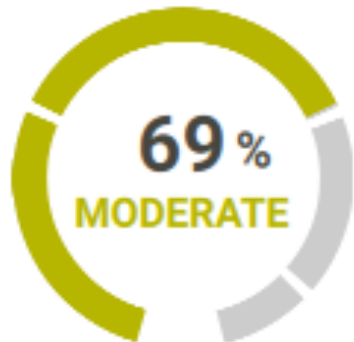
QRT TEST INTERPRETATION

TEAM OVERVIEW

54 % MODERATE

ATHLETE DISTRIBUTION

EXCELLENT ■ 3
GOOD ■ 2
MODERATE ■ 14
POOR ■ 2
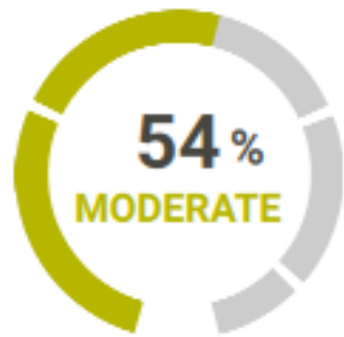
- Quick overview of team status can be used to identify players with POOR and MODERATE recovery levels and allows for intervention when needed.

INDIVIDUAL PLAYER OVERVIEW
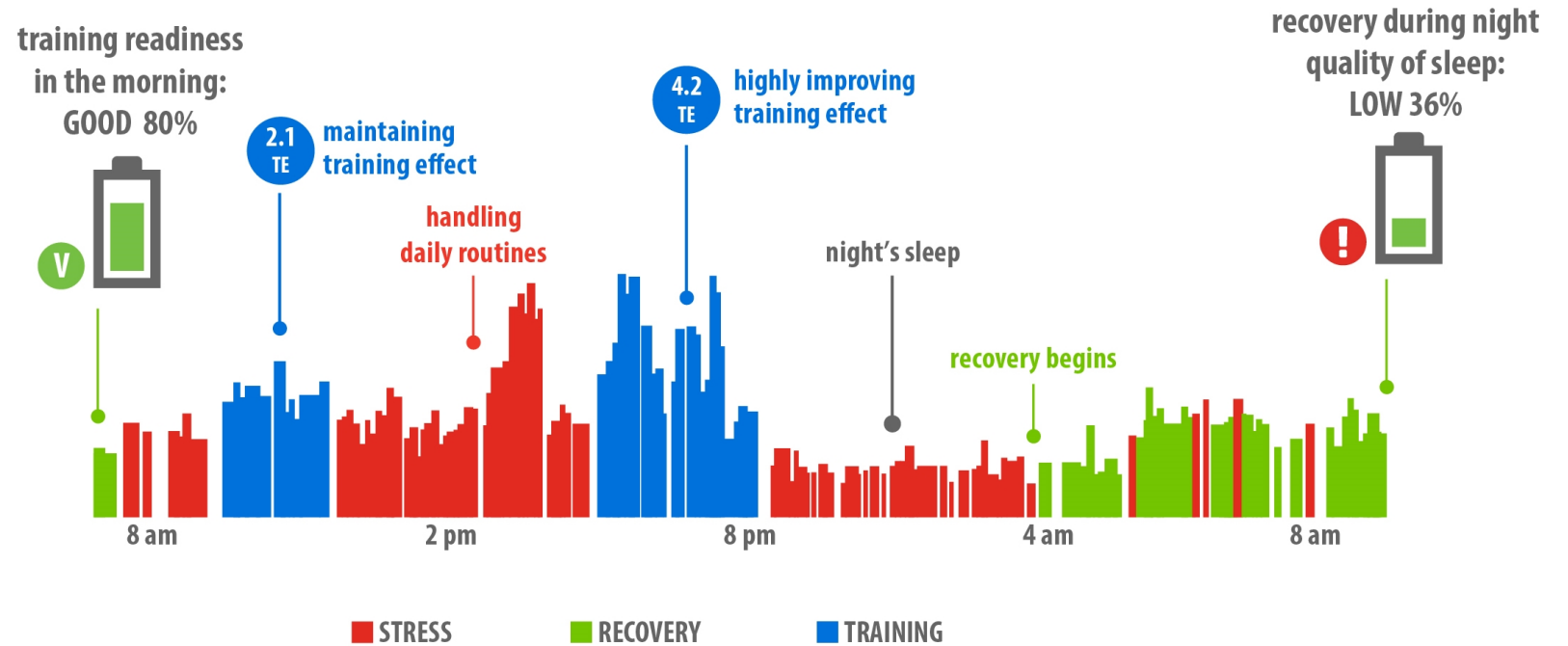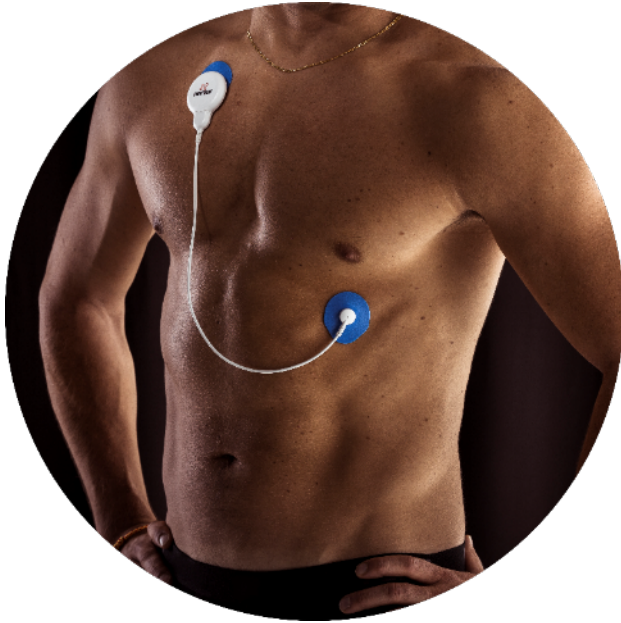
69 % MODERATE

7 DAYS AVERAGE
67%

GOOD RECOVERY
3 DAYS AGO

- Compare daily score to 7-day rolling avg to identify trends
- Days since the last good recovery: monitor fatigue accumulation
  - o 7 DAYS = Good
  - o 8-14 days = Heads up
  - o >14 days ago = Action Needed

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ATHLETES TRAIN UP TO 25 HOURS PER WEEK

How do the remaining 143 hours affect the body?

training readiness in the morning: GOOD 80%

2.1 TE maintaining training effect

handling daily routines

4.2 TE highly improving training effect

night's sleep

recovery begins

recovery during night quality of sleep: LOW 36%

V

8 am   2 pm   8 pm   4 am   8 am

■ STRESS   ■ RECOVERY   ■ TRAINING

| SLEEP | TRAVEL | MASSAGE | FAMILY | ICE BATH | MEDIA | ALCOHOL |

FIRSTBEAT

FIRSTBEAT TECHNOLOGIES LTD.

Firstbeat Technologies was founded in 2002 with a background of state-of-the-art research in physiology, mathematical modeling and behavioral research.

SPORTS

700+ professional teams and performance centers

WELL-BEING

100.000+
individual organizations

CONSUMER PRODUCTS

Leading
technology brands

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