Firstbeat Sports Practical Applications

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PIVOT SPORTS

20 May 2019

DETROIT RED WINGS SKATE TEST – CAN HELP TO ANSWER:

What kind of athletes are you working with?

- Skate Test Protocol = 4 bouts of 3x down and back, hash mark (face off circle) to blue line with 2 minutes between bouts.

- First player must be under 45 seconds and last player must be under 51 seconds or everyone does a 5th repetition.

(Red Zone = **95% / 98% Max for skate test** –
we want to see who can go to near max or max HR)

FIRSTBEAT

DRW SKATE TEST:
WHAT CAN YOU TELL FROM THE SHAPE OF THE HR CURVE?

1. Intensity and effort
    1. Near max HR or max peaks, are peaks consistent or varied
2. HR Recovery – how quickly HR comes down at rest
3. Fitness Level (Inference) based on shape of curve- peaks and valleys
4. Ability to repeat intense effort – repeat sprintability (Anaerobic TE)
    1. *Repeat the peak*
5. Repeat HR recovery
    1. Fit or unfit – Anaerobic %
6. Fitness Improvement (for same session over time)
    1. Later we see with Princeton Rowing example
7. Player Tendencies, Player Profile = understanding player habits and incorporating better training programming

MIKE KADAR, DETROIT RED WINGS STRENGTH & CONDITIONING COACH

There are a number of factors I want to look at:

1. Are they trying to ***figure a way to pace*** themselves to get a competitive score through the four bouts or are they ***blowing it out and giving their max effort regardless of their score***? ***I'd rather work with the second guy knowing his scores (times) could be drastically different from rep 1 to rep 4.***
    - Sports Scientist: We have to figure out (along side skate test performance) what each one of these HR intensity curves will look like for the different kinds of efforts and player profiles.
    - Let's see if you can determine this for yourselves in next slides (pop quiz).
2. **Mike Kadar**: I'm looking for peak intensity and HR…
3. And 1 and 2 min heart rate recovery. How quickly can they recover and go again over 4-5 reps.

FIRSTBEAT

DETROIT RED WINGS SKATE TEST - HR RECOVERY

Detroit Red Wings Development Camp, Day 5

Speed Endurance Skate Test, Heart Rate Recovery

	Skate Test Peak Heart Rate (3rd. Rep.)	1-min Recovery HR (bpm)	2-min Recovery HR (bpm)	1-min, Recovered to, %:	2-min, Recovered to, %
M	188	162	133	86%	71%
S	186	152	137	82%	74%
C	196	177	145	90%	74%
W	188	170	140	90%	74%
E	192	172	143	90%	74%
F	197	169	152	86%	77%
R	187	172	145	92%	78%
S	184	166	143	90%	78%
E	182	163	142	90%	78%
J	182	159	143	87%	79%
V	183	159	145	87%	79%
P	184	164	146	89%	79%
D	189	163	150	86%	79%
S	176	154	140	88%	80%
L	185	164	148	89%	80%
S	186	169	150	91%	81%
J	180	159	146	88%	81%
C	177	161	144	91%	81%
L	199	184	162	92%	81%
K	178	161	145	90%	81%

Detroit Red Wings Development Camp, Day 5

Speed Endurance Skate Test, Heart Rate Recovery

	Skate Test Peak Heart Rate (3rd. Rep.)	1-min Recovery HR (bpm)	2-min Recovery HR (bpm)	1-min, Recovered to, %:	2-min, Recovered to, %
M	197	179	162	91%	82%
G	178	161	147	90%	83%
Fl	188	165	156	88%	83%
M	180	162	150	90%	83%
G	196	181	164	92%	84%
P	184	161	154	88%	84%
K	179	164	150	92%	84%
G	187	175	158	94%	84%
M	188	172	159	91%	85%
S	188	168	160	89%	85%
P	193	180	165	93%	85%
S	193	178	166	92%	86%
H	186	169	160	91%	86%
E	187	174	161	93%	86%
P	182	166	157	91%	86%
H	193	177	168	92%	87%
A	193	177	169	92%	88%
Fl	179	163	157	91%	88%
S	199	188	176	94%	88%
T	187	168	152	90%	81%

FIRSTBEAT

DETROIT RED WINGS SKATE TEST – ASSESSING FITNESS AND PLAYER PROFILES

5 Player Archetypes (a very typical example of a certain type of athlete.
Some players show tendencies of two archetypes):

1. **Repeater** – High first peak – balanced peaks (***repeat the peak***), HARD WORKING & FIT (with good valleys)
    1. If valleys look good too = good fitness level
2. **Pacer** – lower first/ second peaks (relatively) to get a competitive score, if fit (low valleys repeat)
    1. ***Must separate or understand efficient skaters***
3. **Gutter** – High early peak, works hard, (with descending peaks) = fatigued
4. **Sporadic** – Unfocused (varied peaks)
5. **Blender** – Confusion, poor recovery/ low valleys, unfit
    1. Anaerobically % is low

FIRSTBEAT

YOU TELL ME ARCHETYPE? HINT #1:

Diff. in HR peak from reps 1-3 to 4 and last (6 bpm) and look at 5th?

Measurement start time:
Mon 17 Sep 2018 10:22

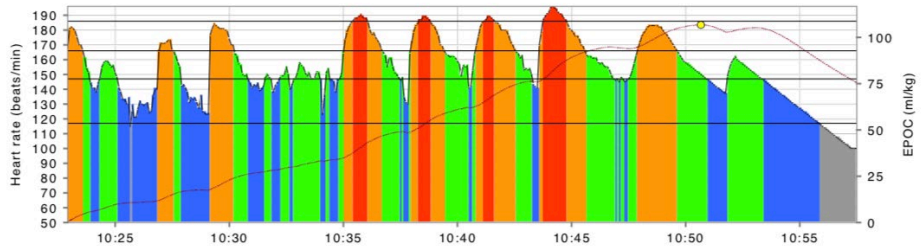
TRAINING REPORT

Age	24
Height (in)	6' 2"
Weight (lb)	180
Resting HR	50
Maximum HR	196
Activity Class	8.5

Exercise summary:

TRAINING TYPE	**Skate Test**	NOTES: -
TRAINING EFFECT	**3.3**	
TRIMP	**70**	
DURATION	**00:34:40** (hh:mm:ss)	
HR low/avg./high	**115/161/196** bpm	
CALORIES	**509** kcal	
carbs / fats	**374/134** kcal	

TRAINING CHART



Peak	8 %	00:02:40
Anaerobic/ Interval	25 %	00:08:38
Aerobic Power	35 %	00:12:10
Aerobic Base	27 %	00:09:30
Recovery	5 %	00:01:42

TRAINING EFFECT

59 % AEROBIC — 41 % ANAEROBIC

IMPROVING

This workout improved mainly your aerobic fitness but had a moderate impact also on your anaerobic fitness.

In this context, anaerobic fitness means your abilities to perform repeated short-term maximal work and aerobic fitness means to perform prolonged submaximal work.

Measurement start time:
Mon 17 Sep 2018 10:22

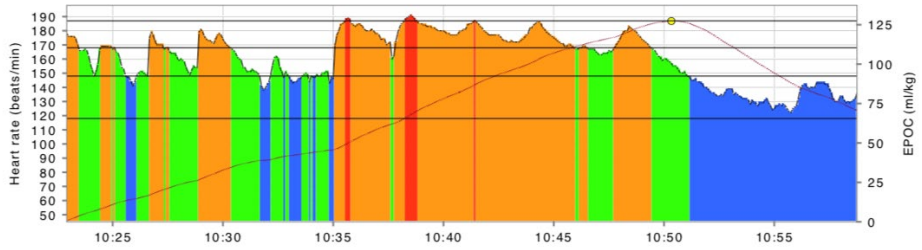
TRAINING REPORT

ge	20
eight (in)	6' 0"
eight (lb)	185
esting HR	45
laximum HR	198
ctivity Class	8.5

Exercise summary:

TRAINING TYPE	**Skate Test**	NOTES: -
TRAINING EFFECT	**3.5**	
TRIMP	**79**	
DURATION	**00:35:55** (hh:mm:ss)	
HR low/avg./high	**122/161/191** bpm	
CALORIES	**547** kcal	
carbs / fats	**388/159** kcal	

RAINING CHART



Peak	4 %	00:01:30
Anaerobic/ Interval	42 %	00:14:56
Aerobic Power	27 %	00:09:50
Aerobic Base	27 %	00:09:41
Recovery	0 %	00:00:00

RAINING EFFECT

71 % AEROBIC — 29 % ANAEROBIC

IMPROVING

This workout improved your aerobic fitness and also had a mild impact on your anaerobic fitness.

In this context, anaerobic fitness means your abilities to perform repeated short-term maximal work and aerobic fitness means to perform prolonged submaximal work.

FIRSTBEAT

ANSWERS:

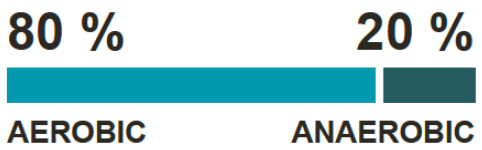
#1 – **PACER/ SPORADIC**

- Pop quiz: Veteran or Rookie?
- Do you like anything about this trace?
- Fatigued?
- Performed well?

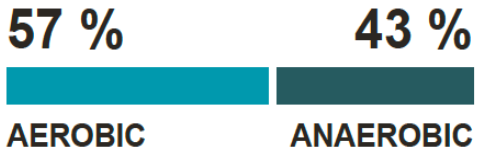
#2 – **GUTTER / BLENDER**

- Look at Anaerobic % = 29% (low)
- Fatigued?
- Could improve fitness and ability to do anaerobic work.
  - Mike can see where he is deficient (and help through proper training) because of big effort
- Do you think this is veteran or rookie?
- Do you think he did well in terms of performance?

HOW THE ANAEROBIC TRAINING EFFECT APPLIES TO DRW SKATE TEST INTERPRETATION



In high intensity interval type training, low Anaerobic TE is related to poor heart rate recovery, over fatiqued and lowered power output.



High Training Effect combined with high distribution of Anaerobic TE is related to good repeated sprinting ability: Peak effort is reached in sprints and recovery is good between sprints.

Training Effect distribution can be monitored in real time and used to optimize the work:rest ratio of the workout for each player to reach the desired training effects.

FIRSTBEAT

TWO MORE PLAYER ARCHETYPES (RED WINGS SKATE TEST), YOU TELL ME WHICH TYPE:

Measurement start time:
Mon 17 Sep 2018 10:22

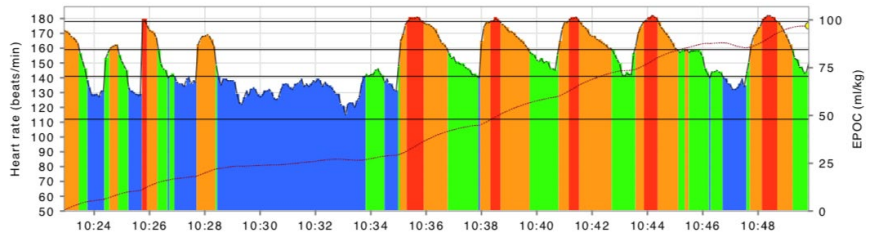
TRAINING REPORT

Age	18
Height (in)	6' 0"
Weight (lb)	196
Resting HR	50
Maximum HR	188
Activity Class	8.5

Exercise summary:

TRAINING TYPE	**Skate Test**	NOTES: -
TRAINING EFFECT	**3.2**	
TRIMP	**57**	
DURATION	**00:27:00** (hh:mm:ss)	
HR low/avg./high	**115/153/182** bpm	
CALORIES	**464** kcal	
carbs / fats	**324/140** kcal	

TRAINING CHART



Peak	10 %	00:02:40
Anaerobic/ Interval	30 %	00:08:06
Aerobic Power	27 %	00:07:25
Aerobic Base	33 %	00:08:51
Recovery	0 %	00:00:00

TRAINING EFFECT

58 % AEROBIC — 42 % ANAEROBIC

IMPROVING

This workout improved mainly your aerobic fitness but had a moderate impact also on your anaerobic fitness.

In this context, anaerobic fitness means your abilities to perform repeated short-term maximal work and aerobic fitness means to perform prolonged submaximal work.

Measurement start time:
Mon 17 Sep 2018 11:42

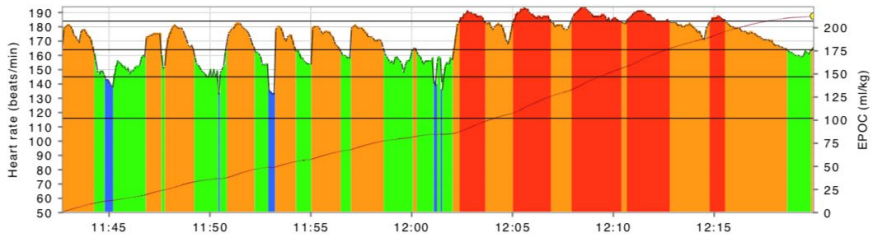
TRAINING REPORT

Age	25
Height (in)	6' 1"
Weight (lb)	205
Resting HR	50
Maximum HR	194
Activity Class	8.5

Exercise summary:

TRAINING TYPE	**-**	NOTES: -
TRAINING EFFECT	**4.5**	
TRIMP	**106**	
DURATION	**00:37:20** (hh:mm:ss)	
HR low/avg./high	**133/172/194** bpm	
CALORIES	**723** kcal	
carbs / fats	**550/173** kcal	

TRAINING CHART



Peak	23 %	00:08:20
Anaerobic/ Interval	47 %	00:17:36
Aerobic Power	27 %	00:10:05
Aerobic Base	3 %	00:01:05
Recovery	0 %	00:00:00

TRAINING EFFECT

73 % AEROBIC — 27 % ANAEROBIC

HIGHLY IMPROVING

This workout sharply improved your aerobic fitness and had mild impact also on your anaerobic fitness.

In this context, anaerobic fitness means your abilities to perform repeated short-term maximal work and aerobic fitness means to perform prolonged submaximal work.

FIRSTBEAT

ANSWERS:

#3 – **REPEATER**

- Veteran or Rookie?
- What do you like or not like?
- Detroit Red Wing or Grand Rapids Griffin (AHL Affiliate)?

#4 – **BLENDER**

- Anaerobic % = 27% (low)
- Look at the TE, VERY HIGH 4.5
- Needs to improve fitness and ability to do anaerobic work.
  - Could also be very Aerobic and can handle this kind of sustained effort
- Detroit Red Wing or Grand Rapids Griffin (AHL Affiliate)?

AND…TWO MORE PLAYER ARCHETYPES (RED WINGS SKATE TEST), YOU TELL ME WHICH TYPE:

Measurement start time:
Mon 17 Sep 2018 11:42

TRAINING REPORT

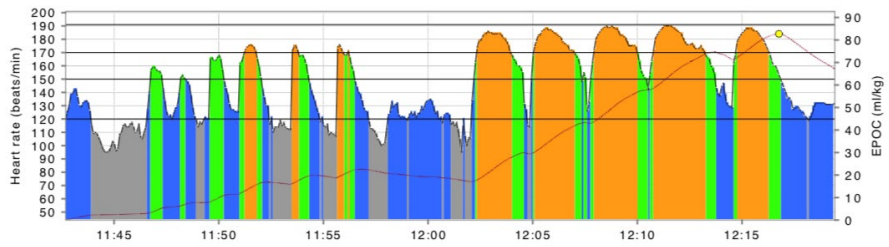
Age	26
Height (in)	6' 5"
Weight (lb)	220
Resting HR	44
Maximum HR	201
Activity Class	8.5

Exercise summary:

TRAINING TYPE	-
TRAINING EFFECT	**3.0**
TRIMP	**63**
DURATION	**00:36:50** (hh:mm:ss)
HR low/avg./high	**95/147/190** bpm
CALORIES	**539** kcal
carbs / fats	**357/182** kcal

NOTES: -

TRAINING CHART



Peak	2 %	00:00:35
Anaerobic/ Interval	28 %	00:10:30
Aerobic Power	17 %	00:06:15
Aerobic Base	34 %	00:12:26
Recovery	19 %	00:07:05

TRAINING EFFECT

53 % AEROBIC — 47 % ANAEROBIC

IMPROVING

This workout improved mainly your aerobic fitness but had a moderate impact also on your anaerobic fitness.

In this context, anaerobic fitness means your abilities to perform repeated short-term maximal work and aerobic fitness means to perform prolonged submaximal work.

Measurement start time:
Mon 17 Sep 2018 11:42

TRAINING REPORT

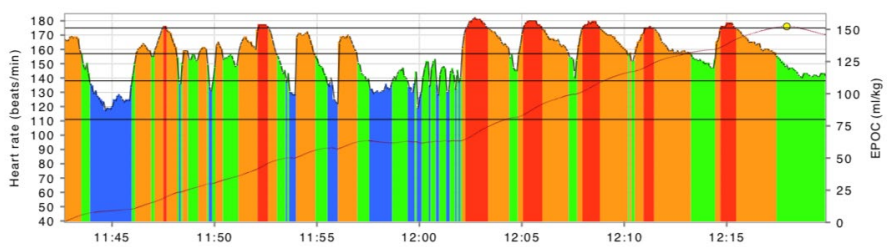
Age	31
Height (in)	6' 2"
Weight (lb)	218
Resting HR	39
Maximum HR	185
Activity Class	8.5

Exercise summary:

TRAINING TYPE	-
TRAINING EFFECT	**3.8**
TRIMP	**93**
DURATION	**00:37:15** (hh:mm:ss)
HR low/avg./high	**117/156/182** bpm
CALORIES	**666** kcal
carbs / fats	**478/188** kcal

NOTES: -

TRAINING CHART



Peak	13 %	00:04:50
Anaerobic/ Interval	42 %	00:15:36
Aerobic Power	30 %	00:11:20
Aerobic Base	15 %	00:05:30
Recovery	0 %	00:00:00

TRAINING EFFECT

60 % AEROBIC — 40 % ANAEROBIC

IMPROVING

This workout improved mainly your aerobic fitness but had a moderate impact also on your anaerobic fitness.

In this context, anaerobic fitness means your abilities to perform repeated short-term maximal work and aerobic fitness means to perform prolonged submaximal work.

FIRSTBEAT

ANSWERS:

#5 – **PACER**

- What do you like or not sure about?
- Fatigued? Fit?
- There's no RED! Hmmm

#6 – **GUTTER/ (WOULD BE REPEATER)**

- What do you like or not sure about?
- Fatigued? Fit?
- Do well on Skate Test?

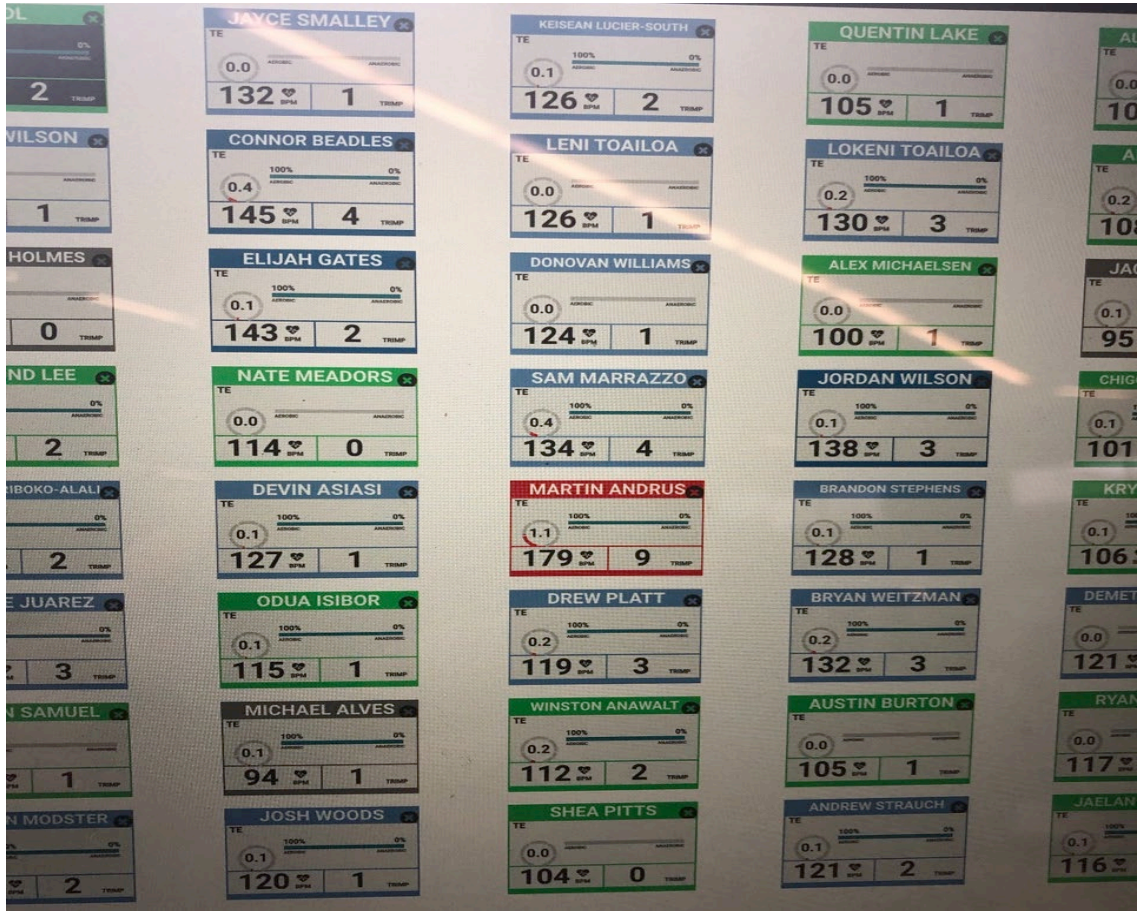
FIRSTBEAT

DETROIT RED WINGS SKATE TEST, WHY IS IDENTIFYING ATHLETE PROFILES IMPORTANT:

- 1/12 (top 12 points getters) below 40% anaerobic.
- Of the top 6 point-getters on both GRG and DRW only 1 was **Blender** and 1 **Pacer** the rest were **Repeaters** or **Gutters**
- 11/ 12 showed **> than 40% Anaerobic** except the one athlete who was **Blender**
- The 12 lowest point-getters of DRW and GRG points list they all had **> than 60% Aerobic**
- Remember: Skating Efficiency and Skill has a lot to do with player tendencies and player profiles too

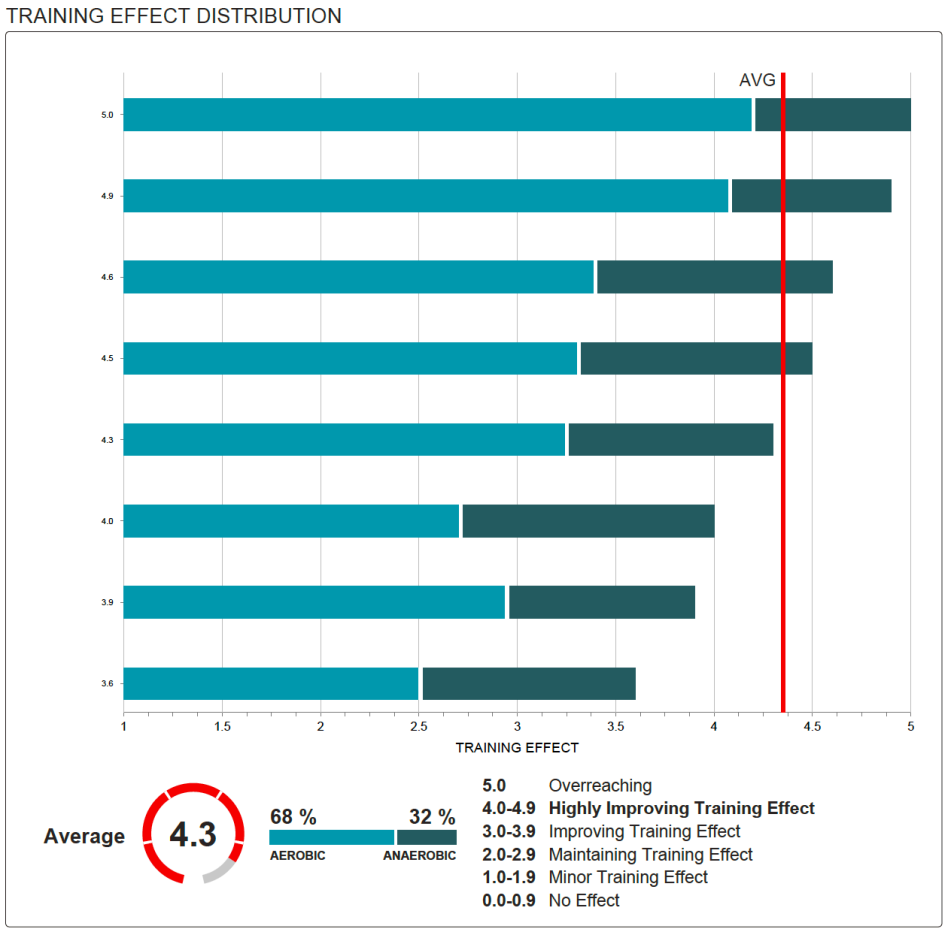
FIRSTBEAT

UCLA FOOTBALL –
COMPARING INDIVIDUAL RESPONSE TO SAME SESSION



FIRSTBEAT

GROUP REPORT UCLA FOOTBALL: HARD CONDITIONING SESSION



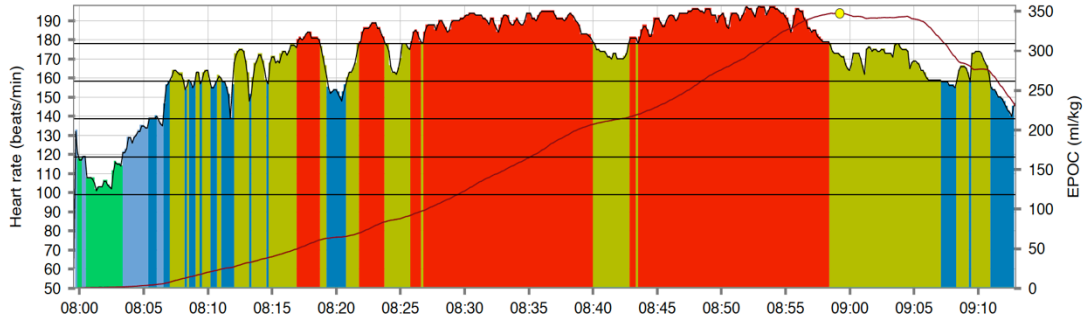
This workout was hardest session of the week, included:

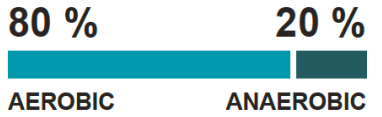
- Warm-up
- Medball throwing
- Trunk stability
- Jumps
- Sprints 12*30”/30”
- Sprints 12*15”/45”
- Cool down

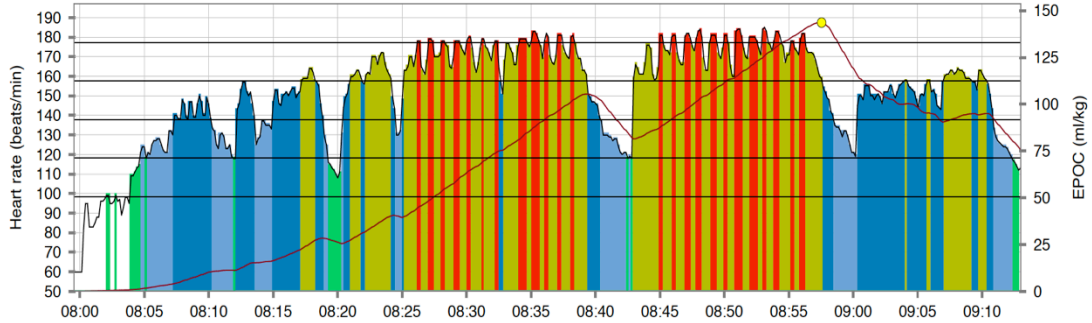
FIRSTBEAT

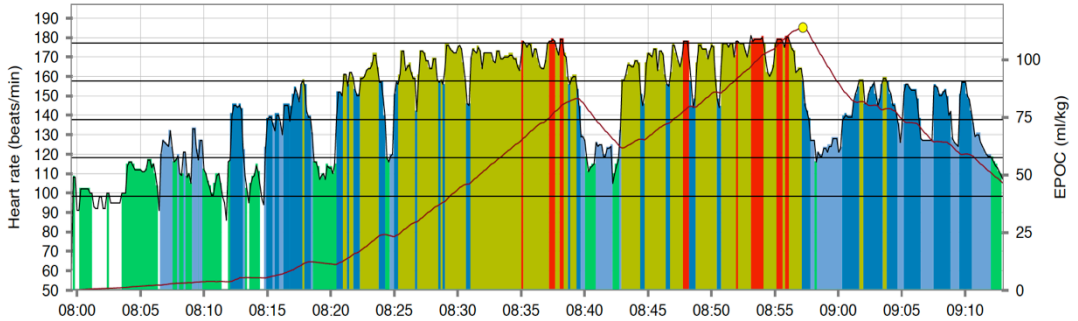
INDIVIDUAL DIFFERENCES – UCLA FOOTBALL

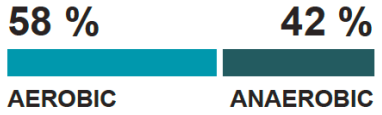
Which would you say is optimal response? A, B, C? And player archetype is pretty clear too!











FIRSTBEAT

PRINCETON ROWING – 8 X 500M, FIRSTBEAT PROGRESSION

- “I am happy to share over some of the 2k prep data we have collected over the past few years on a couple of athletes ***to help show what we’ve seen and how we have used Firstbeat to track it***.
- The workout we have used to assess off of is a 8x500m on/ 2’ off interval workout.”
- Red zone = 95% HRM
- *Greg Hughes, Men’s Heavyweight Rowing Coach, Princeton University*

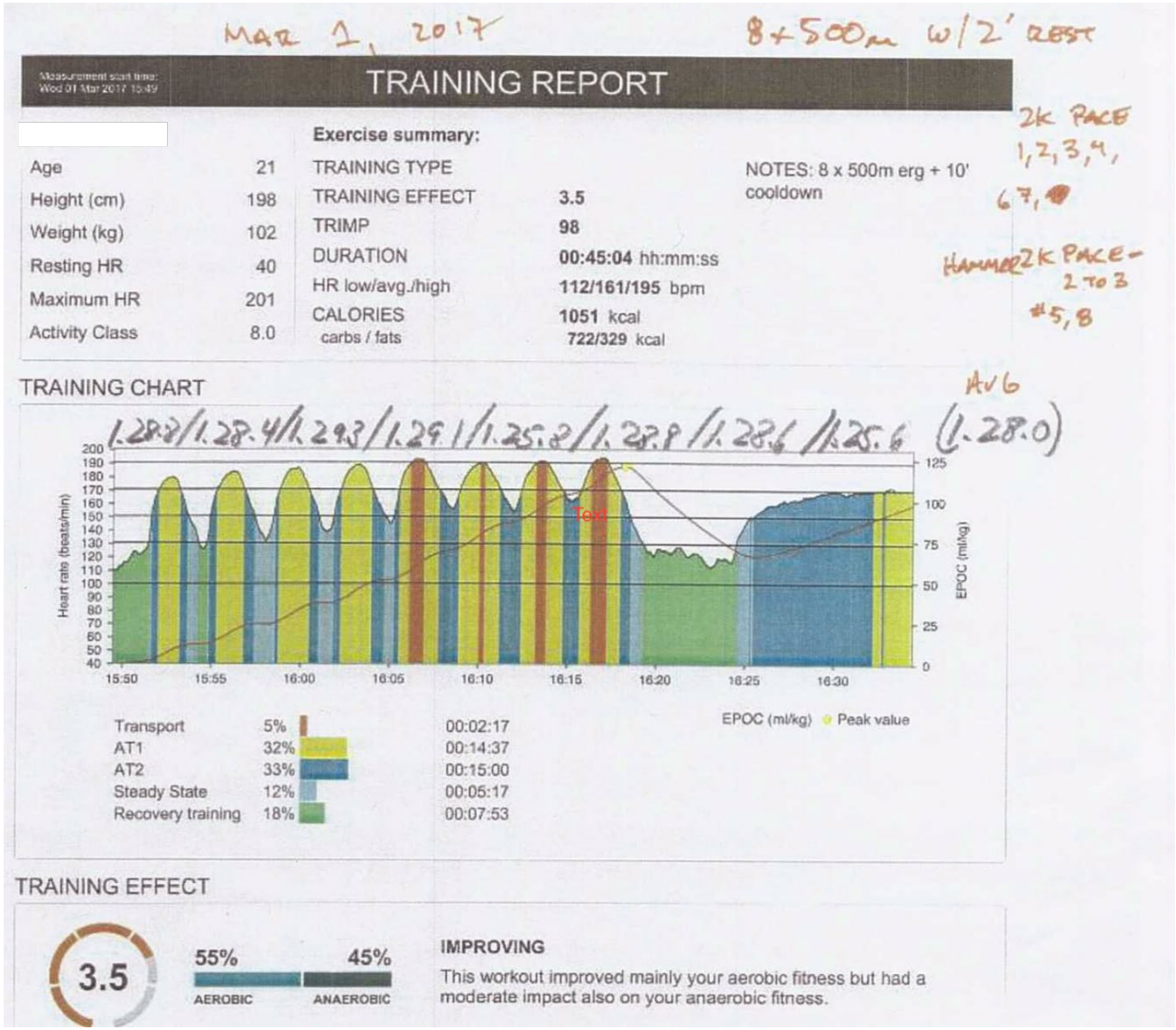
FIRSTBEAT

PRINCETON ROWING – 8 X 500M, FIRSTBEAT PROGRESSION: HR TRAINING ZONES

	CHANGE YELLOW		
Kiwi Method	**MAX HR:**	**185**	
Zone	**Percentage**	**Range Low**	**Range High**
U3/ Recovery	60-74%	111	139
U2/ SS	75-82%	139	153
U1/ Firm SS, AT2	83-87%	154	163
AT	88-92%	163	172
Transport	93-100%	172	185
Firstbeat method			
Zone	**Percentage**	**Range Low**	**Range High**
Recovery	50-64%	93	120
SS	65-74%	120	139
AT2	75-84%	139	157
AT1	85-94%	157	176
Transport	95-100%	176	185

FIRSTBEAT

PRINCETON ROWING – MAR 1ST, 2017



MAR 1, 2017 8+500m w/2' REST

Measurement start time: Wed 01 Mar 2017 15:49

TRAINING REPORT

Age	21
Height (cm)	198
Weight (kg)	102
Resting HR	40
Maximum HR	201
Activity Class	8.0

Exercise summary:

TRAINING TYPE	
TRAINING EFFECT	**3.5**
TRIMP	**98**
DURATION	**00:45:04** hh:mm:ss
HR low/avg./high	**112/161/195** bpm
CALORIES	**1051** kcal
carbs / fats	**722/329** kcal

NOTES: 8 x 500m erg + 10' cooldown

2K PACE 1, 2, 3, 4, 6, 7, 8

HAMMER 2K PACE – 2 TO 3 #5, 8

TRAINING CHART

1.28.8/1.28.4/1.29.3/1.29.1/1.25.2/1.28.8/1.28.6/1.25.6 AVG (1.28.0)

Transport	5%	00:02:17
AT1	32%	00:14:37
AT2	33%	00:15:00
Steady State	12%	00:05:17
Recovery training	18%	00:07:53

EPOC (ml/kg) Peak value

TRAINING EFFECT

55% AEROBIC 45% ANAEROBIC

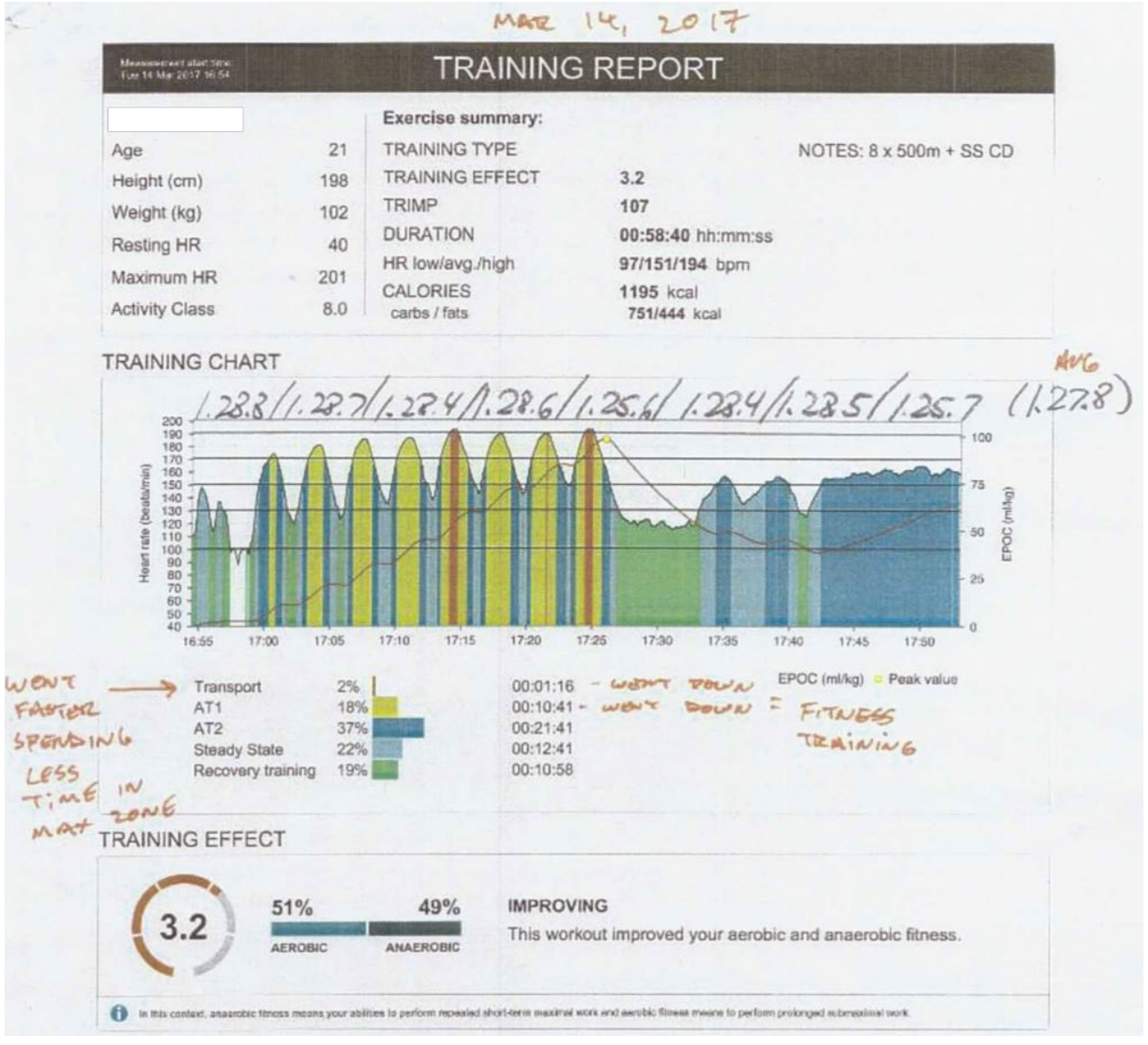
IMPROVING

This workout improved mainly your aerobic fitness but had a moderate impact also on your anaerobic fitness.

FIRSTBEAT

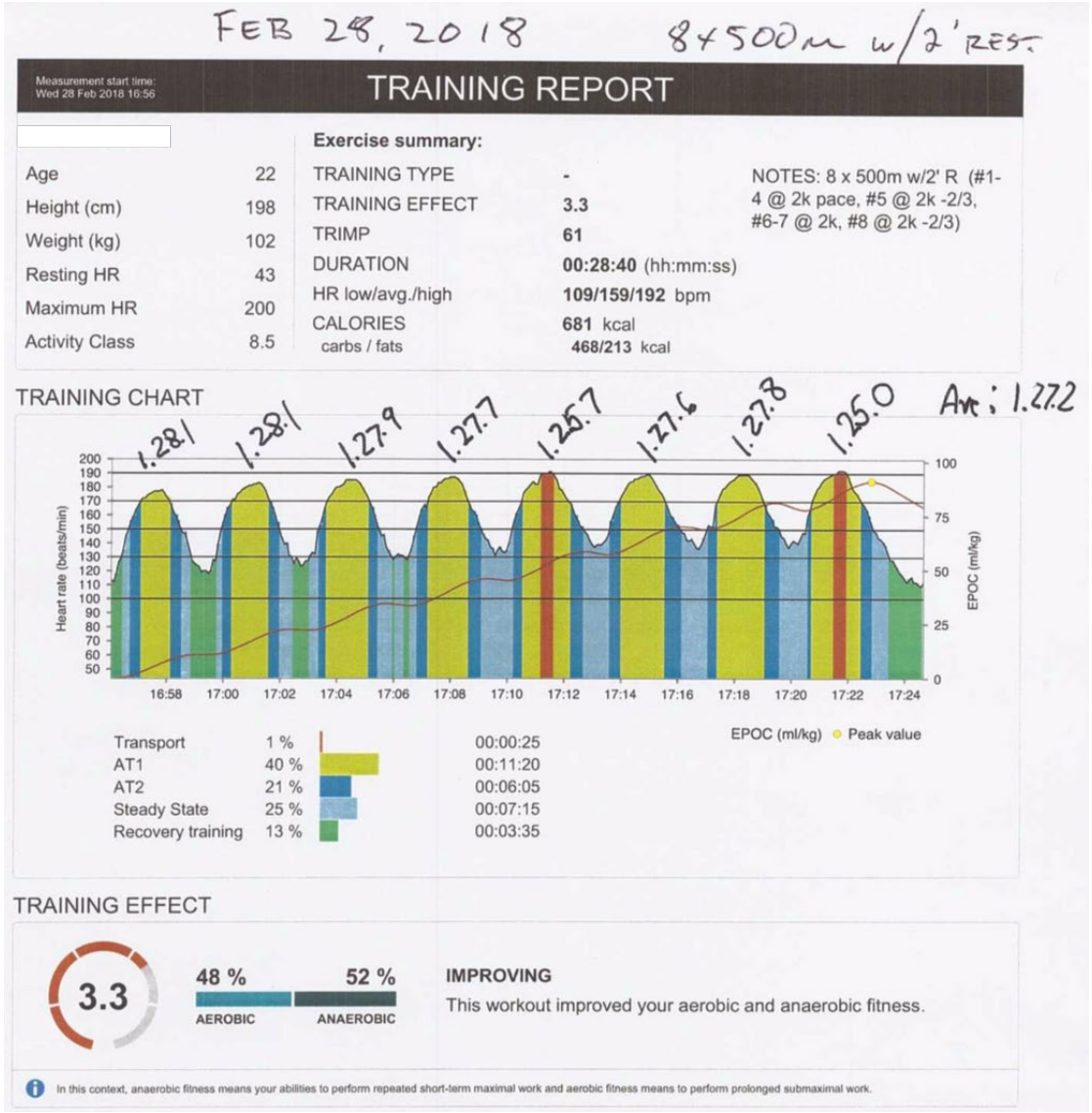
PRINCETON ROWING – MAR 14TH 2017…

Can we infer player profile in this case? is that useful?



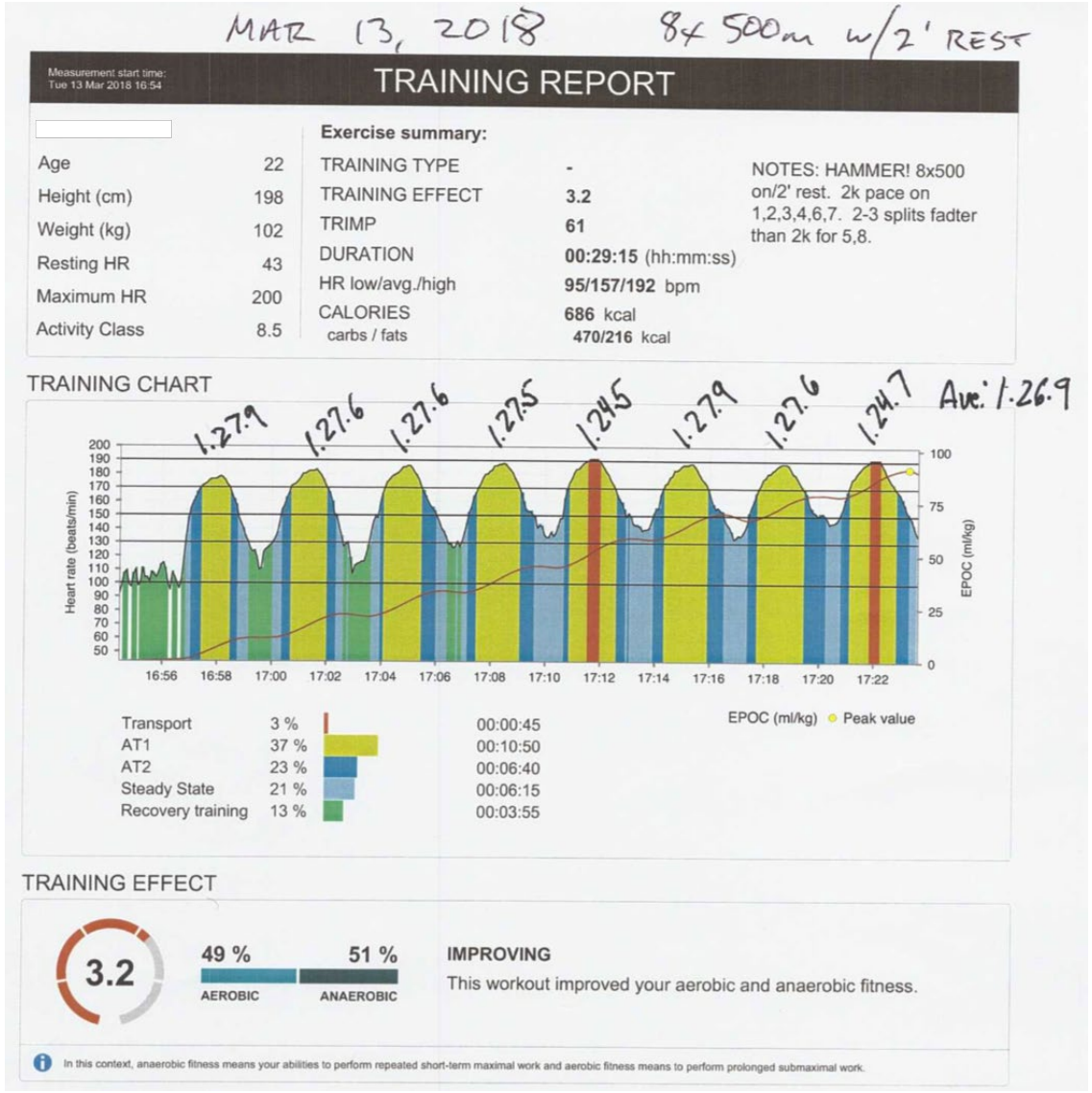
FIRSTBEAT

PRINCETON ROWING – FEB 25TH 2018



FIRSTBEAT

PRINCETON ROWING – MARCH 13TH 2018



MAR 13, 2018 8x 500m w/2' REST

Measurement start time:
Tue 13 Mar 2018 16:54

TRAINING REPORT

Age	22
Height (cm)	198
Weight (kg)	102
Resting HR	43
Maximum HR	200
Activity Class	8.5

Exercise summary:

TRAINING TYPE	-
TRAINING EFFECT	**3.2**
TRIMP	**61**
DURATION	**00:29:15** (hh:mm:ss)
HR low/avg./high	**95/157/192** bpm
CALORIES	**686** kcal
carbs / fats	**470/216** kcal

NOTES: HAMMER! 8x500 on/2' rest. 2k pace on 1,2,3,4,6,7. 2-3 splits fadter than 2k for 5,8.

TRAINING CHART

1.27.9 1.27.6 1.27.6 1.27.5 1.24.5 1.27.9 1.27.6 1.24.7 Ave: 1.26.9

Heart rate (beats/min) 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50

EPOC (ml/kg) 100 75 50 25 0

16:56 16:58 17:00 17:02 17:04 17:06 17:08 17:10 17:12 17:14 17:16 17:18 17:20 17:22

EPOC (ml/kg) Peak value

Transport	3 %	00:00:45
AT1	37 %	00:10:50
AT2	23 %	00:06:40
Steady State	21 %	00:06:15
Recovery training	13 %	00:03:55

TRAINING EFFECT

3.2

49 % AEROBIC 51 % ANAEROBIC

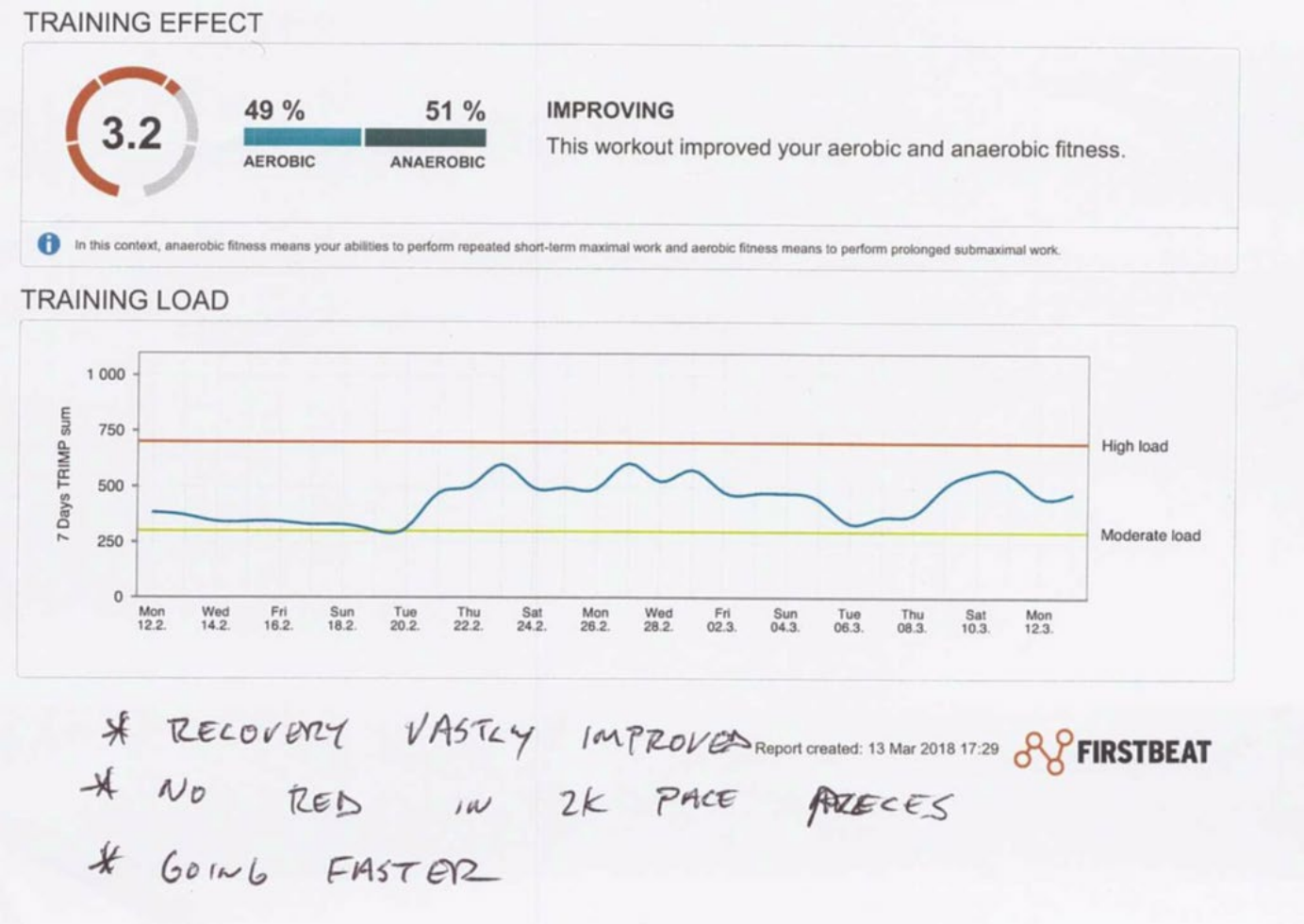
IMPROVING

This workout improved your aerobic and anaerobic fitness.

In this context, anaerobic fitness means your abilities to perform repeated short-term maximal work and aerobic fitness means to perform prolonged submaximal work.

FIRSTBEAT

PRINCETON ROWING –
MARCH 13TH 2018, COACHES *NOTES*, GREG HUGHES SAYS:



FIRSTBEAT

SUMMARY PRINCETON ROWING - GREG HUGHES, HEAD COACH

- If ave. split for the efforts goes down (ie: they go faster on each piece/ faster ave. for entire workout)…
- And they show better recovery between/less yellow/red during efforts…
- And TE score is lower:
  - Then the assumption is that they have improved fitness/adapted to pacing
  - **This data and reports allowed us to communicate to this particular athlete (the athlete wasn't sure before seeing the progression and Firstbeat data) that the training we are doing is working – he is responding positively to training and getting better!**

FIRSTBEAT

Thank you!

FIRSTBEAT