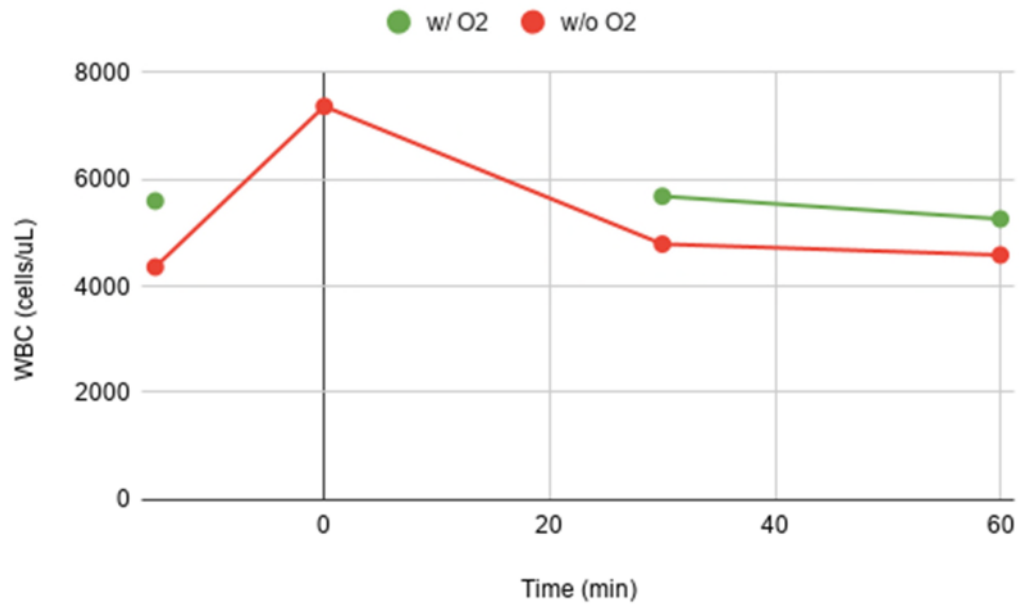


**2020 0513 HyperMax I+S+OS 41yoM – Effects of O2 on Exercise Performance**

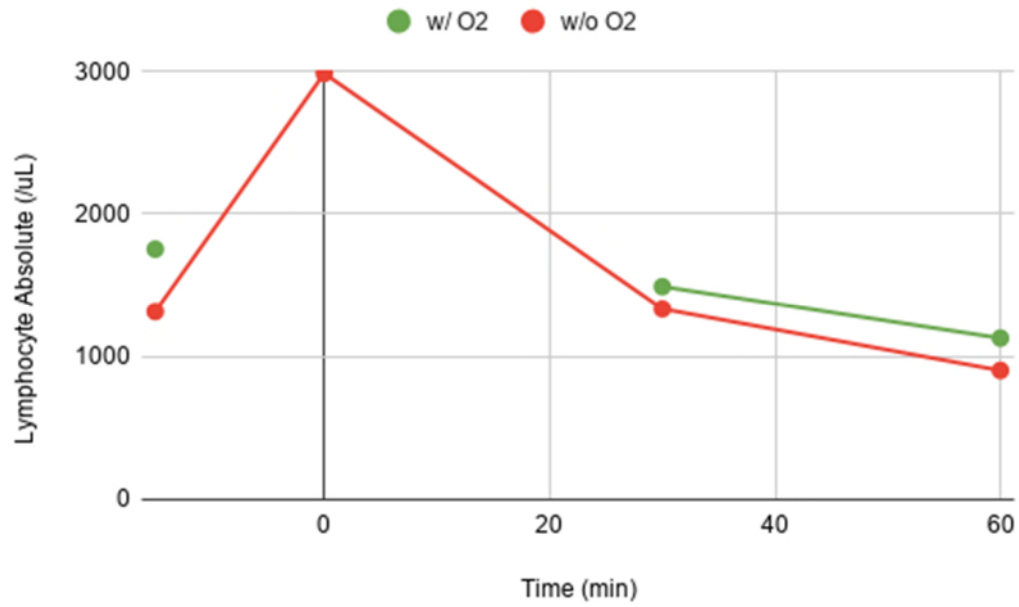
Marker	2020 0513 No O2 Rogue Echo				2020 0514 HyperMax Rogue Echo				Reference Range
	14:25 Pre	15:10 After	15:40 +30 min	16:10 +60 min	11:48 Pre	13:20 After	13:50 +30 min	14:25 +60 min	
DNA Viruses – Plasma	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
DNA Parasites – Plasma	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
DNA Fungi – Plasma	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
DNA Bacteria – Plasma	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
WBC	4358	7359	4787	4583	5592	NA	5680	5256	4000-11000 Cells/uL
Lymphocyte, Absolute	1314	2985	1333	902	1753	NA	1490	1128	600-5500 Cells/uL
Lymphocyte, Percent	30	41	28	20	31	NA	26	21	10 - 45 %
CD3, Absolute (T cells)	893	1617	854	686	1230	NA	1083	852	606 - 3187 /uL
CD3, Percent (T cells)	69.9	55.6L	65.7	75.4	70.0	NA	71.3	75.2	61.0 - 80.0 %
CD4, Absolute (T helper cells)	599	897	547	482	824	NA	700	585	365 - 2087 /uL
CD4, Percent (T helper cells)	45.6	30.1L	41.0	53.4H	47.0	NA	47.0	51.8	37.0 - 52.0 %
CD8, Absolute (T suppressor cells)	271	641	264	176	361	NA	323	228	154 - 1264 /uL
CD8, Percent (T suppressor cells)	20.6	21.5	19.8	19.5	20.6	NA	21.7	20.2	15.0 - 32.0 %
CD4/CD8 Ratio	2.2	1.4	2.1	2.7	2.3	NA	2.2	2.6	1.0 - 3.4 Ratio
CD16/56, Absolute (NK cells)	190	861H	221	77	215	NA	206	105	26 - 497 /uL
CD16/56, Percent (NK cells)	15.3H	30.4H	17.4H	8.4	12.2H	NA	13.3H	9.2	3.0 - 12.0 %
CD19, Absolute (B cells)	164	328	175	134	258	NA	214	144	89 - 747 /uL
CD19, Percent (B cells)	13.2	11.6	13.8	14.6	14.7	NA	13.8	12.6	9.0 - 19.0 %
WBC	4.7	7.1	4.7	4.9	6.0	NA	NA	5.4	4.0 - 11.0 k/mm3
RBC	4.95	5.13	4.92	4.75	4.75	NA	NA	4.56	4.30-6.00 m/mm3
Hemoglobin	15.2	16.0	15.6	14.7	15.2	NA	NA	14.7	13.0 - 18.0 g/dL
Hematocrit	44.8	47.9	46.0	44.3	43.8	NA	NA	42.1	40.0 - 53.0 %
MCV	90.5	93.4	93.5	93.3	92.2	NA	NA	92.3	78.0 - 100.0 fL
MCH	30.7	31.2	31.7	30.9	32.0	NA	NA	32.2	27.0 - 34.0 pg
MCHC	33.9	33.4	33.9	33.2	34.7	NA	NA	34.9	31.0 - 37.0 g/dL
Platelet Count	229	291	238	243	227	NA	NA	220	130 - 450 k/mm3
RDW(sd)	40.1	42.2	42.1	42.0	41.1	NA	NA	41.7	38.0 - 49.0 fL
RDW(cv)	12.1	12.2	12.3	12.1	12.1	NA	NA	12.2	11.0 - 15.0 %
MPV	10.5	11.1	10.6	11.1	10.8	NA	NA	11.0	7.5 - 14.0 fL

Segmented Neutrophils	56.9	49.3	59.6	65.8	59.4	NA	NA	67.3	%
Lymphocytes	30.9	38.7	28.6	22.5	29.0	NA	NA	21.3	%
Monocytes	10.0	10.2	9.7	9.9	10.1	NA	NA	10.1	%
Eosinophils	1.1	1.0	1.1	0.8	0.5	NA	NA	0.4	%
Basophils	0.9	0.7	0.8	0.8	0.8	NA	NA	0.7	%
Absolute Neutrophil	2.68	3.47	2.81	3.25	3.58	NA	NA	3.66	1.60 - 9.30 k/uL
Absolute Lymphocyte	1.45	2.73	1.35	1.11	1.75	NA	NA	1.16	0.60 - 5.50 k/uL
Absolute Monocyte	0.47	0.72	0.46	0.49	0.61	NA	NA	0.55	0.10 - 1.60 k/uL
Absolute Eosinophil	0.05	0.07	0.05	0.04	0.03	NA	NA	0.02	0.00 - 0.70 k/uL
Absolute Basophil	0.04	0.05	0.04	0.04	0.05	NA	NA	0.04	0.00 - 0.20 k/uL
Immature Granulocytes	0.2	0.1	0.2	0.2	0.2	NA	NA	0.2	%
Abs Imm Granulocytes	0.01	0.01	0.01	0.01	0.01	NA	NA	0.01	0.00 - 0.10 k/uL
NRBC RE, Nucleated RBC Perc	0.0	0.0	0.0	0.0	0.0	NA	NA	0.0	0.0 - 1.0 %
Glucose	92	100H	86	97	95	139H	112H	86	65 - 99 mg/dL
Urea Nitrogen (BUN)	25	27H	26H	28H	25	24	24	24	8 - 25 mg/dL
Creatinine	1.22	1.59H	1.49H	1.37	1.16	1.60H	1.50	1.35	0.60 - 1.50 mg/dL
GFR Estimated	73	53L	43L	63	78	52L	56L	65	>=60mL/min/1.73m2
BUN/Creatinine Ratio	20.5	17.0	17.4	20.4	21.6	15.0	16.0	17.8	10.0 - 28.0
Uric Acid	4.8	5.3	5.7	5.8	5.4	5.8	6.3	6.4	3.5 - 8.0 mg/dL
Sodium	141	142	143	139	140	142	138	141	134 - 147 mmol/L
Potassium	4.1	4.1	4.1	4.1	4.0	4.1	4.0	4.9	3.6 - 5.3 mmol/L
Chloride	101	100	102	103	101	102	100	102	95 - 108 mmol/L
Carbon Dioxide (CO2)	25	17L	24	23	26	14L	19	25	19 - 31 mmol/L
Anion Gap	15	25H	17	13	12	26H	19H	15	4 - 18
Osmolality, Calculated	291	294	295	289	289	295	286	291	275 - 295 mOsm/kg
Protein, Total	7.5	8.0	7.7	7.1	7.4	8.0	7.1	7.0	6.0 - 8.0 g/dL
Albumin	4.9	4.9	4.7	4.3	5.0	5.3H	4.7	4.6	3.6 - 5.1 g/dL
Globulin	2.6	3.1	3.0	2.8	2.4	2.7	2.4	2.4	1.9 - 3.7 g/dL
Albumin/Globulin Ratio	1.9	1.6	1.5	1.6	2.1	2.0	2.0	1.9	1.0 - 2.5
Cholesterol	165	184	178	162	171	182	162	159	<=199 mg/dL
Triglyceride	121	120	85	111	82	101	70	65	<=149 mg/dL
Calcium	9.3	9.8	9.9	9.5	9.6	10.0	9.2	9.6	8.7 - 10.4 mg/dL
Phosphorus (Inorganic)	3.8	5.2H	4.5	4.1	2.9	4.5	3.7	3.0	2.4 - 4.8 mg/dL
Alkaline Phosphatase	61	67	61	59	58	62	52	51	40 - 140 IU/L
GGT	20	22	21	19	20	23	20	20	5 - 80 IU/L

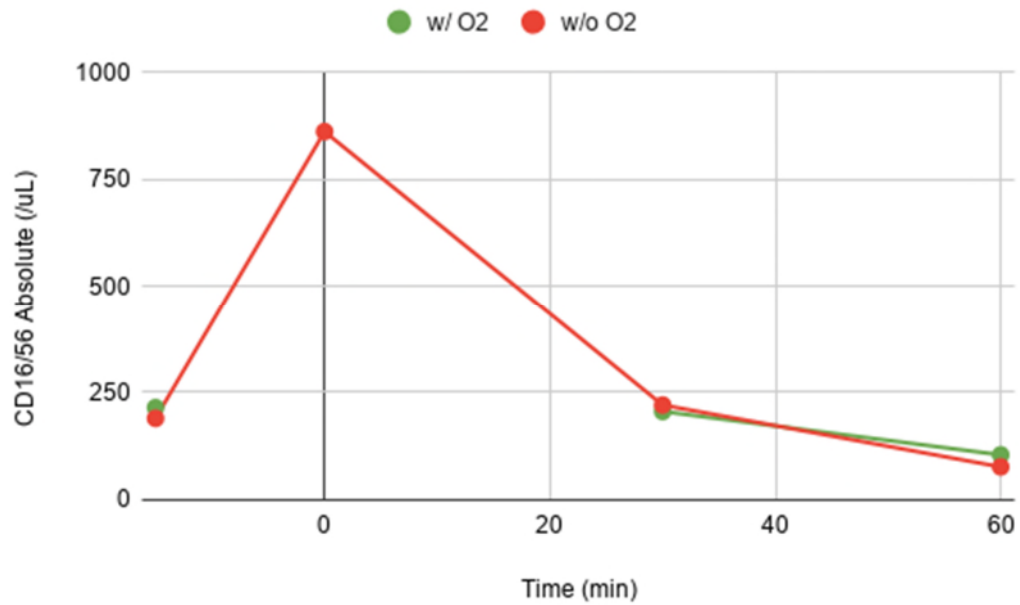
Alanine Aminotransferase	27	26	28	26	29	29	27	28	5 - 60 IU/L
Aspartate Aminotransferase	27	32	31	28	24	28	23	27	10 - 50 IU/L
Lactate Dehydrogenase	167	181	170	155	177	186	157	178	112 - 245 IU/L
Bilirubin, Total	0.4	0.4	0.4	0.3	0.6	0.7	0.5	0.5	0.2 - 1.3 mg/dL
Cholesterol/HDL Ratio	2.6	2.7	2.7	2.7	2.6	2.6	1.6	2.4	<=4.9
HDL Cholesterol	63	67	66	60	66	69	61	65	>=40 mg/dL
Non-HDL Cholesterol	102	117	112	102	105	113	101	94	<=129 mg/dL
LDL Cholesterol, Calculated	78	93	95	80	89	93	87	81	<=99 mg/dL
VLDL Cholesterol	24	24	17	22	16	20	14	13	<=29 mg/dL
d-ROMs <a href="https://www.hedsrl.it/eng/oxidative-stress/what-is-d-roms-test/">https://www.hedsrl.it/eng/oxidative-stress/what-is-d-roms-test/</a> Unit of measure: U. Carr 1 U. Carr = 0.08 mg H <sub>2</sub> O <sub>2</sub> /dL	306	252	217	325	422	294	299	197	250-300 Optimal 300-320 BL 321-340 Low 341-400 Med 401-500 High > 500 Very high
PAT <a href="https://www.hedsrl.it/eng/oxidative-stress/what-is-the-pat-test/">https://www.hedsrl.it/eng/oxidative-stress/what-is-the-pat-test/</a> Unit of measure: U. Cor 1 U. Cor = 1.4 µMol/L of ascorbic acid	3564	2958	2275	2806	3313	2321	2093	2343	<2800 Very high 2200–2800 Nor 2200–2000 BL 2000–1800 Slightly def < 1800 Deficient
OBRI <a href="https://www.hedsrl.it/eng/obri/">https://www.hedsrl.it/eng/obri/</a> Oxidative Balance Risk Index The cardiovascular risk index	0.7	0.2	0.8	1.0	1.1	1.1	1.3	0.7	0.8-1.2 Normal 1.3-1.7 Borderline 1.8-2.2 High >2.2 Very High
OSI Redox <a href="https://www.hedsrl.it/eng/osi/">https://www.hedsrl.it/eng/osi/</a> Oxidative Stress Index Summary value of oxid stress	73	397	40	28	86	23	39	48	<40 Normal 41-65 Borderline 66-120 High >121 Very High



Shows WBC are higher with O2

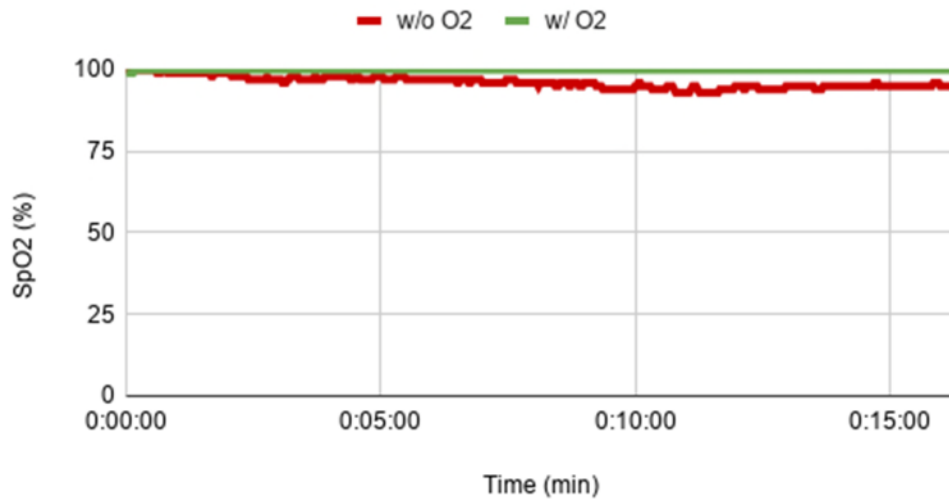


Shows Lymphocytes are higher with O2



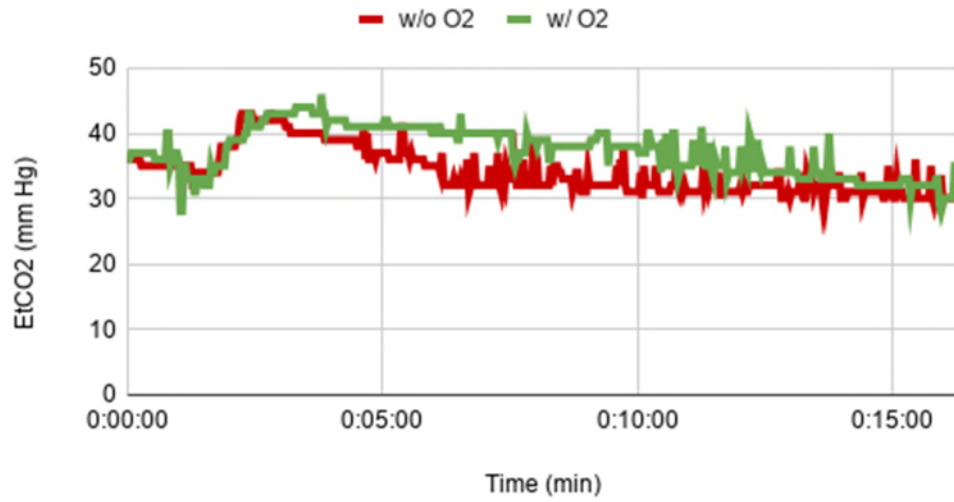
No change in NK cells

BW



O2 saturation is 100% throughout exercise with O2

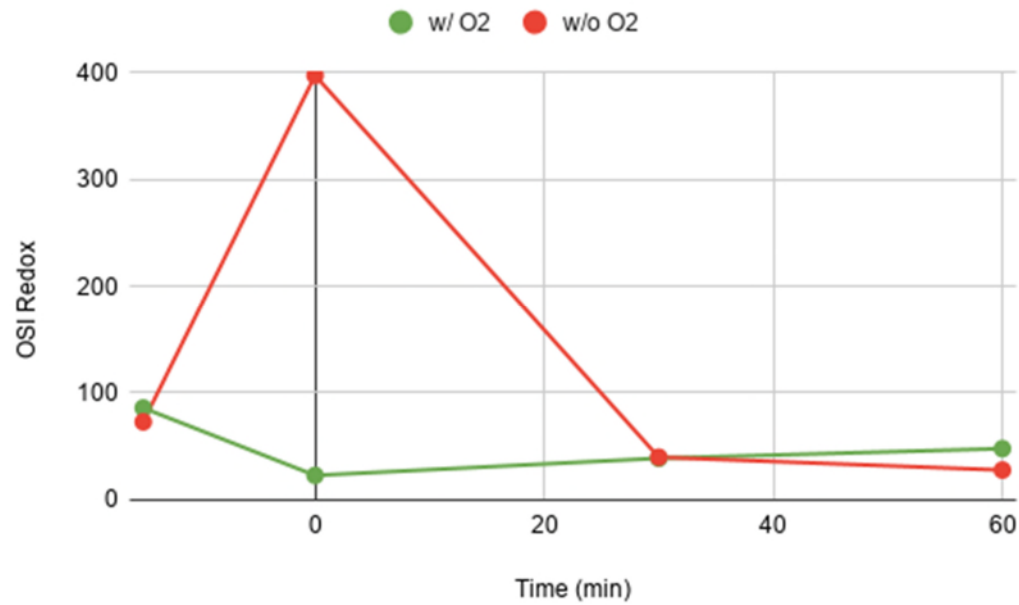
BW



End Tidal CO2

<https://www.aastweb.org/hubfs/End-Tidal%20CO2%20-%20AAST%20Technical%20Guideline.pdf>

Higher EtCO2 with O2



Lower OSI with O2

See

[https://www.researchgate.net/publication/51398057\\_End-tidal\\_pressure\\_of\\_CO2\\_and\\_exercise\\_performance\\_in\\_healthy\\_subjects](https://www.researchgate.net/publication/51398057_End-tidal_pressure_of_CO2_and_exercise_performance_in_healthy_subjects)

<https://www.atsjournals.org/doi/pdf/10.1513/AnnalsATS.201701-043OT>

<https://journals.physiology.org/doi/pdf/10.1152/ajpregu.00165.2017>

### **Subject background:**

- 41 year old male
- No known health issues

### **Exercise Protocol**

- On 2020 0513
  - First blood draw at 14:25, before exercise, called Pre
  - Performed 20 min of Rogue Echo bike exercise while breathing through mask and not connected to O2 bag
  - Second blood draw at 15:10, after exercise, called After
  - Third blood draw at 15:40, 30 minutes after exercise, called +30 min
  - Fourth blood draw at 16:10, 60 minutes after exercise, called +60 min
- 2020 0514
  - First blood draw at 11:48, before exercise, called Pre
  - Performed 20 min of Rogue Echo bike exercise while breathing through mask and connected to O2 bag
  - Second blood draw at 13:20, after exercise, called After
  - Third blood draw at 13:50, 30 minutes after exercise, called +30 min
  - Fourth blood draw at 14:25, 60 minutes after exercise, called +60 min

### **Results:**

- If you compare Rogue Echo bike exercise with room air O2 vs elliptical exercise with HyperMax O2:
  - HyperMax O2 significantly increases WBCs, lymphocytes
- No negative effects of HyperMax on liver or kidney function markers, indicating this is safe
- HyperMax EWOT resulted in better OSI values vs no O2
  
- Reviewing this data with respect to:
  - Immunity Boosting – data shows increase in immune parameters
  - Disease and Virus fighting/preventative – no evidence

- Lung Health – no evidence, cannot measure adequately using Massimo
  - See <https://www.cosmed.com/en/products/cardio-pulmonary-exercise-test/quark-rmr>
  - <https://www.cosmed.com/en/products/pulmonary-function/q-box>
- Youthfulness qualities – subjective evidence based on subject responses
  - Could be improved if we had questionnaire
  - <https://link.springer.com/article/10.1023/A:1009524612420>
  - <https://www.tandfonline.com/doi/abs/10.1080/15298868.2015.1133452?src=recsys&journalCode=psai20>
  - <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7397859/>
- Weight Loss – no evidence
  - We have tools to measure
  - This needs to be considered as a 3-6 month project
- Reduction of Depression and Brain Fog – subjective evidence based on subject responses
  - Could be improved if we had questionnaire
  - Go here <https://www.mdcalc.com/> type in 'depression'
- Joint Pain Relief – subjective evidence based on subject responses
  - Could be improved if we had questionnaire
  - Go here <https://www.mdcalc.com/> type in 'joint pain'
- Cardiovascular Health – subjective evidence based on subject responses
  - Could be improved if we had EEG or other physiological data
- Better overall Fitness – subjective evidence based on subject responses
  - Cannot measure adequately using Massimo
  - See <https://www.cosmed.com/en/products/stress-testing-ecg>
  - <https://www.cosmed.com/en/products/ergometers/cosmed-treadmills>
  - <https://www.cosmed.com/en/products/ergometers/cosmed-bikes>