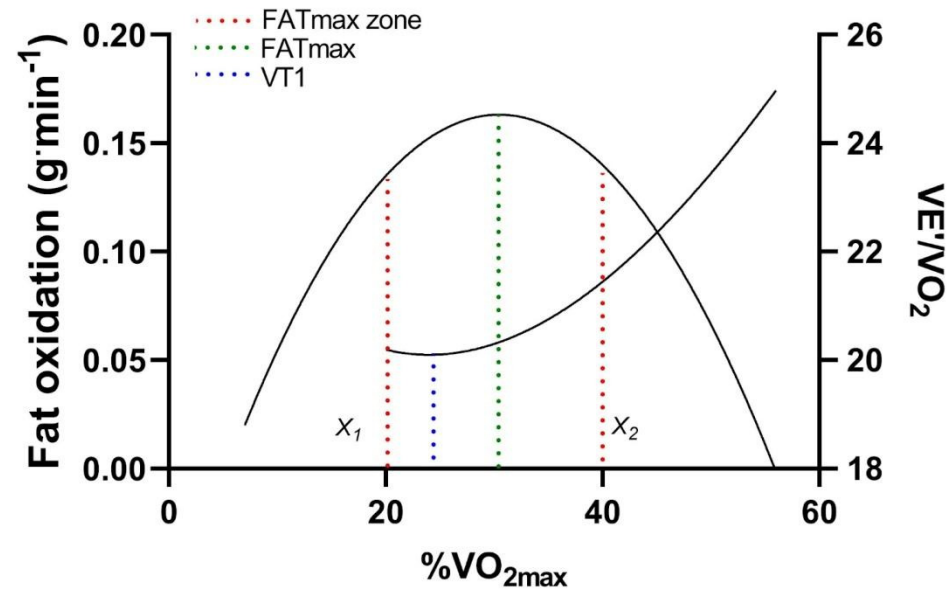


## Section S1: FAT<sub>max</sub> ZONE

FAT<sub>max</sub> zone was estimated using a meta-analytical approach by computing the distance, in terms of VO<sub>2</sub>, between the Upper (X<sub>2</sub>) and Lower (X<sub>1</sub>) FAT<sub>max</sub> zone range (Supplementary Material Section S1, Figure S1), which correspond to the acceptable range (to be divide equally in both sides of the FAT<sub>max</sub>) in which the differences between FAT<sub>max</sub> and AeT can fall and be considered within the FAT<sub>max</sub> zone.

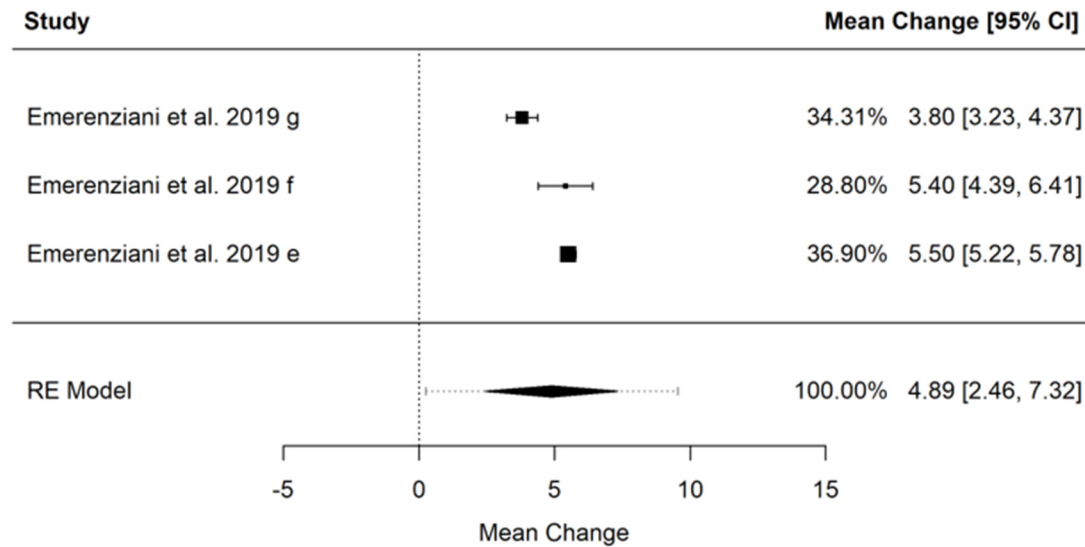


**Figure S1.** Fat oxidation and ventilatory equivalents of oxygen during a graded exercise test performed on a treadmill. The FAT<sub>max</sub> (green dotted line) and the FAT<sub>max</sub> zone (between red dotted lines) were determined by fitting a cubic

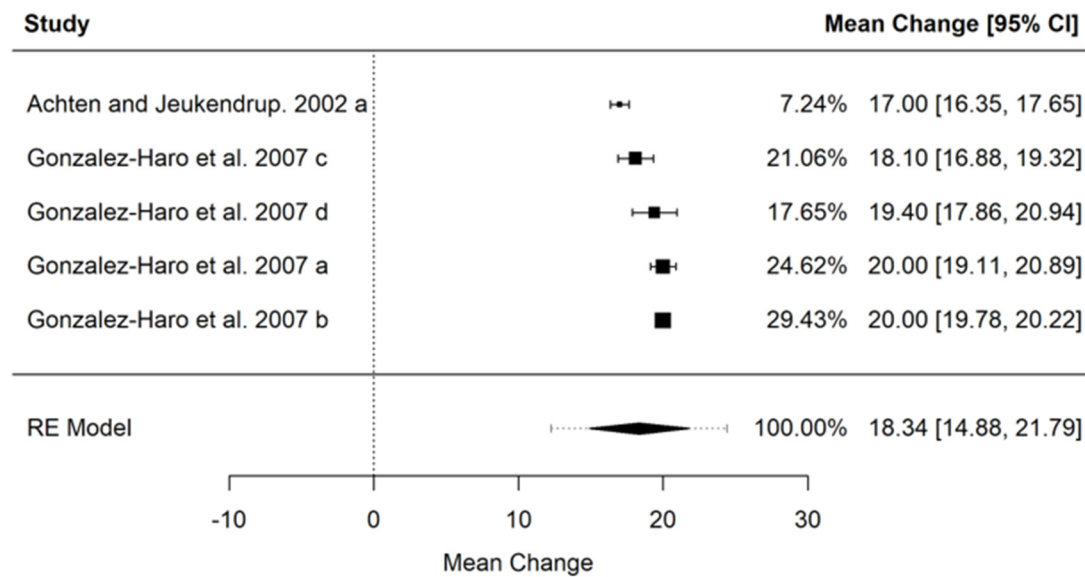
polynomial regression using the fat oxidation rate and the relative oxygen uptake at each stage of a test performed by a representative individual. In addition, the aerobic threshold (blue) was defined as the exercise intensity at which the ventilatory equivalents of oxygen breaks with linearity and showed a sustained increment. Lower ( $X_1$ ) and upper ( $X_2$ )  $FAT_{max}$  zone range.

Six articles (Supplementary Material Section S1, Figure S2) reporting the  $FAT_{max}$  zone in trained ( $n=52$ ) and untrained ( $n=70$ ) individuals were identified from a total of 20 studies that performed a mathematical modelling of the fat oxidation kinetics [1]. The  $FAT_{max}$  zone range was calculated using Metafor package of R software (version 4.0.4) (The R Foundation, Vienna, Austria) by computing the mean difference (MD) between the Upper ( $X_1$ ) (mean  $\pm$  SD) and Lower ( $X_2$ )  $FAT_{max}$  zone intensity range (mean  $\pm$  SD) of each study. Additionally, since Upper and Lower  $FAT_{max}$  zone intensities were paired data deriving from the same individual, the correlation between the two exercise intensities was accounted for MD calculation. Specifically, the correlation coefficient between Upper and Lower  $FAT_{max}$  zone intensities was estimated to be 0.96 for the included studies in the meta-analysis. When MDs were expressed in  $\%VO_{2max}$ , they were clustered in two studies; hence, a multilevel meta-analysis was performed to account for both the within-studies and between-studies variance [40,47]. Summary MD and  $r$  estimates were determined using a random-effects model and presented as mean and 95% confidence (CI) and prediction (PI) interval [40] (see Supplementary Material Section S1, Figure S2).

a)



b)



**Figure S2.** Forest plots of the mean change (e.g., difference between Upper and Lower FAT<sub>max</sub> zone limits) in the VO<sub>2</sub> (expressed as ml/kg/min (a panel) and %VO<sub>2max</sub> (b panel)). The mean change corresponds to the exercise intensity range with fat oxidation higher than 90% of FAT<sub>max</sub> which has to be divided equally in both sides of the FAT<sub>max</sub>.

*NOTE:* Achten and Jeukendrup, 2002a (moderately trained cyclist); Emerenzianni et al. 2019e (women with obesity class I), Emerenzianni et al. 2019f (women with obesity class II), and Emerenzianni et al. 2019g (women with obesity class III); Gonzalez-Haro et al. 2007a (male triathletes), Gonzalez-Haro et al. 2007b (female triathletes), Gonzalez-Haro et al. 2007c (road cyclist) and Gonzalez-Haro et al. 2007d (male mountain bikers).

## Section S2: AGREEMENT INDICATORS

**Table S1.1.** Estimation of 95% Limits of Agreement by subgroup for ml/min/kg method.

Subgroup	Subset	Studies	Sample	N	Bias	sd_bias	LOA_L	LOA_U	CI_L	CI_U
Gender	Male	7	9	326	-2.07	4.02	-9.96	5.82	-15.04	10.90
Gender	Female	3	4	186	-0.55	3.50	-7.42	6.31	-21.82	20.72
Physical level	Active	5	7	257	-2.28	6.15	-14.33	9.77	-22.68	18.12
Physical level	Inactive	5	6	255	-0.72	1.98	-4.60	3.15	-8.76	7.31
Ergometer	Cycle	6	8	348	-2.48	6.00	-14.24	9.28	-20.16	15.20
Ergometer	Treadmill	4	5	164	-0.21	1.53	-3.21	2.79	-6.29	5.87
AeT method	Lactate	5	7	322	-1.88	5.61	-12.87	9.11	-20.55	16.79
AeT method	Gas analysis	6	6	190	-1.33	3.08	-7.37	4.71	-11.76	9.10
FAT max method	Visual	7	10	416	-1.00	3.80	-8.44	6.45	-14.14	12.14
FATmax max method	Mathematical	3	3	96	-2.58	4.27	-10.94	5.78	-24.75	19.58
VO2max protocol	Short	10	11	434	-1.85	3.75	-9.19	5.49	-12.83	9.13
VO2max protocol	Long	2	2	78	5.06	9.82	-14.19	24.31	-89.00	99.13
FATmax protocol	Identical	9	12	490	-0.85	3.27	-7.25	5.56	-11.23	9.54

Subgroup	Subset	Studies	Sample	N	Bias	sd_bia s	LOA_L	LOA_U	CI_L	CI_U
FATmax protocol	Additional	1	1	22	-6.70	4.08	-14.70	1.30		
All Studies	ml/min/kg	10	13	512	-1.49	3.89	-9.12	6.14	-12.89	9.90
All Studies	ml/min/kg (w/o outliers)	10	11	434	-1.85	3.75	-9.19	5.49	-12.83	9.13

**Table S1.2.** Estimation of 95% Limits of Agreement by subgroup for %VO<sub>2max</sub> method.

Subgroup	Subset	Studies	Sample	N	Bias	sd_bias	LOA_L	LOA_U	CI_L	CI_U
Gender	Male	9	10	368	-5.87	9.91	-25.28	13.55	-35.09	23.35
Gender	Female	2	2	195	-8.70	13.90	-35.95	18.55	-164.15	146.74
Physical level	Active	6	6	156	-5.31	10.30	-25.50	14.88	-37.30	26.68
Physical level	Inactive	5	6	407	-7.58	10.49	-28.14	12.99	-46.03	30.88
Ergometer	Cycle	5	5	99	-6.83	10.63	-27.66	14.00	-41.92	28.27
Ergometer	Treadmill	6	7	464	-6.04	10.44	-26.50	14.42	-41.11	29.03
AeT method	Lactate	4	4	73	-6.95	10.60	-27.72	13.83	-46.67	32.78
AeT method	Gas analysis	8	8	490	-6.14	9.83	-25.41	13.12	-36.19	23.90
FAT max method	Visual	6	7	445	-5.29	10.73	-26.33	15.75	-41.52	30.94
FATmax max method	Mathematical	5	5	118	-7.62	10.12	-27.45	12.21	-39.07	23.82
VO2max protocol	Short	9	10	541	-5.15	9.96	-24.67	14.37	-34.25	23.95
VO2max protocol	Long	2	2	22	12.10	10.47	-32.62	8.41	-165.00	140.80
FATmax protocol	Identical	10	11	541	-5.92	10.28	-26.06	14.23	-35.40	23.57
FATmax protocol	Additional	1	1	22	11.30	8.78	-28.50	5.90		

Subgroup	Subset	Studies	Sample	N	Bias	sd_bia s	LOA_L	LOA_U	CI_L	CI_U
All Studies	%VO2max	11	12	563	-6.39	10.24	-26.47	13.69	-35.03	22.25
All Studies	%VO2max (w/o outliers)	10	11	406	-5.12	9.21	-23.18	12.94	-31.30	21.06

### Section S3: SENSITIVITY ANALYSIS



**Table S2.1.** Estimation of 95% Limits of Agreement by subgroup for ml/min/kg method.

Subgroup	Subset	Studies	Sample	N	Bias	sd_bias	LOA_L	LOA_U	CI_L	CI_U
Gender	Male	7	9	326	-1.57	3.67	-8.76	5.61	-13.63	10.48
Gender	Female	3	4	186	-0.58	3.49	-7.43	6.27	-21.91	20.74
Physical level	Active	5	7	257	-1.57	5.73	-12.80	9.66	-20.70	17.57
Physical level	Inactive	5	6	255	-0.85	2.01	-4.78	3.09	-8.90	7.21
Ergometer	Cycle	6	8	348	-1.90	5.72	-13.11	9.31	-18.75	14.95
Ergometer	Treadmill	4	5	164	-0.31	1.63	-3.51	2.88	-6.65	6.02
AeT method	Lactate	5	7	322	-1.41	5.18	-11.57	8.76	-19.26	16.45
AeT method	Gas analysis	6	6	190	-1.33	3.08	-7.37	4.71	-11.76	9.10
FAT max method	Visual	7	10	416	-0.64	3.41	-7.32	6.05	-13.28	12.01
FATmax max method	Mathematical	3	3	96	-2.58	4.27	-10.94	5.78	-24.75	19.58
VO2max protocol	Short	10	11	434	-1.89	3.74	-9.22	5.43	-12.85	9.07
VO2max protocol	Long	2	2	78	5.06	9.82	-14.19	24.31	-89.00	99.13
FATmax protocol	Identical	9	12	490	-0.61	3.05	-6.59	5.37	-10.68	9.46
FATmax protocol	Additional	1	1	22	-6.70	4.08	-14.70	1.30		
All Studies	ml/min/kg	10	13	512	-1.20	3.59	-8.24	5.84	-11.92	9.52
All Studies	ml/min/kg (w/o outliers)	10	11	434	-1.89	3.74	-9.22	5.43	-12.85	9.07

**Table S2.2.** Estimation of 95% Limits of Agreement by subgroup for %VO<sub>2max</sub> method.

Subgroup	Subset	Studies	Sample	N	Bias	sd_bias	LOA_L	LOA_U	CI_L	CI_U
Gender	Male	9	10	368	-6.02	9.86	-25.33	13.30	-35.08	23.04
Gender	Female	2	2	195	-8.70	13.90	-35.95	18.55	-164.15	146.74
Physical level	Active	6	6	156	-5.31	10.30	-25.50	14.88	-37.30	26.68
Physical level	Inactive	5	6	407	-7.84	10.34	-28.11	12.44	-45.77	30.09
Ergometer	Cycle	5	5	99	-6.83	10.63	-27.66	14.00	-41.92	28.27
Ergometer	Treadmill	6	7	464	-6.26	10.36	-26.56	14.05	-41.04	28.53
AeT method	Lactate	4	4	73	-6.95	10.60	-27.72	13.83	-46.67	32.78
AeT method	Gas analysis	8	8	490	-6.14	9.83	-25.41	13.12	-36.19	23.90
FAT max method	Visual	6	7	445	-5.51	10.67	-26.43	15.41	-41.52	30.51
FATmax max method	Mathematical	5	5	118	-7.62	10.12	-27.45	12.21	-39.07	23.82
VO2max protocol	Short	9	10	541	-5.30	9.92	-24.74	14.14	-34.27	23.68
VO2max protocol	Long	2	2	22	-12.10	10.47	-32.62	8.41	-165.00	140.80
FATmax protocol	Identical	10	11	541	-6.05	10.23	-26.11	14.01	-35.40	23.29
FATmax protocol	Additional	1	1	22	-11.30	8.78	-28.50	5.90		
All Studies	%VO2max	11	12	563	-6.51	10.20	-26.50	13.47	-35.01	21.98

Subgroup	Subset	Studies	Sample	N	Bias	sd_bias	LOA_L	LOA_U	CI_L	CI_U
All Studies	%VO2max (w/o outliers)	10	11	406	-5.25	9.18	-23.24	12.74	-31.32	20.81