

CORRECTION

Correction: Navigating under sea ice promotes rapid maturation of diving physiology and performance in beluga whales

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There was an error in *J. Exp. Biol.* (2016) **219**, 2828–2836 (doi:10.1242/jeb.143644).

The mathematics used in Eqn 2 in the blood oxygen storage portion of our calculated aerobic dive limit (cADL) shown below:

$$\text{Venous O}_2 = (0.67 \times \text{BV} \times M)([\text{Hb}] \times 0.00134)[0.95 \text{ saturation} - (0.05 \times 0.95 \text{ saturation})]$$

did not adequately represent the assumptions of Ponganis (2011), where on pp. 453–454 he described the oxygenation of the venous blood as follows: (i) one-third of the blood volume is arterial and two-thirds are venous; (ii) initial arterial Hb saturation is 95% and final arterial Hb saturation is 20%; (iii) initial venous O₂ content is 5 ml dl⁻¹ less than 95% saturated Hb and final venous O₂ content is zero; and (iv) the oxygen-binding capacity of hemoglobin is 1.34 ml O₂ g⁻¹ Hb at 100% saturation.

The revised equation below is the accurate mathematical interpretation of these assumptions:

$$\text{Venous O}_2 = [0.95 \text{ saturation} \times (0.67 \times \text{BV} \times M)([\text{Hb}] \times 0.00134)] - [0.051 \text{ O}_2 \text{ l}^{-1} \text{ blood} \times (0.67 \times \text{BV} \times M)],$$

where venous O₂ is in l, blood volume (BV) is in l kg⁻¹, body mass (*M*) is in kg, Hb concentration ([Hb]) is in g l⁻¹ blood and the oxygen-binding capacity of hemoglobin is 1.34 ml O₂ g⁻¹ Hb.

Tables 1–3 show the original and revised calculations for blood and total oxygen storage capacity, cADLs and maximum attainable depth for each cADL, as well as search times for dive depths of 200, 300 and 400 m.

Table 1. Calculated aerobic dive limit (cADL) and maximum dive depth achievable within these estimated breath-hold limits in relation to age, sex and diving metabolism for neonatal to 10 year old belugas

Age (years)	Female				Male			
	2× Kleiber MR		4× Kleiber MR		2× Kleiber MR		4× Kleiber MR	
	cADL (min)	Max. depth (m)	cADL (min)	Max. depth (m)	cADL (min)	Max. depth (m)	cADL (min)	Max. depth (m)
0	3.61 (3.25)	216 (195)	1.80 (1.63)	108 (98)	3.61 (3.25)	216 (195)	1.80 (1.63)	108 (98)
0.5	5.67 (5.19)	340 (311)	2.84 (2.59)	170 (155)	6.00 (5.49)	360 (329)	3.00 (2.74)	180 (164)
1	8.54 (8.00)	512 (480)	4.27 (4.00)	256 (240)	8.87 (8.31)	532 (499)	4.43 (4.15)	266 (249)
2	9.30 (8.71)	558 (523)	4.65 (4.36)	279 (262)	9.38 (8.79)	563 (527)	4.69 (4.39)	281 (263)
3	9.91 (9.28)	594 (557)	4.95 (4.64)	297 (278)	9.84 (9.22)	591 (553)	4.92 (4.61)	295 (277)
4	10.46 (9.80)	627 (588)	5.23 (4.90)	314 (294)	10.34 (9.69)	620 (581)	5.17 (4.84)	310 (290)
5	10.82 (10.14)	649 (608)	5.41 (5.07)	325 (304)	10.71 (10.04)	643 (602)	5.36 (5.02)	321 (301)
6	11.13 (10.43)	668 (626)	5.56 (5.21)	334 (313)	11.05 (10.35)	663 (621)	5.52 (5.18)	331 (311)
7	11.33 (10.62)	680 (637)	5.66 (5.31)	340 (319)	11.31 (10.60)	679 (636)	5.66 (5.30)	339 (318)
8	11.48 (10.76)	689 (646)	5.74 (5.38)	344 (323)	11.58 (10.85)	695 (651)	5.79 (5.42)	347 (325)
9	11.59 (10.86)	695 (652)	5.79 (5.43)	348 (326)	11.81 (11.07)	708 (664)	5.90 (5.53)	354 (332)
10	11.67 (10.94)	700 (656)	5.84 (5.47)	350 (328)	12.01 (11.26)	721 (676)	6.01 (5.63)	360 (338)
At max. mass	12.58 (11.79)	755 (707)	6.29 (5.89)	377 (353)	13.53 (12.68)	812 (761)	6.77 (6.34)	406 (380)

The table shows values from the original Table 3 calculated using the original Eqn 2, with values in parentheses calculated using the revised equation.

Table 2. Data used to generate Fig. 3 for blood and total mass-specific oxygen store of a female neonate, 6 month nursing calf, 2 year old newly weaned calf and maximum-sized adult female and male

Age class	Blood (ml kg ⁻¹)	Total (ml kg ⁻¹)
Neonate (F)	18.00 (15.47)	25.85 (23.32)
6 months (F)	24.54 (21.63)	34.04 (31.13)
2 years (F)	27.35 (24.29)	48.40 (45.35)
Adult F	27.35 (24.29)	48.48 (45.43)
Adult M	27.35 (24.29)	48.41 (45.36)

The table shows the values used in Fig. 3, with values calculated using the revised equation shown in parentheses. Data for muscle and lung oxygen stores are not shown as these were not altered by using the revised equation.

Table 3. Data used to generate Fig. 4 for theoretical search time in minutes at 200, 300 and 400 m depth in relation to age for female and male beluga whales, assuming a diving metabolism of 2× Kleiber basal metabolism and swim speed of 2 m s⁻¹

Age (years)	Female			Male		
	200 m	300 m	400 m	200 m	300 m	400 m
0	0.3 (0)	0 (0)	0 (0)	0.3 (0)	0 (0)	0 (0)
0.5	2.3 (1.9)	0.7 (0.2)	0 (0)	2.7 (2.2)	1.0 (0.5)	0 (0)
1	5.2 (4.7)	3.5 (3.0)	1.9 (1.3)	5.5 (5.0)	3.9 (3.3)	2.2 (1.6)
2	6.0 (5.4)	4.3 (3.7)	2.6 (2.0)	6.0 (5.5)	4.4 (3.8)	2.7 (2.1)
3	6.6 (5.9)	4.9 (4.3)	3.2 (2.6)	6.5 (5.9)	4.8 (4.2)	3.2 (2.6)
4	7.1 (6.5)	5.5 (4.8)	3.8 (3.1)	7.0 (6.4)	5.3 (4.7)	3.7 (3.0)
5	7.5 (6.8)	5.8 (5.1)	4.2 (3.5)	7.4 (6.7)	5.7 (5.0)	4.0 (3.4)
6	7.8 (7.1)	6.1 (5.4)	4.5 (3.8)	7.7 (7.0)	6.0 (5.4)	4.4 (3.7)
7	8.0 (7.3)	6.3 (5.6)	4.7 (4.0)	8.0 (7.3)	6.3 (5.6)	4.6 (3.9)
8	8.1 (7.4)	6.5 (5.8)	4.8 (4.1)	8.2 (7.5)	6.6 (5.9)	4.9 (4.2)
9	8.3 (7.5)	6.6 (5.9)	4.9 (4.2)	8.5 (7.7)	6.8 (6.1)	5.1 (4.4)
10	8.3 (7.6)	6.7 (5.9)	5.0 (4.3)	8.7 (7.9)	7.0 (6.3)	5.3 (4.6)
At max. mass	9.2 (8.5)	7.6 (6.8)	5.9 (5.1)	10.2 (9.3)	8.5 (7.7)	6.9 (6.0)

The table shows the values used in Fig. 4, with values calculated using the revised equation shown in parentheses.

The estimated blood and total oxygen storage capacity and cADLs are not largely impacted by using the revised equation, and the major findings and conclusions of the paper remain the same.

The authors apologize to readers for any inconvenience caused.

Reference

Ponganis, P. J. (2011). Diving mammals. *Compr. Physiol.* **1**, 447-465. <https://doi.org/10.1002/cphy.c091003>