Supplementary Materials for

Relationship between red blood cell lifespan and endogenous carbon monoxide in the common bottlenose dolphin and beluga

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Fig. S1. Individual Survival Curves. Fifth order polynomials fit to the (APE%) for each individual. Each figure is titled with the animals' identification. Bottlenose dolphins are depicted with a gray line and belugas are depicted with a blue line. Each black dot represents a sampling time point.

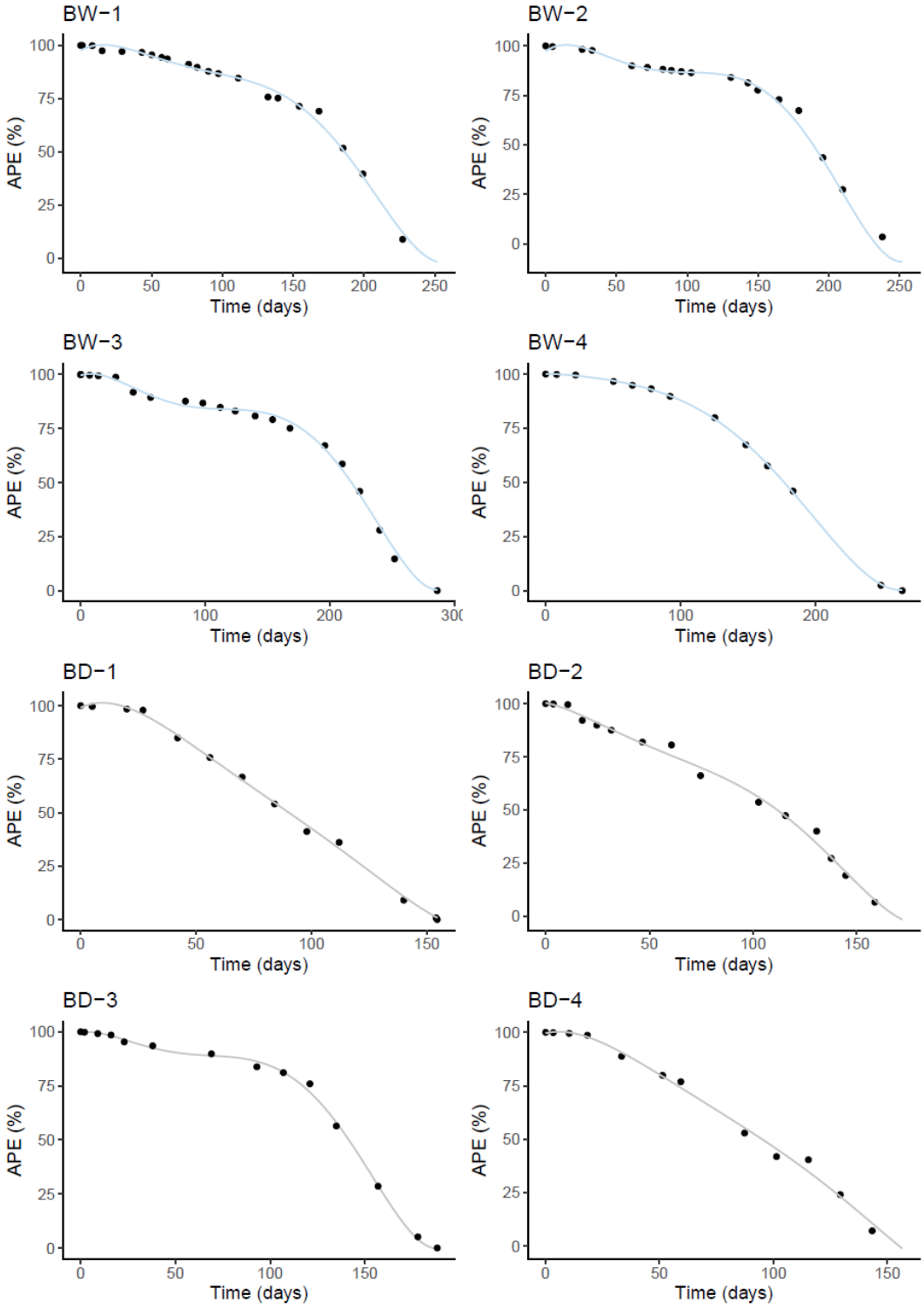

Table S1. Equations for 5th order polynomials fit to survival curves of all individuals.

Animal ID	Equation	Adjusted R-squared
BD-1	$99.59 + 0.2389x - 0.0023x^2 + (2.844 * 10^{-4})x^3 - (1.68 * 10^{-6}) * x^4 + (3.652 * 10^{-9})x^5$	0.997
BD-2	$100.4 - 0.2026x - (1.154 * 10^{-2})x^2 + (2.250 * 10^{-4})x^3 - (1.774 * 10^{-6})x^4 + (4.53 * 10^{-9})x^5$	0.992
BD-3	$99.66 + 0.1283x - (1.944 * 10^{-2})x^2 + (3.98 * 10^{-4})x^3 - (3.059 * 10^{-6})x^4 + (7.408 * 10^{-9})x^5$	0.997
BD-4	$99.59 + 0.2389x - (2.3 * 10^{-2})x^2 + (2.844 * 10^{-4})x^3 - (1.68 * 10^{-6})x^4 + (3.652 * 10^{-9})x^5$	0.992
BW-1	$97.65 + 0.3668x - (1.555 * 10^{-2})x^2 + (1.863 * 10^{-4})x^3 - (9.5 * 10^{-7})x^4 + (1.619 * 10^{-9})x^5$	0.993
BW-2	$97.36 + 0.491x - (2.281 * 10^{-2})x^2 + (2.937 * 10^{-4})x^3 - (1.511 * 10^{-6})x^4 + (2.57 * 10^{-9})x^5$	0.995
BW-3	$99.66 + 0.1742x - (1.27 * 10^{-2})x^2 + (1.561 * 10^{-4})x^3 - (7.28 * 10^{-9})x^4 + (1.102 * 10^{-9})x^5$	0.995
BW-4	$100.1 - 0.008306\text{x} - (1.569 * 10^{-3})x^2 + (1.651 * 10^{-5})x^3 - (1.6 * 10^{-7})x^4 + (3.783 * 10^{-10})x^5$	0.999

Table S2. Statistical Results. Mann-Whitney test (W) results with corresponding p-value between bottlenose dolphins and belugas for each paired test.

	Mann-Whitney Test (W)	p-value
Mean RBC age	16	0.029
Median RBC survival	16	0.029
Half-median RBC survival	16	0.029
Mean RBC survival	16	0.029
α-spectrin	10	0.69
β-spectrin	6	0.69
Ankryin	8.5	1.00
Band 3	11	0.49
Band 4.1	7	0.89
Band 4.2	8	1.00
Actin	6	0.69
Stomatin	10	0.69
Mean ETCO	32	0.018
Max ETCO	44.5	0.016
COHb (%)	10	0.49
mL CO/ 100 mL blood	14	0.11
50% Hemolysis	0	0.029

Methods S2. CO Production from RBC Turnover.

Example calculation for individual BW-1:

Average tHb (g/100 ml)	22.2
Average body mass (g)	574000
Average blood volume (ml/kg)	128 (*43*)
Mean RBC survival (days)	172

Rate of red blood cell turnover/hr:

$$\left(\frac{1}{172\ days}\right) * \left(\frac{1\ day}{24\ hours}\right) = 2.42 * 10^{-4}\ rate\ destroyed/hr$$

Total volume of blood:

$$\frac{128\ ml\ blood}{kg} * \left(\frac{1\ kg}{1000\ g}\right) * 574000\ g = 73472\ ml\ blood$$

Total moles of Hb:

$$\frac{22.2\ g\ Hb}{100\ ml\ blood} = \left(\frac{x}{73472\ ml\ blood}\right)\left(\frac{1\ mol\ Hb}{64500\ g}\right)$$

Total moles heme:

$$0.25\ mol\ Hb\ \left(\frac{4\ mol\ heme}{1\ mol\ Hb}\right) = 1.0\ mol\ heme$$

Amount of heme degraded per hour:

$$1.0\ mol\ heme * (2.42 * 10^{-4}) = 2.42 * 10^{-4}\ \frac{mol\ heme}{hr}$$

Amount of CO produced per hour (assuming equimolar concentrations of heme and CO):

$$2.42 * 10^{-4}\ \frac{mol\ heme}{hr} * 22,400 = 5.5\ ml\ CO/hr$$

References:

43. Ridgway SH, Bowers CA, Miller D, Schultz ML, Jacobs CA, and Dooley CA. Diving and blood-oxygen in the white whale. *Canadian Journal of Zoology-Revue Canadienne De Zoologie* 62: 2349-2351, 1984.