

Table S1. Characteristics of the female and male Asian elephants that have body composition data.

	Females (n=31)	Males (n=7)
Age (years)	31.2 ± 13.9	19.1 ± 10.14*
Body Mass (kg)	3340 ± 702	4319 ± 1495
Fat Mass (kg)	349 ± 217	389 ± 296
Fat-Free Mass (kg)	2991 ± 588	3930 ± 1245*
RFM (kg)	20 ± 172	-97 ± 146
BCS (0-10)	7.13 ± 1.43	7.29 ± 1.11
Height (in)	94 ± 7	105 ± 7**
Length (in)	85 ± 10	96 ± 9*
Glucose (mg/dL)	74.52 ± 10.46	77.71 ± 13.49
Insulin (µg/L)	0.861 ± 0.747	0.675 ± 0.486
SAA (mg/L)	6.19 ± 21.23	8.24 ± 19.55
Distance (km)	0.62 ± 0.35 ^a	0.81 ± 0.45 ^b

Abbreviation: SAA, serum amyloid A. Data are presented as mean ± SD. Distance walked is depicted on 60-minute intervals for a minimum of 6 hours. T-tests were used to compare the means of age, height, and body length. Wilcoxon tests were used to compare the means of body mass, fat mass, fat-free mass, glucose, insulin, SAA, and distance walked because of their non-normal distributions.

*,**Significant difference between male and female elephants: *P<0.05, **P<0.001.

^an =28, ^bn=6.

Table S2. Characteristics of the female Asian elephants that have body composition.

	Cycling (n=19)	Noncycling (n=12)
Age (years)	23.6 ± 11.2	43.1 ± 8.4**
Body Mass (kg)	3245 ± 729	3492 ± 659
Fat Mass (kg)	376 ± 250	307 ± 154
Fat-Free Mass (kg)	2868 ± 582	3185 ± 567
RFM (kg)	62 ± 192	-46 ± 113
BCS (0-10)	7.53 ± 1.31	6.50 ± 1.45
Height (in)	94 ± 6	95 ± 7
Length (in)	84 ± 11	87 ± 8
Nulliparous [No. (%)]	10/19 (52.6)	10/12 (83.3)
Glucose (mg/dL)	74.84 ± 11.28	74.00 ± 9.47
Insulin(μg/L)	0.944 ± 0.819	0.729 ± 0.626
Estradiol (pg/mL)	12.76 ± 6.73 ^a	16.06 ± 13.66
SAA (mg/L)	9.54 ± 26.82	0.88 ± 1.29
Distance (km)	0.62 ± 0.29 ^a	0.60 ± 0.45 ^b

Abbreviation: SAA, serum amyloid A. Data, except for nulliparous, are presented as mean ± SD.

Nulliparous data are presented as the number of elephants that were nulliparous out of the total number of elephants. Data presented are all available data on the sample population, regardless of whether there was body composition on the elephant. Distance walked is depicted on 60-minute intervals for a minimum of 6 hours. T-tests were used to compare the means of age, body mass, fat mass, fat-free mass, height, body length, glucose, insulin, estradiol, and distance walked. Wilcoxon tests were used to compare the means of SAA because of its non-normal distribution.

*,** Significant difference between cycling and noncycling elephants: *P<0.05, **P<0.001.

^an=18; ^bn=10.

Table S3. Odds ratios for FM in GEE models to predict cycling status in Asian elephants, excluding elephants with calves aged 3 years or younger

Model	OR	(95% CI)	P
Cycling = FFM FM	1.70	(1.19-2.45)	0.004
Cycling = age FFM FM	3.06	(1.65-5.69)	<0.001
Cycling = age dominant FFM FM	3.12	(1.57-6.17)	0.001
Cycling = age male FFM FM	2.88	(1.63-5.08)	<0.001
Cycling= age estradiol FFM FM	4.35	(1.20-15.78)	0.025

Cycling: cycling status (cycling or not cycling); FFM: fat-free mass (100 kg); FM: fat mass (100 kg); Dominant: dominance status (dominant or non-dominant; Male: housed with males with direct contact, housed with males with indirect contact, or not housed with males.

Table S4. Estimates for estradiol in linear mixed models to predict fat mass and relative fat mass of Asian elephants

Model	Estimate	SE	(95% CI)	P
RFM = Estradiol	-5.62	3.08	(-12.11 to -0.31)	0.081
RFM = Estradiol age	-5.40	3.13	(-12.42 to 0.97)	0.096
FM = Estradiol	-3.31	4.14	(-12.00 to 4.86)	0.430
FM = Estradiol age	-3.16	4.21	(-11.69 to 5.00)	0.459
RFM = Estradiol*	-6.57	2.95	(-12.34 to -0.80)	0.035
RFM = Estradiol age*	-6.98	2.93	(-12.58 to -1.37)	0.025
FM = Estradiol*	-4.67	4.25	(-13.00 to 3.61)	0.280
FM = Estradiol age*	-4.44	4.32	(-12.69 to 3.79)	0.316

Abbreviations: FM, fat mass; FFM, fat-free mass; RFM, relative fat mass. *Estimates for estradiol in linear mixed models to predict fat mass, excluding elephants with calves aged 3 years and younger

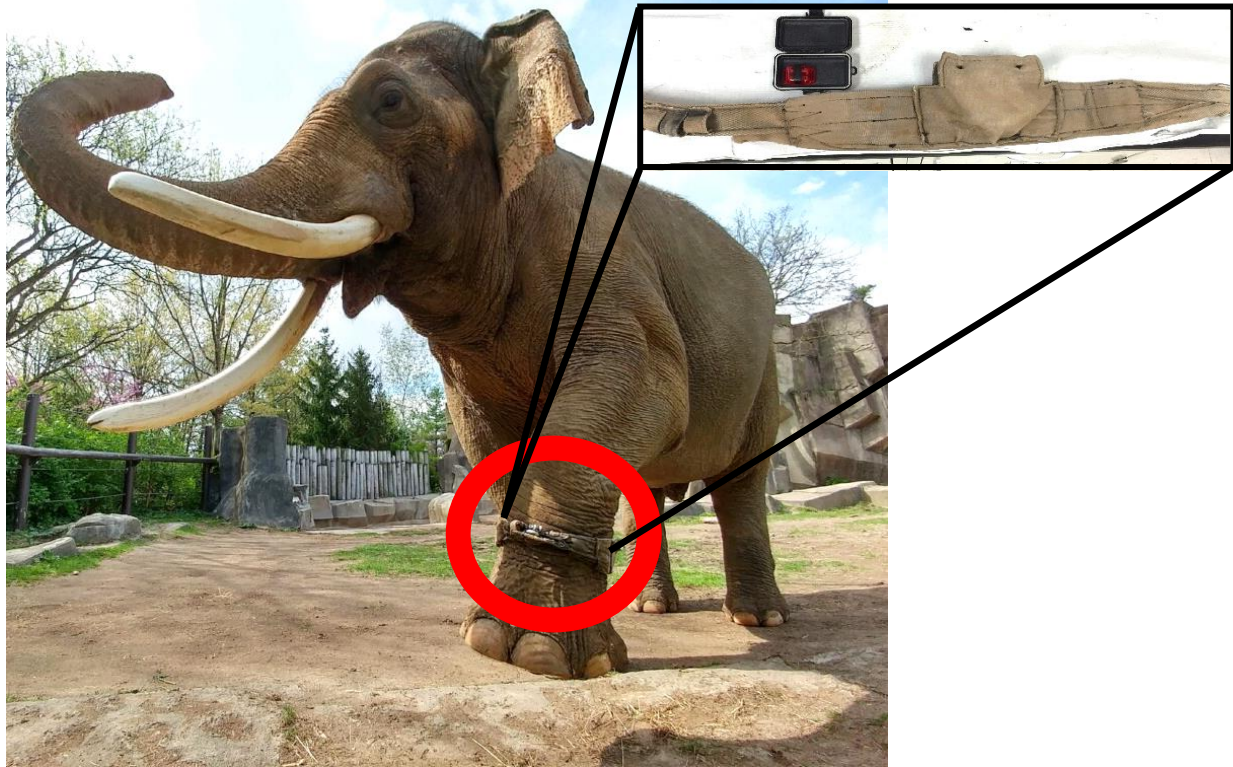
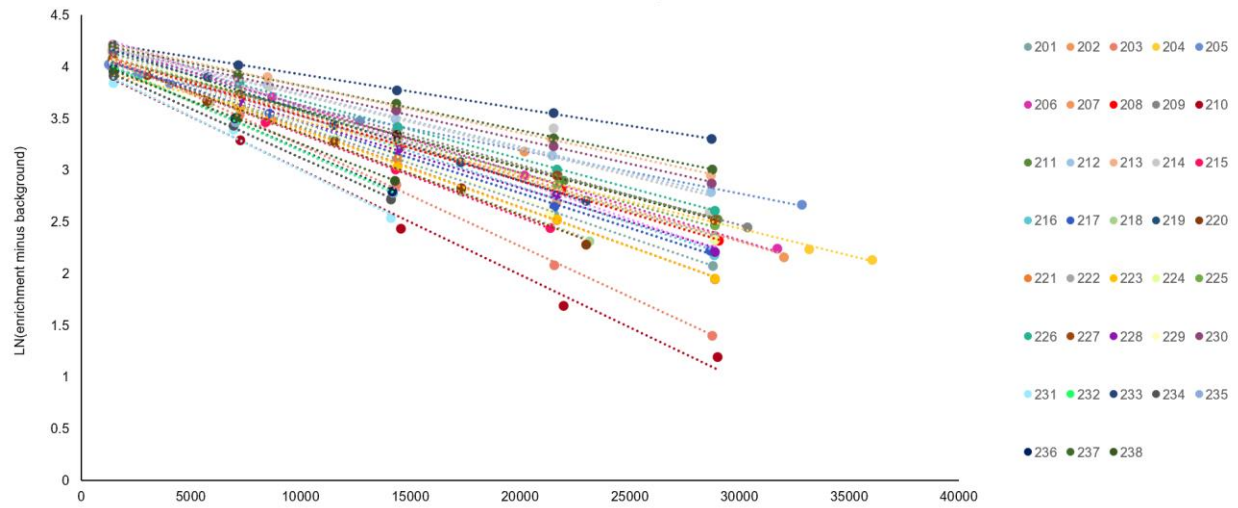


Figure S1. Photographic depiction of an Asian elephant wearing the activity tracking bracelet, highlighted by the red circle. In the inlay is a photograph of the accelerometer (red device) inside the waterproof box (black case) above the bracelet they will ultimately be placed inside of.

A



B

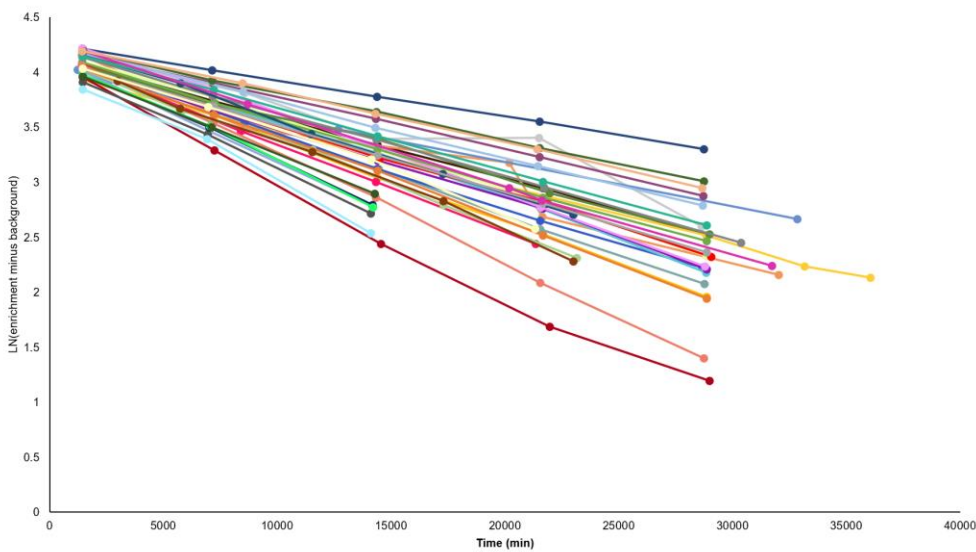


Figure S2. Deuterium washout curves for Asian elephants. A) Trendline for each respective elephant, which was used to back extrapolate the elephant's initial deuterium enrichment. B) Each elephant's curve demonstrating that deuterium equilibrated completely and rapidly with the rest of the body water, leading to single pool kinetics. Each point represents a blood sample analyzed for deuterium enrichment.