Table S1. Species, common names, body mass (MB), grams of fat and lean mass consumed per day of hibernation, including the proportional contribution of each tissue to the consumption, daily energy expenditure of hibernation (DEEH) and DEEH corrected by arousal costs. This last value was used for the allometric regressions (see methods for details, in [1]).

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Species | common | Order | MB | Fat consumption | Lean mass consumption | Fat+Lean | DEEHTotal | DEEH | Savings  (%) | Cellular MR5  (W cell-1) | Reference |  |
|  | name |  | (g) | (g/d) | (g/d) | (g/d) | (kJ/d) | minus arousals |  |  |  |  |
| *M. lucifugus* | Little brown bat | *Eutheria* | 8.5 | 0.0063 | 0.0021 | 0.01 | 0.29 | 0.23 | 97.32 | 6.02E-13 | [2] |  |
| *M. myotis* | Mouse eared bat | *Eutheria* | 24.7 | 0.05 | 0.01 | 0.06 | 2.24 | 2.10 | 88.12 | 1.86E-12 | [3] |  |
| *Z. princeps* | Jumping mouse | *Eutheria* | 36 | 0.07 | 0.021 | 0.09 | 3.22 | 0.42 | 98.12 | 2.57E-13 | [4] | |
| *D. gliroides* | Monito del monte | *Metatheria* | 45 | 0.18 | 0.05 | 0.23 | 8.40 | 6.32 | 76.12 | 3.06E-12 | [5] | |
| *C. nanus* | Pigmy possum | *Metatheria* | 50 | 0.061 | 0.021 | 0.08 | 2.80 | 2.31 | 91.92 | 1.01E-12 | [6] |  |
| *S. parryii* | Arctic ground squirrel | *Eutheria* | 820 | 0.4536 | 0.27 | 0.72 | 24.38 | 18.97 | 90.92 | 5.04E-13 | [7] |  |
| *M. monax* | Woodchuck | *Eutheria* | 2180 | 3 | 0.801 | 3.80 | 137.92 | 120.64 | 66.12 | 1.21E-12 | [8] |  |
| *T. aculeatus* | Short-beaked equidna | *Pototheria* | 4673 | 5.63 | 1.501 | 7.13 | 258.83 | 239.39 | 59.62 | 1.12E-12 | [9] | |
| *U. americanus* | Black bear | *Eutheria* | 74900 | 100.3 | 15.5 | 115.8 | 4347.71 | 4337.11 | -14.02 | 1.26E-12 | [10] |  |
| *U. arctos* | Brown bear | *Eutheria* | 179157 | 264 | 206 | 470.0 | 15342.40 | 15317.62 | -124.52 | 1.86E-12 | [11] | |
| *M\_marmota* | Alpine marmot | *Eutheria* | 4100 | 4.1 | 1.081 | 5.15 | 187.15 | 149.72 | 72.42 | 7.95E-13 | [12] |  |
| *E\_quercinus* | Dormouse | *Eutheria* | 180.2 | 0.34 | 0.091 | 0.43 | 15.45 | 12.36 | 81.52 | 1.49E-12 | [13] |  |
| *S\_columbianus* | Columbian ground squirrel | *Eutheria* | 490.9 | 0.47 | 0.131 | 0.60 | 21.79 | 17.43 | 86.72 | 7.73E-13 | [14] |  |
| *E\_fuscus* | Big brown bat | *Eutheria* | 20.6 | 0.03 | 0.0081 | 0.04 | 1.38 | 1.10 | 92.92 | 1.17E-12 | [15] | |
| *G\_glis* | Garden dormouse | *Eutheria* | 192.5 | 0.29 | 0.0781 | 0.37 | 13.45 | 10.76 | 84.62 | 1.22E-12 | [16] | |
| *H\_terasensis* | Formosan leaf-nosed bat | *Eutheria* | 55 | 0.08 | 0.0211 | 0.10 | 3.68 | 2.95 | 90.32 | 1.17E-12 | [17] | |
| *T\_taxus* | American badger | *Eutheria* | 8005 | 5.6 | 1.491 | 7.1 | 257.14 | 205.71 | 75.82 | 5.60E-13 | [18] |  |
| *M. flaviventris* | Yellow bellied marmot | *Eutheria* | 2111 | --- | --- | --- | ---- | --- | 83.33 | --- | [19] |  |
| *U. americanus* | Black bear | *Eutheria* | 60000 | --- | --- | --- | --- | --- | 533 | --- | [20] |  |
| *U. richardsonii* | Richardson’s ground squirrel | *Eutheria* | 330 | --- | --- | --- | --- | --- | 87.74 | --- | [21] |  |
| *S. saturatus* | Golden-mantled ground squirrel | *Eutheria* | 250 | --- | --- | --- | --- | --- | 854 | --- | [22] |  |

1the contribution of fat and lean mass to DEEH was estimated assuming 79% of fat and 21% of lean mass (1 gram of fat=39.7kJ; 1 gram of lean mass = 23.6kJ, see methods for details). 2Energy savings were computed as (DEEH-BMR)/BMR (see methods for details). 3Energy savings of hibernation were reported in the original study (compared to BMR). 4Energy savings of hibernation was estimated compared with the annual energy budget.5 Cellular metabolic rate was calculated assuming that a human body contains 3.72x1013 cells [23].

References

1. Nespolo R.F., Mejias C., Bozinovic F. 2022 Why bears hibernate? Redefining the scaling energetics of hibernation. *Proceedings of the Royal Society B* **in press**.

2. Jonasson K.A., Willis C.K.R. 2012 Hibernation energetics of free-ranging little brown bats. *J Exp Biol* **215**(12), 2141-2149. (doi:10.1242/jeb.066514).

3. Koteja P., Jurczyszyn M., Woloszyn B.W. 2001 Energy balance of hibernating mouse-eared bat Myotis myotis: a study with a TOBEC instrument. *Acta Theriologica* **46**(1), 1-12. (doi:10.1007/bf03192411).

4. Cranford J.A. 1978 Hibernation in the western jumping mouse (*Zapus princeps*). *Journal of Mammalogy* **59**, 496-509.

5. Mejias C., J. N., Sabat P., Franco L.M., Bozinovic F., Nespolo R.F. 2022 Body composition and energy savings by hibernation in the South American marsupial *Dromiciops gliroides*: a field study applying quantitative magnetic resonance. *Physiological and Biochemical Zoology (in press)* (xx), 1-10.

6. Geiser F. 2007 Yearlong hibernation in a marsupial mammal. *Naturwissenschaften* **94**(11), 941-944. (doi:10.1007/s00114-007-0274-7).

7. Buck C.L., Barnes B.M. 1999 Annual cycle of body composition and hibernation in free-living arctic ground squirrels. *Journal of Mammalogy* **80**(2), 430-442. (doi:10.2307/1383291).

8. Bailey E.D., Davis D.E. 1965 The utilization of body fat during hibernation in woodchucks. *Canadian Journal of Zoology* **43**, 701-707.

9. Falkenstein F., Kortner G., Watson K., Geiser F. 2001 Dietary fats and body lipid composition in relation to hibernation in free-ranging echidnas. *Journal of Comparative Physiology B-Biochemical Systemic and Environmental Physiology* **171**(3), 189-194. (doi:10.1007/s003600000157).

10. Harlow H.J., Lohuis T., Grogan R.G., Beck T.D.I. 2002 Body mass and lipid changes by hibernating reproductive and nonreproductive black bears (*Ursus americanus*). *Journal of Mammalogy* **83**(4), 1020-1025. (doi:10.1644/1545-1542(2002)083<1020:Bmalcb>2.0.Co;2).

11. Hilderbrand G.V., Schwartz C.C., Robbins C.T., Hanley T.A. 2000 Effect of hibernation and reproductive status on body mass and condition of coastal brown bears. *Journal of Wildlife Management* **64**(1), 178-183. (doi:10.2307/3802988).

12. Arnold W. 1986 Ökosoziologie des Alpenmurmeltieres (Marmota marmota marmota Linne 1758). Dissertation Ludwig-MaHmüian-Unversität, München 1-138.

13. Pajunen I. 1970 Body temperature, heart rate, breathing pattern, weight loss and periodicity of hibernation in the Finnish garden dormouse, *Eliomys quercinus* L. *Ann Zool Fenn* **7**, 251-266.

14. Neuhaus P. 2000 Timing of hibernation and molt in female Columbian ground squirrels. *Journal of Mammalogy* **81**(2), 571-577. (doi:10.1644/1545-1542(2000)081<0571:Tohami>2.0.Co;2).

15. Beer J.R., Richards A.G. 1956 Hibernation of the big brown bat. *Journal of Mammalogy* **37**, 31-41.

16. Bieber C., Lebl K., Stalder G., Geiser F., Ruf T. 2014 Body mass dependent use of hibernation: why not prolong the active season, if they can? *Funct Ecol* **28**(1), 167-177. (doi:10.1111/1365-2435.12173).

17. Liu J.-N., Karasov W.H. 2011 Hibernation in warm hibernacula by free-ranging Formosan leaf-nosed bats, Hipposideros terasensis, in subtropical Taiwan. *Journal of Comparative Physiology B-Biochemical Systemic and Environmental Physiology* **181**(1), 125-135. (doi:10.1007/s00360-010-0509-3).

18. Harlow H.J. 1981 Torpor and other physiological adaptations of the badger (Taxidea taxus) to cold environment. *Physiol Zool* **54**, 267-275.

19. Armitage K.B., Blumstein D.T., Woods B.C. 2003 Energetics of hibernating yellow-bellied marmots (*Marmota flaviventris*). *Comp Biochem Physiol A-Mol Integr Physiol* **134**(1), 103-116.

20. Toien O., Blake J., Edgar D.M., Grahn D.A., Heller H.C., Barnes B.M. 2011 Hibernation in black bears: independence of metabolic suppression from body temperature. *Science* **331**(6019), 906-909. (doi:10.1126/science.1199435).

21. Wang L.C.H. 1978 Energetic and field aspects of mammalian torpor: the Richardson’s ground squirrel. *J Therm Biol* **3**, 87.

22. Kenagy G.J., Sharbaugh S.M., Nagy K.A. 1989 Annual cycle of energy and time expenditure in a golden-mantled ground squirrel population. *Oecologia (Berlin)* **78**, 269-282.

23. Bianconi E., Piovesan A., Facchin F., Beraudi A., Casadei R., Frabetti F., Vitale L., Pelleri M.C., Tassani S., Piva F., et al. 2013 An estimation of the number of cells in the human body. *Annals of Human Biology* **40**(6), 463-471. (doi:10.3109/03014460.2013.807878).