**Suppl 1.** PTH data

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Pre-flight** | **In-flight** | **R+0** | **R+1** | **R+2-7** | **>R+7** |
| # | Author(s), year (units) |  |  |  |  |  |  |  |  |  |  |  |  |
|  | (n) Condition | Mean | **±** σ | Mean | **±** σ | Mean | **±** σ | Mean | **±** σ | Mean | **±** σ | Mean | **±** σ |
|  |  | *d* | Trend | *d* | Trend | *d* | Trend | *d* | Trend | *d* | Trend | *d* | Trend |

Trend legend:

(↓) authors found significant decrease from pre-flight (p < 0.05)

(▼) authors found trend to significant decrease from pre-flight (0.05 < p ≤ 0.1)

(↑) authors found significant increase from pre-flight (p < 0.05)

(▲) authors found trend to significant increase from pre-flight (0.05 < p < 0.1)

(-) authors found nonsignificant change from pre-flight

(U) p-values unreported by authors.

**Table S1.** Data table with mean PTH data, standard deviation, calculated Cohen’s *d*, sample size, experimental condition, and significance of results extracted from all studies.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Pre-Flight** | **In-Flight** | **R+0** | **R+1** | **R+2-7** | **>R+7** |
| 1 | Smith et al. 2005 (pg/mL) |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  (6) Real | 26 | 24.5 | 15 | 14.7 | 25 | 29.4 |  |  | 32 | 41.6 | 26 | 9.8 |
|  |  |  |  | -0.54 | - | -0.04 | - |  |  | 0.18 | - | 0.0 | - |
|  |  (16) Real | 31 | 14 |  |  | 33 | 9 | 24 | 8 | 33 | 10 | 39 | 9 |
|  |  |  |  |  |  | 0.17 | -- | 0.61 | -- | 0.16 | -- | 0.68 | -- |
| 2 | Shackelford et al. 2004 (pg/mL) |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  (18) Simulated | 23.7 | 7.2 | 17.6 | 5.1 |  |  |  |  |  |  |  |  |
|  |  |  |  | -0.98 | ↓ |  |  |  |  |  |  |  |  |
| 3 | Linossier et al.[[1]](#footnote-1) 2022 (ng/L) |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  (9) Simulated | 23.4 | 21.7 | 21.2 | 14 |  |  |  |  | 23.4 | 20.4 |  |  |
|  |  |  |  | -0.12 | ↓[[2]](#footnote-2) |  |  |  |  | 0.0 | - |  |  |
| 4 | Morukov et al.[[3]](#footnote-3) 2005 (percent of baseline) |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  (9) Real | 100 | N/A |  |  |  |  | 174.15 | 51.82 | 175.00 | 39.93 | 161.41 | 39.08 |
|  |  |  |  |  |  |  |  | 2.02 | U | 2.66 | U | 2.22 | U |
| 5 | Smith et al. 2015 (pg/mL) |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  (7) Real | 32 | 3 | 28 | 18 |  |  |  |  |  |  |  |  |
|  |  |  |  | -0.31 | ↓ |  |  |  |  |  |  |  |  |
| 6 | Armbrecht et al. 2010 (percent change from baseline) |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  (10) Simulated | 0 | N/A | -43.13 | 24.70 |  |  | -32.5 | 28.65 | -11.56 | 34.60 | 55.69 | 175.82 |
|  |  |  |  | -2.47 | ↓ |  |  | -1.60 | ↓ | -0.47 | - | 0.45 | ↑ |
| 7 | Smith et al. 2012 (percent change from baseline) |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  (6) Real | 0 | N/A | -50.0 | 18.07 | 6.63 | 63.25 |  |  |  |  | 9.64 | 64.46 |
|  |  |  |  | -3.91 | ↓ | 0.15 | - |  |  |  |  | 0.21 | - |
| 8 | Zerwekh et al. 2007 (pg/mL) | 43 | 16 | 29 | 10 |  |  |  |  |  |  |  |  |
|  |  (10) Simulated |  |  | -1.05 | ↓ |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 9 | Smith et al. 2003 (pg/mL) |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  (8) Simulated | 21.9 | 8.2 | 13.9 | 5.7 |  |  | 18.3 | 5.9 | 22.6 | 7.6 |  |  |
|  |  |  |  | -1.14 | ↓ |  |  | -0.61 | ▼ | 0.09 | - |  |  |
| 10 | Zwart et al. 2007 (pg/mL) |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  (7) Simulated | 20.8 | 4.0 | 16.6 | 5.1 | 15.8 | 4.4 | 18.4 | 4.9 | 19.9 | 6.3 |  |  |
|  |  |  |  | -0.8 | - | -1.14 | ↓ | -0.50 | ▼ | -0.27 | - |  |  |
| 11 | Morgan et al. 2012 (pg/mL) |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  (12) Simulated | 19.9 | 7.8 | 14.1 | 4.18 |  |  |  |  | 17.5 | 4.7 |  |  |
|  |  |  |  | -0.93 | ↓ |  |  |  |  | -0.37 | - |  |  |
| 12 | Rittweger et al. 2005 (pmol/L) |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  (25) Simulated | 3.10 | 0.48 | 2.18 | 0.08 |  |  | 2.94 | 0.01 | 3.25 | 0.08 | 3.37 | 0.08 |
|  |  |  |  | -2.67 | ↓ |  |  | -0.47 | ▼ | -0.44 | - | 0.78 | ▲ |

**Table S2.** Summary table with *x̅* and *n* for all studies [1], real microgravity only [2], simulated microgravity only [3], and all studies with outlier data from Morukov et al. 2005 excluded [4]. Removing the outlier data did not change the significance of the results identified in the analysis.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **#** | **Condition** | **Pre-Flight** | **In-Flight** | **R+0** | **R+1** | **R+2-7** | **>R+7** |
|  |  |  | **n** | **x̅** | **n** | **x̅** | **n** | **x̅** | **n** | **x̅** | **n** | **x̅** | **n** |
| 1 | Total |  | 145 | -1.49 | 118 | -0.13 | 35 | -0.14 | 77 | 0.06 | 102 | 0.78 | 72 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 | Real |  | 46 | -1.52 | 19 | 0.12 | 28 | 0.93 | 27 | 0.69 | 31 | 0.87 | 37 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 | Simulated |  | 99 | -1.48 | 99 | -1.14 | 7 | -0.72 | 48 | -0.30 | 71 | 0.69 | 35 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 | Outliers excluded |  | 136 | -1.49 | 118 | -0.13 | 28 | -0.43 | 68 | -0.19 | 23 | 0.57 | 63 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |

1. 1 Results are reported as medians with IQRs. Standard deviations are approximated from IQRs using the formula SD = IQR/1.35 as given by the Cochrane Handbook for Systematic Reviews. [↑](#footnote-ref-1)
2. p < 0.07 as reported by authors [↑](#footnote-ref-2)
3. Measures of variance are assumed to be standard error. [↑](#footnote-ref-3)