**T****h****e** **Bone Biomarker Response to an Acute Bout of Exercise:**

**A Systematic Review with Meta-Analysis**

**Supplementary File 7: Primary meta-analyses and moderator analyses for bone resorption**

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|  | | **Summary of findings** | | | **Evidence Certainty** | | | | |
| **Outcome (#/n)** | | **Effect size**  **Median [95% CrI]** | **Between study standard error ()**  **Median [75% CrI]** | **ICC**  **Median [75% CrI]** | **D1**  **Risk of Bias** | **D2**  **Directness** | **D3**  **Inconsistency** | **D4**  **Imprecision** | **D5**  **Small-study Effects** |
| All biomarkers exercise  538 outcomes / 70 studies | | 0.10 [0.00 to 0.20] | 0.41 [0.39 to 0.44] | 0.11 [0.04 to 0.18] | High | Moderate | Low | Low | Very Low |
|  | CTX-1  323 outcomes / 52 studies | 0.14 [-0.01 to 0.31] | 0.54 [0.49 to 0.59] | 0.14 [0.04 to 0.23] | High | Moderate | Low | Low | Very Low |
|  | TRAP5b  86 outcomes / 7 studies | -0.06 [-0.12 to -0.00] | 0.03 [0.01 to 0.05] | 0.33 [0.07 to 0.74] | High | High | High | High | Moderate |
|  | ICTP  51 outcomes / 14 studies | 0.10 [-0.03 to 0.26] | 0.17 [0.11 to 0.23] | 0.39 [0.16 to 0.65] | Low | Very Low | Very Low | Very Low | Very Low |
|  | NTX  28 outcomes / 7 studies | 0.05 [-0.19 to 0.30] | 0.13 [0.06 to 0.22] | 0.77 [0.44 to 0.93] | Moderate | Low | Very Low | Very Low | Very Low |
|  | OPG  28 outcomes / 7 studies | 0.20 [0.04 to 0.38] | 0.13 [0.09 to 0.19] | 0.46 [0.16 to 0.79] | Moderate | Low | Low | Low | Very Low |
|  | RANKL  22 outcomes / 6 studies | -0.17 [-0.52 to 0.20] | 0.26 [0.16 to 0.39] | 0.35 [0.12 to 0.67] | Moderate | Low | Very Low | Very Low | Very Low |
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| All biomarkers Control  30 outcomes / 12 studies  (CTX-1:21; ICTP:10) | | -0.12 [-0.30 to 0.03] | 0.15 [0.08 to 0.23] | 0.45 [0.14 to 0.82] | High | Moderate | Low | Very Low | Very Low |
| Biomarkers control (CTX-1 only)  21 outcomes / 9 studies | | -0.15 [-0.41 to 0.09] | 0.17 [0.08 to 0.28] | 0.52 [0.18 to 0.85] | High | High | Moderate | Low | Very Low |
| **Moderator Analysis (CTX-1 Only)** | | | | | | | | | |
| **Timing** | | | | | | | | | |
| (Immediately - 8 hours post)  240 outcomes / 49 studies | | 0.13 [-0.07 to 0.34] | 0.62 [0.57 to 0.67] | 0.12 [0.04 to 0.21] | Moderate | Low | Very Low | Very Low | Very Low |
| (Immediatel­­­­y - 15min post)  119 outcomes / 44 studies | | 0.15 [-0.05 to 0.34] | 0.52 [0.46 to 0.58] | 0.21 [0.07 to 0.33] | Moderate | Low | Very Low | Very Low | Very Low |
| (> 15 min, ≤ 2 hours post)  90 outcomes / 31 studies | | 0.36 [-0.09 to 0.86] | 1.3 [1.1 to 1.4] | 0.01 [0.00 to 0.02] | Moderate | Low | Very Low | Very Low | Very Low |
| (> 2 hours, ≤ 8 hours post)  31 outcomes / 10 studies | | -0.04 [-0.78 to 0.83] | 1.1 [0.80 to 1.4] | 0.04 [0.01 to 0.10] | Low | Moderate | Very Low | Very Low | Very Low |
| 24 hours post  42 outcomes / 18 studies | | 0.00 [-0.14 to 0.16] | 0.20 [0.14 to 0.26] | 0.27 [0.09 to 0.56] | High | Moderate | Low | Low | Very Low |
| 48 hours post  20 outcomes / 12 studies | | 0.08 [-0.11 to 0.30] | 0.25 [0.17 to 0.34] | 0.09 [0.02 to 0.31] | High | Moderate | Low | Very Low | Very Low |
| 72 hour post  11 outcomes / 6 studies | | 0.23 [-0.05 to 0.53] | 0.18 [0.09 to 0.29] | 0.19 [0.04 to 0.57] | High | Moderate | Moderate | Low | Very Low |
| **Exercise Type** | | | | | | | | | |
| Aerobic  260 outcomes / 38 studies | | 0.23 [0.02 to 0.48] | 0.66 [0.60 to 0.72] | 0.10 [0.03 to 0.18] | High | Moderate | Low | Low | Very Low |
| Plyometric  31 outcomes / 7 studies | | -0.07 [-0.30 to 0.15] | 0.11 [0.05 to 0.19] | 0.85 [0.57 to 0.97] | High | Moderate | Low | Very Low | Very Low |
| Resistance  17 outcomes / 4 studies | | -0.14 [-0.32 to 0.10] | 0.08 [0.03 to 0.16] | 0.34 [0.07 to 0.78] | Moderate | Moderate | Moderate | Low | Very Low |
| **Impact level** | | | | | | | | | |
| Low impact/repetitive  108 outcomes / 16 studies | | 0.56 [0.08 to 1.0] | 0.81 [0.70 to 0.95] | 0.21 [0.08 to 0.34] | Moderate | Low | Very Low | Very Low | Very Low |
| Moderate impact/repetitive  150 outcomes / 25 studies | | 0.03 [-0.22 to 0.26] | 0.49 [0.46 to 0.58] | 0.05 [0.02 to 0.10] | High | Moderate | Low | Very Low | Very Low |
| Low impact / High load  28 outcomes / 9 studies | | -0.17 [-0.29 to -0.04] | 0.07 [0.03 to 0.13] | 0.60 [0.19 to 0.90] | High | Moderate | Moderate | Moderate | Low |
| High impact / directional  37 outcomes / 9 studies | | -0.04 [-0.20 to 0.13] | 0.09 [0.04 to 0.16] | 0.82 [0.48 to 0.96] | Moderate | Moderate | Low | Low | Very Low |
| **Modality** | | | | | | | | | |
| Running  114 outcomes / 17 studies | | -0.05 [-0.25 to 0.13] | 0.33 [0.28 to 0.39] | 0.05 [0.01 to 0.10] | High | Moderate | Low | Very Low | Very Low |
| Cycling  106 outcomes / 15 studies | | 0.65 [0.20 to 0.99] | 0.80 [0.69 to 0.95] | 0.20 [0.08 to 0.33] | Moderate | Low | Very Low | Very Low | Very Low |
| Walking  36 outcomes / 9 studies | | 0.32 [-0.25 to 1.1] | 0.98 [0.88 to 1.2] | 0.21 [0.08 to 0.38] | Moderate | Low | Very Low | Very Low | Very Low |
| **Exercise Characteristics** | | | | | | | | | |
| Continuous  220 outcomes / 30 studies | | 0.35 [0.07 to 0.65] | 0.70 [0.62 to 0.79] | 0.14 [0.05 to 0.24] | Moderate | Low | Very Low | Very Low | Very Low |
| Intermittent  38 outcomes / 8 studies | | -0.09 [-0.46 to 0.30] | 0.42 [0.32 to 0.54] | 0.04 [0.01 to 0.11] | High | Moderate | Low | Very Low | Very Low |
| Duration (Per 10 Mins)  258 outcomes / 38 studies | | 0.15 [0.11 to 0.20] | 0.72 [0.65 to 0.80] | 0.08 [0.02 to 0.14] | High | Moderate | Low | Low | Very Low |
| Intensity Low  185 outcomes / 24 studies | | 0.18 [-0.13 to 0.50] | 0.73 [0.65 to 0.81] | 0.12 [0.04 to 0.19] | High | Moderate | Low | Very Low | Very Low |
| Intensity High  55 outcomes / 9 studies | | 0.23 [-0.28 to 0.73] | 0.65 [0.53 to 0.81] | 0.09 [0.03 to 0.18] | High | Moderate | Low | Very Low | Very Low |
| Total work done  (Per 1000 units)  240 outcomes / 27 studies | | 0.27 [0.21 to 0.35] | 0.81 [0.73 to 0.90] | 0.06 [0.02 to 0.10] | High | Moderate | Low | Low | Very Low |
| **Participant Characteristics** | | | | | | | | | |
| Male  201 outcomes / 29 studies | | 0.17 [-0.05 to 0.44] | 0.58 [0.53 to 0.65] | 0.09 [0.03 to 0.15] | High | Moderate | Low | Very Low | Very Low |
| Female  73 outcomes / 16 studies | | 0.11 [-0.23 to 0.42] | 0.59 [0.51 to 0.69] | 0.16 [0.06 to 0.26] | Moderate | Moderate | Low | Very Low | Very Low |
| Mixed: male/female  48 outcomes / 9 studies | | 0.39 [-0.31 to 0.98] | 0.90 [0.72 to 1.1] | 0.10 [0.03 to 0.21] | Moderate | Low | Very Low | Very Low | Very Low |
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| Sedentary  31 outcomes / 5 studies | | 0.00 [-0.23 to 0.34] | 0.17 [0.11 to 0.26] | 0.15 [0.04 to 0.44] | High | Moderate | Low | Very Low | Very Low |
| Recreational  163 outcomes / 26 studies | | 0.02 [-0.18 to 0.23] | 0.47 [0.42 to 0.53] | 0.06 [0.02 to 0.10] | High | Moderate | Low | Very Low | Very Low |
| Athlete  101 outcomes / 17 studies | | 0.59 [0.10 to 1.1] | 0.85 [0.74 to 0.99] | 0.22 [0.09 to 0.34] | Moderate | Moderate | Low | Very Low | Very Low |

All variables with sufficient data to analyse are presented.