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

**A Systematic Review with Meta-Analysis**

**Supplementary File 2: Codebook**

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| **Column** | | **Heading** | **Description** |
| **STUDY DETAILS** | A | Study Number | Study number |
| B | Author | First author surname *et al.,* |
| C | Year | Year of publication |
| D | Journal | Journal name |
| E | Title | Study title |
| F | Funding/COI | List all funding sources, and any declared conflict of interest. |
| G | Aim | Study aim |
| H | Design | Main study design, with brief description of conditions investigated. |
| I | Design Code | Experimental Trials = 1; Observational Trials = 2 |
| J | Nutritional Intervention | 0 = Studies without a nutritional intervention; 1 = Studies that include a nutritional intervention (e.g., exercise conducted with and without calcium supplementation) |
| K | Nutritional Intervention | If column H is coded 1, provide a brief, free-text, description of the nutritional intervention under investigation. |
| **POPULATION** | L | Participant Overview | Brief descriptive overview of the participant population (age, sex, health and training status) |
| M | Starting n | Number of individuals initially enrolled in the study. |
| N | End n | Number of individuals who finished the study. |
| O | Group | Number of independent groups who participated in the study. |
| P | Training Status | 1 = sedentary; 2 = recreationally trained; 3 = athlete. |
| Q | Sex | 1 = male, 2 = female, 3 = mixed male and female group. |
| R | Age | Mean (yrs) |
| S | Age | SD (yrs) |
| T | Age | 1 = <18; 2 = 18 – 45; 3 = >45 |
| U | Height | Mean (cm) |
| V | Height | SD (cm) |
| W | Weight | Mean (kg) |
| X | Weight | SD (kg) |
| Y | BMI | Mean |
| Z | BMI | SD |
| AA | Comments | Any additional information relevant information related to the participants investigated. |
| **EXERCISE TEST DETAILS** | AB | Exercise stimulus | Brief narrative description of the test undertaken. |
| AC | Type | 1 = resistance (defined as exercises that cause the body’s muscles to work or hold against an applied force or weight, *e.g.,* weight lifting); 2 = aerobic (defined as activities whereby large muscle groups move in a rhythmic manner for a sustained period of time, *e.g.,* walking, running or cycling); 3 = multi-modal (defined as exercise bouts that comprise a combination of exercise modalities, *e.g.,* sessions that comprise a mixture of both resistance and aerobic exercises); 4 = plyometric (high-impact exercise types designed to develop muscular power, *e.g.,* jump based exercise bouts); 5 = calisthenics (systematic rhythmic body weight exercises, *e.g.,* yoga or pilates); 6 = no exercise control. |
| AD | Aerobic type | 1 = running; 2 = cycling; 3 = walking. |
| AE | Aerobic type | 1 = continuous; 2 = intermittent. |
| AF | Aerobic Intensity | % (free text) |
| AG | Aerobic Intensity | 1 = <80% (low/moderate); 2 = >80% (high/supramaximal). For studies that vary intensities throughout the test do not code, unless it is clear that the majority of the test was conducted at an intensity aligning to the categories (e.g., a brief warm-up at a lower intensity followed by fixed load test) |
| AH | Aerobic Duration | Minutes |
| AI | Resistance Intensity | 1 = <80% (low/moderate); 2 = >80% (high/supramaximal). |
| AJ | Total reps | Sets\*repetitions |
| AK | Total work done (aerobic) | Intensity\*Duration |
| AL | Total work done (resistance) | Total reps\*Intensity |
| AM | Impact level | 1 = low-impact/repetitive; 2 = moderate-impact/repetitive; 3 = low-impact with high muscular load; 4 = high-impact/multi-directional. |
| AN | Active Versus Control | 1 = Exercise; 2 = Non-exercise control |
| **SAMPLING** | AO | Samples | Brief narrative description of the number and timing of samples taken. |
| AP | Baseline condition | Time of day (free text) |
| AQ | Baseline condition | 1 = fed; 2 = overnight fast; 3 = fasted sample taken, then a breakfast was provided before the exercise test; 4 = unclear |
| AR | Bone biomarkers | List all bone biomarkers assessed. |
| AS | Other biomarkers | List all other biomarkers assessed. |
| AT | Bone biomarker | Name |
| AU | Bone biomarker (code) | 1 = bone specific alkaline phosphatase (B-ALP); 2 = dickkopf-1 (DKK-1); 3 = carboxyterminal propeptide of type 1 procollagen (P1CP); 4 = N-terminal propeptide of type 1 procollagen (P1NP); 5 = sclerostin; 6 = pyridinoline (Pyr); 7 = deoxypyridinoline (Dpd); 8 = carboxyterminal telopeptide of type-1 procollagen (ICTP); 9 = aminoterminaltelopeptide of type 1 collagen (NTx); 10 = cathepsin K; 11 = C-terminal telopeptide of type 1 collagen (β-CTX-1); 12 = tartrate resistance acid phosphatase isoenzyme 5b (TRAP5b), 13 = OPG/RANKL ratio, 14 = OPG, 15 = RANKL, 16 = hydroxylysine, 17 = hydroxylysine; 18 = osteopontin; 19 = total OC; 20 = ucOC 21 = iCa; 22 = Aca, 23 = PTH |
| AV | Subtype | If information regarding specific biomarker subtype is provided, insert as free text. |
| AW | Process | Free text |
| AX | Process | 1 = Formation (bone specific alkaline phosphatase (B-ALP (+)); dickkopf-1 (DKK-1 (-)); carboxyterminal propeptide of type 1 procollagen (P1CP (+)) and N-terminal propeptide of type 1 procollagen (P1NP (+)) and sclerostin (-); Undercarboxylated osteocalcin (ucOC (+)); 2 = Resorption (pyridinoline (Pyr (+)); deoxypyridinoline (Dpd (+)); carboxyterminal telopeptide of type-1 procollagen (ICTP (+)); aminoterminal telopeptide of type 1 collagen (NTx (+)); C-terminal telopeptide of type 1 collagen (β-CTX-1 (+)); tartrate resistance acid phosphatase isoenzyme 5b (TRAP5b (+)), osteoprotegerin (-); RANKL (+); the ratio of osteoprotegerin to receptor activator NF kappaB ligand (OPG/RANKL (-1)), hydroxylysine (+) and hydroxyproline (+)); 3 = General (osteopontin (+) and total osteocalcin (T-OC (+)); 4 = Ca Metabolism (ionized or albumin adjusted calcium (+) and parathyroid hormone (+)) |
| AY | Direction | 1 = increase represents an increase in the relevant process; -1 = increase represents a decrease in the relevant process (e.g., sclerostin, DKK, OPG, OPG/RANKL). |
| AZ | Sample type | Free text |
| BA | Sample type code | 1 = serum; 2 = plasma; 3 = urine. |
| BB | Process | Brief narrative description of the assay used/assessment type. |
| BC | Inter-assay variability | % |
| BD | Intra-assay variability | % |
| BE | Unit | Unit of measurement |
| **MAIN DATA** | BF | Baseline | Mean |
| BG | Baseline | SD |
| BH | Time | Exact time at which the measurement was taken |
| BI | Time (code) | 1 = sample taken immediately before the exercise bout (i.e., within 15 minutes before exercise commencement); 2 = samples taken within 15 minutes and 2 hours before exercise commencement); 3 = samples taken > 2 hours before exercise commencement); 4 = day before. |
| BJ | Post Exercise | Mean |
| BK | Post Exercise | SD |
| BL | Time | Exact time at which the measurement was taken |
| BM | Time | 1 = sample taken immediately post exercise (i.e., within 15 minutes of exercise termination); 2 = samples taken within 15 minutes and 2 hours post exercise; 3 = samples taken within 2 and 8 hours post exercise; 4 = samples taken 1 day post exercise; 5 = samples taken 2 days post exercise; 6 = samples taken 3 days post exercise; 7 = samples taken 4 days post exercise, *etc*. |
| BN | During/Post | 1 = sample taken post exercise; 2 = sample taken during the exercise bout. |
|  | BO | Comment | Any other relevant comments |