Title: New Biomarkers and Therapeutic Targets in Osteoporosis via Omics Technologies

Acronym: OsteOmics

Keywords: Osteoporosis, Bone Remodeling, Clinical Osteoporotic Models, Proteomics, Metabolomics, Biomarkers, Pathogenic Mechanisms

Coordinator: National and Kapodistrian University of Athens (NKUA),

Duration: 18 months

Scientific Field: Medicine and Health Sciences

Summary of the Research Proposal:

Osteoporosis is a common bone disease characterized by decreased bone strength, leading to an increased risk of fractures. Affecting approximately 200 million patients worldwide, osteoporosis poses significant socioeconomic challenges and severe health impacts. The disease predominantly affects postmenopausal women due to the sharp decline in estrogen levels, crucial for maintaining bone density. However, it also occurs in men, especially the elderly. Early diagnosis is critical as osteoporosis often remains undetected until fractures occur, significantly impacting the quality of life and increasing mortality risk.

Study Objectives:

1. **Proteomic and Metabolomic Analysis:**
   - **Clinical Samples:** Collect bone and serum samples from postmenopausal women with osteoporotic fractures and controls with hip osteoarthritis. Perform proteomic and metabolomic analyses to find disease-specific biomarkers and therapeutic targets.
2. **Identification of New Biomarkers:**
   - Identify proteins and metabolites that significantly differ between osteoporosis and control groups.
   - Correlate omics data with clinical markers of bone metabolism (e.g., CTX, PINP).
3. **Pathophysiological Mechanisms:**
   - Explore the underlying mechanisms of bone loss and remodeling in osteoporosis.
   - Develop a panel of potential omics biomarkers for osteoporosis.
4. **Therapeutic Target Identification:**
   - Use the data to evaluate new pharmacological targets for osteoporosis treatment at the clinical level.

Research Methodology:

- **Omics Technologies:** Employ proteomics and metabolomics for a non-targeted analysis of bone, plasma, and serum samples.
- **Data Integration:** Combine omics results with clinical data to create comprehensive profiles of osteoporosis.
- **Clinical Studies:** Utilize human clinical samples to validate findings and identify potential interventions.

Expected Outcomes:

- Enhanced understanding of osteoporosis mechanisms.
- Identification of novel biomarkers for early diagnosis and prognosis.
- Development of targeted therapies based on identified biomarkers and disrupted pathways.

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- **Recruitment Status:** Recruiting