**Supplementary Table 1. The detailed information of this study subjects.**

| ID | Age | Gender | Sample       | T-score of BMD | Disease state                  | Date    |
|----|-----|--------|--------------|----------------|--------------------------------|---------|
|    |     |        |              | Lumbar vertebra | Left hip joint               |         |
| S1 | 61  | female | femoral head | -3             | -1.9                          | osteoarthritis and osteoporosis | 2019.7.16 |
| S2 | 45  | female | femoral head | -1.3           | -1.2                          | osteoarthritis and osteopenia  | 2019.7.19 |
| S3 | 66  | male   | femoral head | NA             | NA                            | NA      | 2019.7.26 |
| S4 | 31  | male   | femoral head | 0.6            | -1.1                          | osteoarthritis and osteopenia  | 2019.8.7 |

S3 without bone mineral density test due to the tight schedule of surgery.