**Supplementary Material**

**Supplementary Table 1: Primers sequences for human genes in the study.**

|  |  |
| --- | --- |
| GENE | Primer sequence (5'-3') |
| FGF23 | F：GGAACAGCTACCACCTGCAGAT |
| R：CACCACAAAGCCAGCATCCTCT |
| GAPDH | F：TGACCCCTTCATTGACCTCA |
| R：ATCGCCCCACTTGATTTTGG |
| FGFR3 | F：TCCATCTCCTGGCTGAAGAACG |
| R：TGTTCTCCACGACGCAGGTGTA |
| TNAP | F：GCTGTAAGGACATCGCCTACCA |
| R：CCTGGCTTTCTCGTCACTCTCA |
| OPN | F：CGAGGTGATAGTGTGGTTTATGG |
| R：GCACCATTCAACTCCTCGCTTTC |
| OPG | F：GGTCTCCTGCTAACTCAGAAAGG |
| R：CAGCAAACCTGAAGAATGCCTCC |
| RANKL | F：GCCTTTCAAGGAGCTGTGCAAAA |
| R：GAGCAAAAGGCTGAGCTTCAAGC |

**Supplementary Table 2: Clinical data of identical twins in the study.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Subjects** | **Sex** | **Age (years)** | **Height (cm)** | **Type** | **Cobb angle (°)** | **BMD** | |
| ***Z* -value** | ***T* -value** |
| CS1 | M | 15 | 163 | M-SDV | 57.8 | −2.3 | 1.7 |
| N1 | M | 15 | 178 | – | – | 1.2 | 2.4 |
| CS2 | F | 4 | 96 | M-SDV | 30.6 | −3.4 | 2.3 |
| N2 | F | 4 | 109 | – | – | 2.4 | 3.2 |

BMD: Bone mineral density; F: Female; M-SDV: Multiple defects of the vertebrae; M: Male.

**Supplementary Table 3: DNA methylation sequencing results in the study.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Chromosome** | **Starting point** | **Terminal point** | ***P*-value** | **Methylation rate of normal** | **Methylation rate of CS** | **Gene** | **Log2 ratio (C/N)** |
| chr12 | 4488997 | 4489076 | 0.00034 | 0.41729 | 0.18071 | *FGF23* | −1.207 |
| chr7 | 47622153 | 47622200 | 0.011 | 0.5617 | 0.79 | *TNS3* | 0.492 |
| chr8 | 37653890 | 37653973 | 0.0068 | 0.7515 | 0.8664 | *GPR124* | 0.205 |
| chr15 | 64456244 | 64456426 | 0.013 | 0.51943 | 0.37429 | *PPIB* | −0.473 |
| chr16 | 90014349 | 90014430 | 0.0089 | 0.1555 | 0.3232 | *DEF8* | 1.056 |
| chr7 | 137687653 | 137687736 | 0.029 | 0.7238 | 0.5794 | *CREBL2* | −0.321 |

CS: Congenital scoliosis; FGF23: Fibroblast growth factor 23.