

Supplementary Table 1 Baseline characteristics and laboratory findings of all patients categorized by osteopenia/osteoporosis status at the total hip

Factors	Normal N=58	Osteopenia N=79	Osteoporosis N=46	P
Age (years)	59.1 ± 13.7	65 ± 14.7 ^a	71.7 ± 12.7 ^{c,d}	<0.001
Sex (female)	38 (65.5)	65 (82.3) ^a	44 (95.7) ^{c,d}	0.001
Height (cm)	159.6 ± 8.5	152.6 ± 7.1 ^c	149.9 ± 8 ^c	<0.001
Weight (kg)	66 ± 16.5	55 ± 10 ^c	51.6 ± 10.5 ^c	<0.001
Body mass index (kg/m ²)	25.8 ± 5.5	23.7 ± 4.28 ^a	22.9 ± 3.95 ^b	0.003
Diabetes (n/%)	23 (39.7)	32 (40.5)	18 (39.1)	0.99
Cardiovascular disease (n/%)	13 (22.4)	26 (32.9)	19 (41.3) ^a	0.115
Dyslipidemia (n/%)	55 (92.8)	73 (92.4)	45 (97.8)	0.434
Fracture (n/%)	1 (1.72)	8 (10.1)	7 (15.2) ^a	0.045
Parathyroidectomy (n/%)	7 (12.7)	6 (7.59)	4 (8.7)	0.664
CKD stages (n/%)				0.02
5	13 (22.4)	26 (32.9)	5 (10.9) ^e	
5D	45 (77.6)	53 (67.1)	41 (89.1) ^e	
Dialysis vintage (months)	43.9 (11.1–96.8)	40.8 (0–86)	51.9 (22.7–101)	0.225
Medications				
Steroids (n/%)	7 (12.7)	5 (6.33)	4 (8.7)	0.501
Phosphate binders (n/%)				0.471
Calcium (n/%)	34 (58.6)	45 (57)	27 (58.7)	
Non-Calcium (n/%)	5 (8.62)	3 (3.8)	2 (4.35)	
Natural vitamin D (n/%)	20 (34.5)	19 (24.1)	18 (39.1)	0.172
Active vitamin D (n/%)	11 (19)	31 (39.2) ^a	24 (52.2) ^c	0.002
Calcimimetics (n/%)	4 (6.9)	4 (5.06)	6 (13.4)	0.261
Denosumab (n/%)	2 (3.45)	5 (6.33)	5 (10.9)	0.314
Sodium bicarbonate (n/%)	50 (86.2)	67 (84.8)	37 (80.4)	0.71
Proton pump inhibitors (n/%)	22 (37.9)	35 (44.3)	26 (56.5)	0.162
Laboratory data				
Hemoglobin (g/dL)	10.6 ± 1.68	10.6 ± 1.52	11 ± 1.13	0.429
Mean corpuscular volume (µm ³)	85.3 ± 9.98	85.4 ± 10.8	90.1 ± 10.1	0.033
Total lymphocyte count (cells)	1495 ± 412	1447 ± 517	1328 ± 503	0.185
Platelets (cells x 10 ³)	229 ± 63.5	231 ± 74.1	194 ± 58.1 ^{a,d}	0.009
Mean platelet volume (µm ³)	9.37 ± 0.95	9.59 ± 0.94	9.67 ± 0.96	0.237
Neutrophil-to-lymphocyte ratio	3.25 (2.38–4.41)	2.75 (2.24–3.95)	2.81 (2.48–3.9)	0.34
Platelet-to-lymphocyte ratio	10.1 (8.24–13.5)	9.96 (7.67–14.3)	9.02 (6.86–13.2)	0.223
Sodium (mmol/L)	139 ± 2.31	139.1 ± 3.16	138.5 ± 3.23	0.505
Potassium (mmol/L)	4.52 ± 0.56	4.53 ± 0.53	4.53 ± 0.48	0.993
Chloride (mmol/L)	100.8 ± 4.37	102.2 ± 4.77	100.9 ± 4.27	0.144
Bicarbonate (mmol/L)	23.1 ± 3.12	22.8 ± 2.82	23.3 ± 2.93	0.67
Blood urea nitrogen (mg/dL)	51 ± 13.81	50.2 ± 15.43	47.3 ± 17.2	0.48
Creatinine (mg/dL)	8.6 ± 3.52	7.03 ± 3.62 ^a	6.57 ± 2.19 ^b	0.004
Albumin (g/L)	34.6 ± 3.57	33.9 ± 4.66	34 ± 3.66	0.567
Cholesterol (mg/dL)	169.4 ± 38.6	172.9 ± 49.6	167.3 ± 40.8	0.8
Calcium (mg/dL)	9.95 ± 0.9	9.77 ± 0.92	9.72 ± 0.64	0.344
Phosphate (mg/dL)	4.81 ± 1.28	4.7 ± 1.04	4.11 ± 1.21 ^{b,d}	0.007
Parathyroid hormone (pg/mL)	282 (130–631)	328 (152–621)	267 (137–605)	0.989
Alkaline phosphatase (unit/L)	92.7 (68.5–109)	95 (73–126)	106 (84–177) ^a	0.103
25 hydroxy vitamin D (ng/mL)	26.9 ± 6.59	27.8 ± 19.1	32.6 ± 18.2	0.472
Bone Mineral Density (g/cm ³)	0.884 ± 0.091	0.649 ± 0.059 ^c	0.478 ± 0.072 ^{c,f}	<0.001

^aP<0.05, ^bP<0.01, ^cP<0.001 vs. normal ^dP<0.05, ^eP<0.01, ^fP<0.001 vs. osteopenia; CKD, chronic kidney disease

Supplementary Table 2. Baseline characteristics and laboratory findings of all patients categorized by osteopenia/osteoporosis status at the femoral neck

Factors	Normal N=28	Osteopenia N=66	Osteoporosis N=89	P
Age (years)	55.6± 12.6	62.7 ± 15.1	69.3 ± 13.2 ^{c,d}	<0.001
Sex (female)	13 (46.4)	52 (78.8) ^b	82 (92.1) ^{c,d}	<0.001
Height (cm)	164.8 ± 6.3	154.8 ± 7.1 ^c	150.3 ± 7.4 ^{c,f}	<0.001
Weight (kg)	73.7 ± 17.9	57.6 ± 10.2 ^c	52.6 ± 10.7 ^{c,d}	<0.001
Body mass index (kg/m ²)	27.1 ± 6.13	24.1 ± 4.39 ^a	23.3 ± 4.17 ^b	<0.001
Diabetes (n/%)	10 (35.7)	22 (33.3)	41 (46.1)	0.246
Cardiovascular disease (n/%)	7 (25)	15 (22.7)	36 (40.5) ^d	0.045
Dyslipidemia (n/%)	28 (100)	58 (87.9)	87 (97.8) ^d	0.011
Fracture (n/%)	0 (0)	3 (4.55) ^a	13 (14.6) ^a	0.019
Parathyroidectomy (n/%)	6 (21.4)	5 (7.58)	6 (6.74) ^a	0.055
CKD stages (n/%)				0.395
5	4 (14.3)	18 (27.3)	22 (24.7)	
5D	24 (85.7)	48 (72.7)	67 (75.3)	
Dialysis vintage (months)	75.3 (17.8- 134)	51.2 (0-111)	43.3 (6.47-86.3)	0.233
Medications				
Steroids (n/%)	4 (14.3)	4 (6.06)	8 (8.99)	0.432
Phosphate binders (n/%)				0.079
Calcium (n/%)	18 (64.3)	35 (53)	53 (59.6) ^d	
Non-Calcium (n/%)	0 (0)	8 (12.2)	2 (2.25) ^d	
Natural vitamin D (n/%)	8 (28.6)	16 (24.2)	33 (37.1)	0.222
Active vitamin D (n/%)	5 (17.9)	22 (33.3)	39 (43.8) ^a	0.038
Calcimimetics (n/%)	3 (10.7)	3 (4.55)	8 (8.99)	0.473
Denosumab (n/%)	0 (0)	5 (7.58)	7 (7.87)	0.313
Sodium bicarbonate (n/%)	25 (89.3)	53 (80.3)	76 (85.4)	0.499
Proton pump inhibitors (n/%)	12 (42.9)	26 (39.4)	45 (50.6)	0.37
Labs				
Hemoglobin (g/dL)	10.5 ± 1.93	10.6 ± 1.37	10.7 ± 1.42	0.792
Mean corpuscular volume (µm ³)	86.7 ± 11	84.9 ± 10.1	87.7 ± 10.6	0.282
Total lymphocyte count (cells)	1501 ± 415	1418 ± 451	1420 ± 527	0.714
Platelets (cells x 10 ³)	227 ± 63.4	219 ± 62.5	220 ± 74.2	0.878
Mean platelet volume (µm ³)	9.35 ± 1.11	9.45 ± 0.91	9.65 ± 0.92	0.236
Neutrophil-to-lymphocyte ratio	3.57 (2.97-4.33)	2.81 (2.28-4.19)	2.78 (2.37-3.9)	0.184
Platelet-to-lymphocyte ratio	10.9 (8.46-13.6)	9.73 (7.56-12.8)	9.87 (7.79-14)	0.551
Sodium (mmol/L)	139.4 ± 2.27	138.9 ± 2.26	138.8 ± 3.48	0.595
Potassium (mmol/L)	4.61 ± 0.6	4.49 ± 0.51	4.53 ± 0.51	0.642
Chloride (mmol/L)	100.5 ± 4.57	101.4 ± 4.33	101.7 ± 4.68	0.533
Bicarbonate (mmol/L)	22.6 ± 2.59	23 ± 3.28	23.2 ± 2.8	0.642
Blood urea nitrogen (mg/dL)	53.3 ± 16.3	51.4 ± 14.8	47.4 ± 16.1	0.138
Creatinine (mg/dL)	9.92 ± 3.85	7.78 ± 3.42 ^b	6.36 ± 2.63 ^{c,d}	<0.001
Albumin (g/L)	33.9 ± 2.55	34.4 ± 3.99	34 ± 4.53	0.745
Cholesterol (mg/dL)	168.5 ± 38.5	170.2 ± 50	171 ± 41.2	0.965
Calcium (mg/dL)	9.81 ± 0.99	10.1 ± 0.83	9.65 ± 0.78 ^d	0.019
Phosphate (mg/dL)	4.8 ± 1.28	4.89 ± 1.16	4.29 ± 1.14 ^e	0.007
Parathyroid hormone (pg/mL)	225 (97.8-519)	326 (191-852)	283 (144-605)	0.389
Alkaline phosphatase (unit/L)	91.7 (65.8-107)	97 (73-125)	102 (76.5-157)	0.324
25 hydroxy vitamin D (ng/mL)	27 ± 7.42	24.8 ± 6.94	31.6 ± 20.7	0.278
Bone Mineral Density (g/cm ³)	0.804 ± 0.076	0.604 ± 0.055 ^c	0.432 ± 0.073 ^{c,f}	<0.001

^aP<0.05, ^bP<0.01, ^cP<0.001 vs. normal ^dP<0.05, ^eP<0.01, ^fP<0.001 vs. osteopenia; CKD, chronic kidney disease

Supplementary Table 3 Baseline characteristics and laboratory findings of all patients categorized by osteopenia/osteoporosis status at the lumbar spine

Factors	Normal N=69	Osteopenia N=76	Osteoporosis N=42	P
Age (years)	62 ± 15.8	66.9 ± 14.4	65.1 ± 13.9	0.136
Sex (female)	47 (68.1)	65 (85.5) ^a	38 (90.5) ^b	0.005
Height (cm)	158 ± 9.1	152.4 ± 8 ^c	151.4 ± 6.9 ^c	<0.001
Weight (kg)	63.7 ± 16	55.4 ± 11.5 ^c	50.8 ± 9.1 ^c	<0.001
Body mass index (kg/m ²)	25.4 ± 5.49	23.8 ± 4.2	22.2 ± 3.91 ^b	0.002
Diabetes (n/%)	33 (47.8)	29 (38.2)	14 (18.4)	0.272
Cardiovascular disease (n/%)	19 (27.5)	26 (34.2)	15 (35.7)	0.587
Dyslipidemia (n/%)	67 (97.1)	71 (93.4)	38 (90.5)	0.336
Fracture (n/%)	2 (2.9)	8 (10.5)	7 (16.7) ^a	0.043
Parathyroidectomy (n/%)	5 (7.25)	8 (10.5)	4 (9.52)	0.785
CKD stages (n/%)				0.038
5	16 (23.2)	25 (32.9)	5 (11.9) ^d	
5D	53 (76.8)	51 (67.4)	37 (88.1) ^d	
Dialysis vintage (months)	42.4 (9.4-85.9)	29.9 (0-102)	59.8 (25.9-101)	0.173
Medications				
Steroids (n/%)	8 (11.59)	5 (6.58) ^a	4 (9.52)	0.573
Phosphate binders (n/%)				0.722
Calcium (n/%)	38 (55.1)	46 (60.5)	25 (59.5)	
Non-Calcium (n/%)	6 (8.7)	3 (3.95)	2 (4.76)	
Natural vitamin D (n/%)	22 (31.9)	23 (30.3)	14 (33.3)	0.995
Active vitamin D (n/%)	13 (18.8)	30 (39.5) ^b	23 (54.8) ^c	<0.001
Calcimimetics (n/%)	4 (5.8)	4 (5.26)	6 (14.3)	0.163
Denosumab (n/%)	4 (5.8)	7 (9.21)	1 (2.38)	0.338
Sodium bicarbonate (n/%)	57 (82.6)	66 (86.8)	36 (85.7)	0.768
Proton pump inhibitors (n/%)	31 (44.9)	32 (42.1)	20 (47.6)	0.841
Labs				
Hemoglobin (g/dL)	10.7 ± 1.68	10.6 ± 1.33	10.6 ± 1.43	0.935
Mean corpuscular volume (µm ³)	87.2 ± 9.37	85.1 ± 11	88.1 ± 11	0.306
Total lymphocyte count (cells)	1480 ± 469	1509 ± 514	1246 ± 483 ^{a,d}	0.017
Platelets (cells x 10 ³)	229 ± 68.8	219 ± 71.1	220 ± 72.8	0.669
Mean platelet volume (µm ³)	9.39 ± 0.9	9.73 ± 1	9.41 ± 0.86	0.074
Neutrophil-to-lymphocyte ratio	3.21 (2.4-4.14)	2.66 (2.25-3.95)	3.08 (2.5-5.95)	0.128
Platelet-to-lymphocyte ratio	11 (8.04-14.4)	9.2 (7.42-12) ^a	10.4 (7.96-16.5)	0.126
Sodium (mmol/L)	138.9 ± 2.52	139.1 ± 3.06	138.6 ± 3.47	0.644
Potassium (mmol/L)	4.43 ± 0.49	4.57 ± 0.58	4.59 ± 0.46	0.174
Chloride (mmol/L)	100.8 ± 4.61	102.3 ± 4.99	100.6 ± 3.53	0.078
Bicarbonate (mmol/L)	23.2 ± 3.07	22.9 ± 3.04	22.9 ± 2.65	0.856
Blood urea nitrogen (mg/dL)	51.6 ± 14.7	48.2 ± 16.7	51 ± 17	0.44
Creatinine (mg/dL)	8.11 ± 3.63	6.66 ± 3.29 ^a	7.31 ± 2.77	0.039
Albumin (g/L)	34.1 ± 3.65	34.4 ± 4.09	33.7 ± 4.74	0.616
Cholesterol (mg/dL)	167.9 ± 37.4	170 ± 48.1	168.8 ± 40.7	0.958
Calcium (mg/dL)	9.98 ± 0.88	9.79 ± 0.85	9.59 ± 0.7	0.065
Phosphate (mg/dL)	4.92 ± 1.3	4.43 ± 1.07	4.31 ± 1.2 ^a	0.016
Parathyroid hormone (pg/mL)	270 (130-734)	257 (126-569)	388 (245-586) ^d	0.121
Alkaline phosphatase (unit/L)	93 (65.7-112)	97 (75-123)	106 (92-187) ^a	0.04
25 hydroxy vitamin D (ng/mL)	23.9 ± 8.04	32.6 ± 20.2	29.5 ± 16.4	0.137
Bone Mineral Density (g/cm ³)	0.661 ± 0.137	0.522 ± 0.120 ^c	0.427 ± 0.084 ^{c,f}	<0.001

^aP<0.05, ^bP<0.01, ^cP<0.001 vs. normal ^dP<0.05, ^eP<0.01 vs. osteopenia; CKD, chronic kidney disease