

高齢者地域住民コホート 1,774名 (平均年齢72歳)

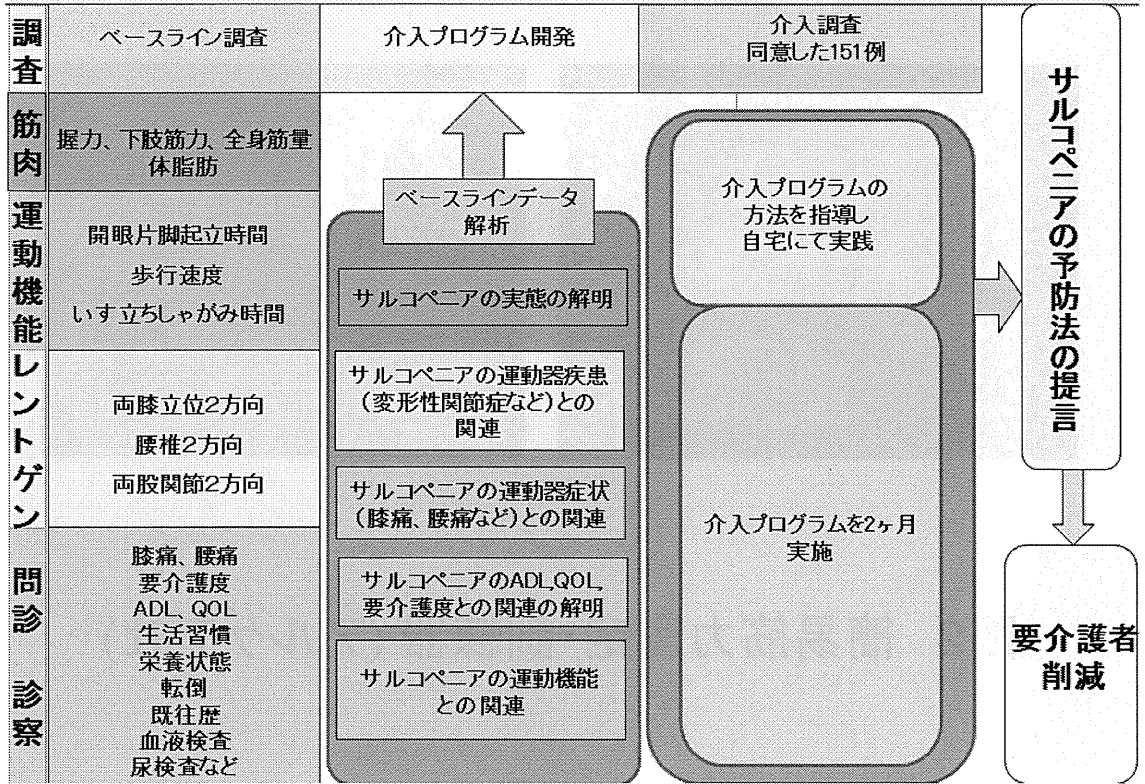


図1. 研究目的と年次計画

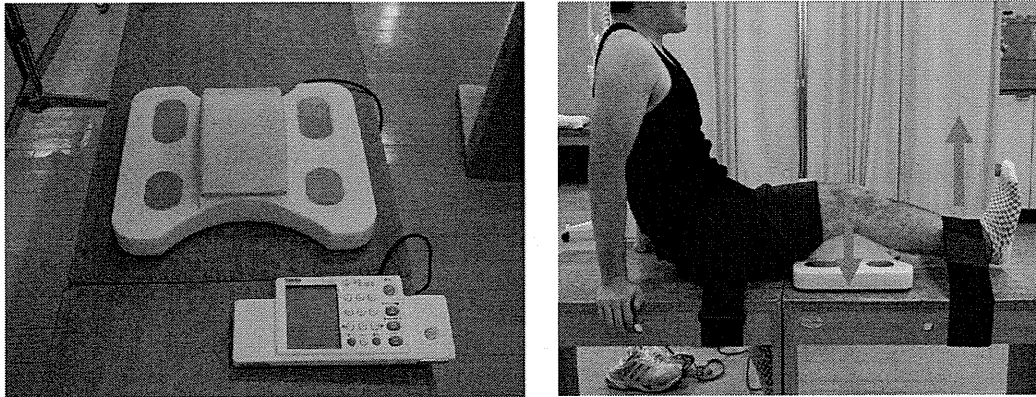


図2 簡易筋力測定・訓練器 (アルケア社)

筋肉量、体脂肪を部位別に測定

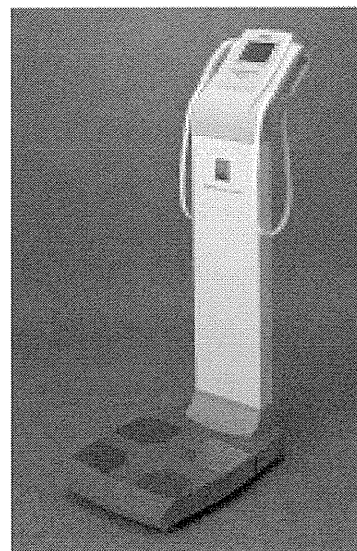


図3 筋量測定器 タニタ 体組成計(MC-190)

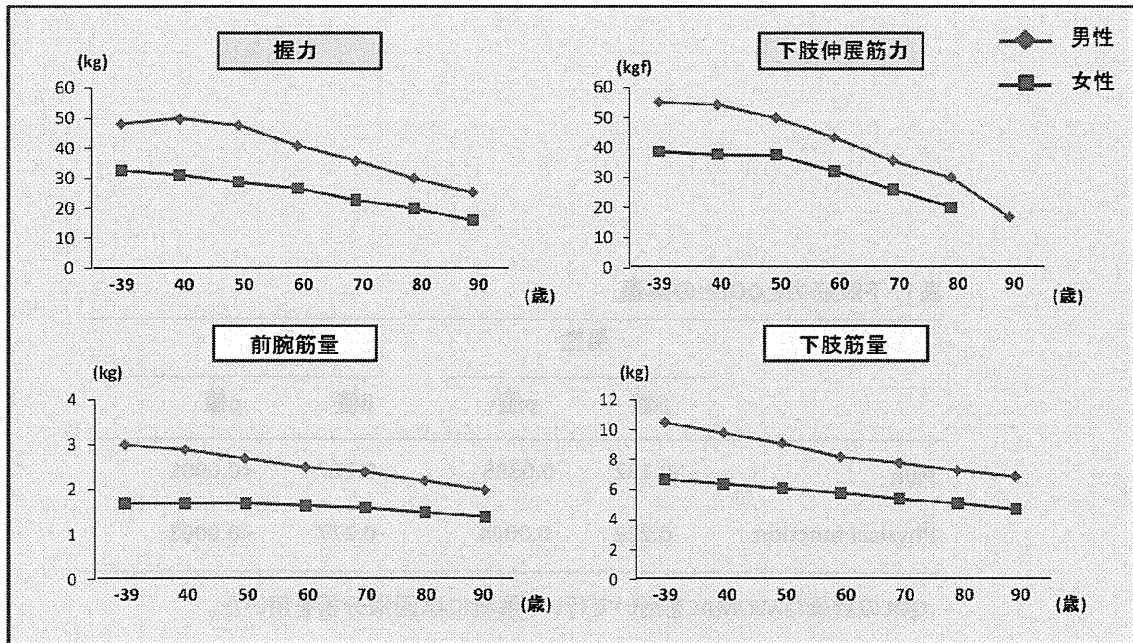


図4 上下肢の筋力および筋量の年代推移

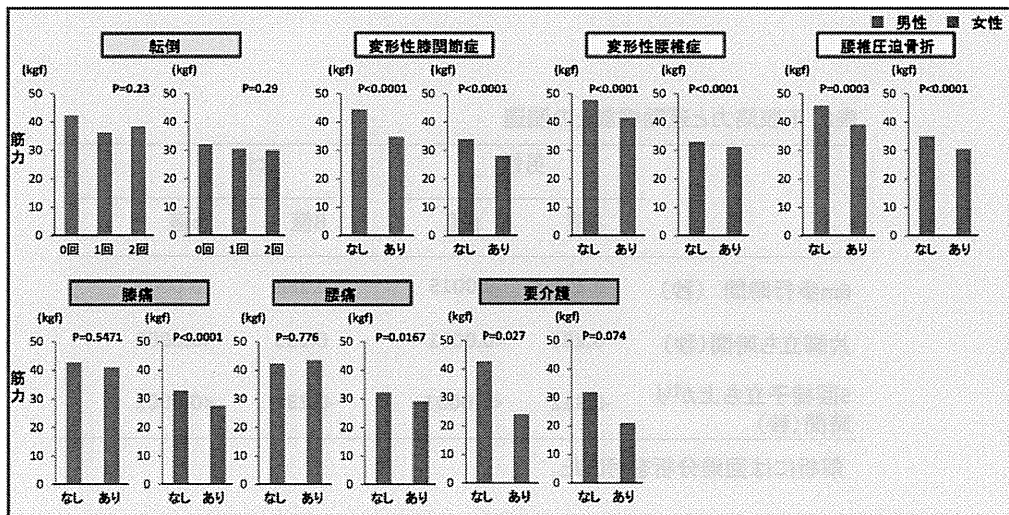


図5 下肢筋力と転倒、運動器疾患、要介護との関連

表1. 下肢筋力とQOLとの関連

	男性		女性	
	β値	p値	β値	p値
Pain	-0.132	0.0385	-0.227	<0.0001
Physical function	-0.222	0.0004	-0.277	<0.0001

QOLの評価はWOMACを用いて行い、解析には回帰分析を用いた。

表2. 下肢筋力と運動機能との関連

	男性		女性	
	β値	p値	β値	p値
6m歩行時間 (秒)	-0.218	0.0015	-0.198	<0.0001
片脚立ち時間(秒)	0.255	<0.0001	0.193	<0.0001
5回椅子立ち上がり時間(秒)	-0.312	<0.0001	-0.232	<0.0001

解析には回帰分析を用いた。

II. 研究成果の刊行に関する一覧

発表者氏名	論文タイトル名	発表誌名	巻号	ページ	出版年
Yoshimura N, <u>Muraki S</u> , Oka H, Kawaguchi H, Nakamura K, Akune T	Cohort profile: research on osteoarthritis/osteopor osis against disability study.	Int J Epidemiol	39	988-95	2010
<u>Muraki S</u> , Akune T, Oka H, En-yo Y, Yoshida M, Saika A, Suzuki T, Yoshida H, Ishibashi H, Tokimura F, Yamamoto S, Nakamura K, Kawaguchi H, Yoshimura N	Health-related quality of life with vertebral fracture, lumbar spondylosis and knee osteoarthritis in Japanese men: the ROAD study.	Archives Osteoporos	5	91-99	2010
<u>Muraki S</u> , Akune T, Oka H, En-yo Y, Yoshida M, Saika A, Suzuki T, Yoshida H, Ishibashi H, Tokimura F, Yamamoto S, Nakamura K, Kawaguchi H, Yoshimura N	Impact of knee and low back pain on health-related quality of life in Japanese women: The Research on Osteoarthritis Against Disability (ROAD)	Modern Rheum	20	444-51	2010

Yoshimura N, <u>Muraki S</u> , Oka H, Kawaguchi H, Nakamura K, Akune T	Capacity of endogenous sex steroids to predict bone loss in Japanese men: Ten-year follow-up of the Taiji Cohort Study	J Bone Miner Metab	29	96-102	2010
<u>Muraki S</u> , Akune T, Oka H, En-yo Y, Yoshida M, Saika A, Suzuki T, Yoshida H, Ishibashi H, Tokimura F, Yamamoto S, Nakamura K, Kawaguchi H, Yoshimura N	Association of Radiographic and Symptomatic Knee Osteoarthritis with Health-related Quality of Life in a Population-Based Cohort Study in Japan: The ROAD Study	Osteoarthrit is Cartilage	18	1227-34	2010
Oka H, <u>Muraki S</u> , Akune T, Nakamura K, Kawaguchi H, Yoshimura N	Normal and threshold values of joint space width, joint space area, osteophyte area and fibro-tibial angle using a computer-assisted measuring system (KOACAD) to evaluate knee osteoarthritis: The ROAD study	J Orthop Sci	15	781-9	2010

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<u>Muraki S</u> , Akune T, Oka H, En-yo Y, Yoshida M, Saika A, Suzuki T, Yoshida H, Ishibashi H, Tokimura F, Yamamoto S, Nakamura K, Kawaguchi H, Yoshimura N	Health-related Quality of Life in Subjects with Low Back Pain and Knee Pain in a Population-Based Cohort Study of Japanese men: The ROAD study.	SPINE	36	1312-131 9	2011
Yoshimura N, <u>Muraki S</u> , Oka H, Kawaguchi H, Nakamura K, Akune T	Association of knee osteoarthritis with the accumulation of metabolic risk factors such as overweight, hypertension, dyslipidaemia, and impaired glucose tolerance in Japanese men and women: The ROAD Study	J Rheum	38	921-30	2011

Yoshimura N, <u>Muraki S</u> , Oka H, Kawaguchi H, Nakamura K, Akune T	Changes in serum levels of biochemical markers of bone turnover over 10 years among Japanese men and women: associated factors and birth-cohort effect; The Taiji Study.	J Bone Miner Metab	29	699-708	2011
<u>Muraki S</u> , Oka H, Akune T, En-yo Y, Yoshida M, Nakamura K, Kawaguchi H, Yoshimura N	Association of Occupational Activity with Joint Space Narrowing and Osteophytosis in the Medial Compartment of the Knee: The ROAD study	Osteoarthritis Cartilage	19	840-846	2011
Yoshimura N, <u>Muraki S</u> , Oka H, Kawaguchi H, Nakamura K, Akune T	Biochemical markers of bone turnover as predictors for occurrence of osteoporosis and osteoporotic fractures in men and women: Ten-year follow-up of the Taiji cohort study.	Modern Rheum	21	608-20	2011

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<u>Muraki S</u> , Dennison E, Jameson K, Boucher B, Akune T, Yoshimura N, Judge A, Arden N, Javaid K, Cooper C	Association of vitamin D status with knee pain and radiographic knee osteoarthritis.	Osteoarthrit is Cartilage	19	1301-130 6	2011

Yoshimura N, Oka H, <u>Muraki S</u> , Akune T, Hirabayashi N, Matsuda S, Nojiri T, Hatanaka K, Ishimoto Y, Nagata K, Yoshida M, Tokimura F, Kawaguchi H, Nakamura K	Reference values for hand grip strength, muscle mass, walking time, and one-leg standing time as indices for locomotive syndrome and associated disability: The second survey of the ROAD study	J Orthop Sci	16	768-77	2011
<u>Muraki S</u> , Akune T, Oka H, Ishimoto Y, Nagata K, Yoshida M, Tokimura F, Nakamura K, Kawaguchi H, Yoshimura N	Incidence and Risk Factors for Radiographic Knee Osteoarthritis and Knee Pain in Japanese Men and Women: a Longitudinal Population-Based Cohort Study.	Arthritis Rheum	64	1447-56	2012

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Kwok A, Leung J, Chan A, Au B, Lau E, Yuriyanto H, Yuktanandana P, Yoshimura N, <u>Muraki S</u> , Oka H, Akune T, Leung P.	The Prevalence of Vertebral Fracture in Asian Men and Women: Comparison between Hong Kong, Thailand, Indonesia and Japan.	Public Health	126	523-31	2012
<u>Muraki S</u> , Akune T, Oka H, Ishimoto Y, Nagata K, Yoshida M, Tokimura F, Nakamura K, Kawaguchi H, Yoshimura N.	Incidence and Risk Factors for Radiographic Lumbar Spondylosis and Lower Back Pain in Japanese Men and Women: The ROAD Study.	Osteoarthr itis Cartilage	20	712-8	2012

Nagata K, Yoshimura N, <u>Muraki S</u> , Hashizume H, Ishimoto Y, Yamada H, Takiguchi N, Nakagawa Y, Oka H, Kawaguchi H, Nakamura K, Akune T, Yoshida M	Prevalence of cervical cord compression and its association with physical performance in a population-based cohort in Japan: the Wakayama Spine Study	SPINE	37	1892-8	2012
Yoshimura N, <u>Muraki S</u> , Oka H, Kawaguchi H, Nakamura K, Akune T.	Accumulation of metabolic risk factors such as overweight, hypertension, dyslipidaemia, and impaired glucose tolerance raises the risk of occurrence and progression of knee osteoarthritis: A 3-year follow-up of the ROAD study.	Osteoarthritis Cartilage	20	1217-26	2012
Ishimoto Y, Yoshimura N, <u>Muraki S</u> , Yamada H, Nagata K, Hashizume H, Takiguchi N, Minamide A, Oka H, Kawaguchi H, et al	Prevalence of symptomatic lumbar spinal stenosis and its association with physical performance in a population-based cohort in Japan: The Wakayama Spine Study.	Osteoarthritis Cartilage	20	1103-8	2012

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<u>Muraki S</u> , Akune T, Ishimoto Y, Nagata K, Yoshida M, Tanaka S, Oka H, Kawaguchi H, Nakamura K, Yoshimura N	Risk factors for falls in a longitudinal population-based cohort study of Japanese men and women: The ROAD Study	Bone	52	516-23	2012
Oka H, Akune T, <u>Muraki S</u> , Tanaka S, Kawaguchi H, Nakamura K, Yoshimura N.	The mid-term efficacy of intra-articular hyaluronic acid injections on joint structure: A nested case-control study.	Modern Rheum e			In press

Yoshimura N, <u>Muraki S</u> , Oka H, Kawaguchi H, Nakamura K, Tanaka S, Akune T.	Does mild cognitive impairment affect the occurrence of radiographic knee osteoarthritis? A 3-year follow-up in the ROAD study.	BMJ Open			In press
<u>Muraki S</u> , Akune T, En-yo Y, Yoshida M, Tanaka S, Kawaguchi H, Nakamura K, Oka H, Yoshimura N.	Association of Dietary Intake with Joint Space Narrowing and Osteophytosis at the Knee in Japanese Men and Women: The ROAD Study	Modern Rheum			In press
Ishimoto Y, Yoshimura N, <u>Muraki S</u> , Yamada H, Nagata K, Hashizume H, Takiguchi N, Minamide A, Oka H, Kawaguchi H, Nakamura K, Akune T, Yoshida M..	Associations between radiographic lumbar spinal stenosis and clinical symptoms in the general population: The Wakayama Spine Study	Osteoarthrit is Cartilage			In press

Yoshimura N, <u>Muraki S</u> , Oka H, Morita M, Yamada H, Tanaka S, Kawaguchi H, Nakamura K, Akune T.	Profiles of vitamin D insufficiency and deficiency in Japanese men and women: Association with biological, environmental, and nutritional factors and coexisting disorders: The ROAD study	Osteoporos Int			In press
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Ⅲ. 研究成果の刊行物・別刷

COHORT PROFILE

Cohort Profile: Research on Osteoarthritis/ Osteoporosis Against Disability study

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How did the study come about?

Since the proportion of the ageing population in Japan is increasing, a comprehensive and evidence-based strategy is urgently required for the prevention of musculoskeletal diseases, including osteoarthritis (OA) and osteoporosis (OP), both of which affect the activities of daily living (ADL) and quality of life (QOL) and increase morbidity and mortality.^{1–4} However, few prospective, longitudinal studies for the purpose of developing such a strategy have been conducted, and little information is available regarding the prevalence and incidence of musculoskeletal disorders, including OA and OP, as well as pain and disability in the Japanese population.^{5–10} It is difficult to design rational clinical and public health approaches for the diagnosis, evaluation and prevention of OA and OP without such epidemiological data.

The Research on Osteoarthritis/osteoporosis Against Disability (ROAD) study was established in 2005 by N.Y., T.A., H.O., S.M., H.K. and K.N. (principal investigators). The principal investigators are affiliated with the 22nd Century Medical and Research Center, University of Tokyo.

What does the ROAD study cover?

The ROAD study is a multi-centre prospective observational study that aims to elucidate the environmental and genetic background of bone and joint diseases (with OA and OP as the representative bone and joint diseases). It is designed to examine the extent to which risk factors for these diseases are related to

the clinical features of the diseases, laboratory and radiographic findings, bone mass, bone geometry, life-style, nutritional factors, anthropometric and neuromuscular measures and fall propensity. It also aims to determine how these diseases affect the ADL and QOL of Japanese men and women.

The study will provide the information required to develop clinical algorithms for the early identification of potential high-risk populations. It will also provide information required to develop policies for the detection and prevention of OA, OP and osteoporotic fractures. The immediate goal of this study is to establish a representative population of elderly people, principally for the study of bone and joint health. The establishment of this cohort will also facilitate the expansion of other studies in related areas of investigation. Moreover, the knowledge gained from the ROAD study will have major implications for understanding and managing several other common problems of ageing.

Who are in the sample?

The subjects were residents of any one of the three communities that have different characteristics: an urban region in Itabashi, Tokyo; a mountainous region in Hidakagawa, Wakayama; and a coastal region in Taiji, Wakayama (Figure 1). The inclusion criteria, apart from residence in the communities mentioned above, were the ability to (i) walk to the survey site, (ii) report data and (iii) understand and sign an informed consent form. The age of the participants recruited from the urban region was ≥ 60 years, and that of the participants from the other

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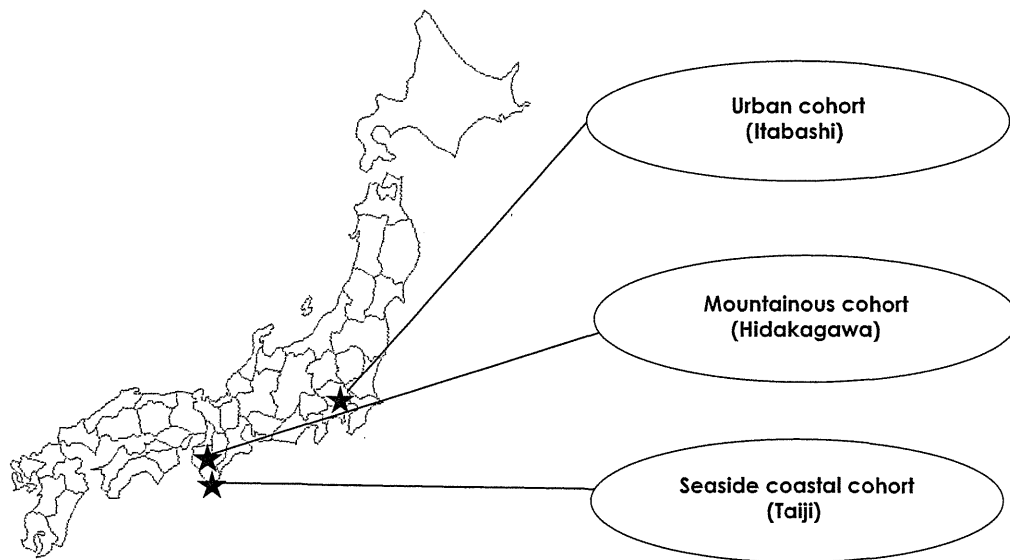


Figure 1 Locations of the three regions from which the study cohort was derived

Table 1 Age-sex distribution and mean values [standard deviation (SD)] of selected characteristics of the participants

Age strata (years)	Men				Women			
	Total	Urban	Mountainous	Coastal	Total	Urban	Mountainous	Coastal
≤39	14	0	2	12	31	0	7	24
40-49	44	0	7	37	105	0	17	88
50-59	107	0	36	71	211	2	67	142
60-69	168	11	93	64	385	60	183	142
70-79	535	315	150	70	913	594	196	123
≥80	193	139	31	23	334	229	75	30
Total	1061	465	319	277	1979	885	545	549
Age (years)	71.0 (10.7)	77.2 (4.3)	69.5 (9.1)	62.6 (13.2)	69.9 (11.2)	76.3 (5.0)	68.6 (10.4)	60.8 (12.5)
Height (cm)	162.5 (6.7)	161.3 (5.9)	161.4 (6.9)	165.8 (6.8)	149.8 (6.5)	148.5 (5.6)	148.2 (6.7)	153.2 (6.2)
Weight (kg)	61.3 (10.0)	60.0 (8.5)	60.0 (10.2)	64.8 (11.0)	51.5 (8.6)	50.8 (8.3)	50.5 (8.6)	53.5 (8.8)
BMI (kg/m ²)	23.1 (3.0)	23.0 (2.8)	23.0 (3.0)	23.5 (3.4)	22.9 (3.5)	23.0 (3.4)	23.0 (3.4)	22.8 (3.6)
Current smoker (%)	25.9	19.0	28.9	31.1	3.5	2.9	4.7	2.9
Current drinker (%)	64.4	60.5	69.8	63.2	25.9	27.4	26.1	24.2

BMI=body mass index.

two regions was ≥40 years. In the urban region, invitation letters were distributed only to the inhabitants whose name was on a list of community-dwelling people that was prepared in 2002.¹¹

Subjects from each area who were willing to attend the study were invited to participate. Despite being younger (58 years) than the age limit defined in the inclusion criteria, 2 inhabitants from the urban area, 9 from the mountainous area and 36 from the coastal area were included in the study because they were very keen to participate. Over the 1.5-year

period from October 2005 to March 2007, 3040 of 5785 candidates were enrolled from the three regions (participation rate, 52.5%).

Selected characteristics of the study population, including age, height, weight, BMI and proportions of participants who smoked and consumed alcohol, are shown in Table 1. In the urban, mountainous and coastal areas, 99.8, 84.3 and 54.7% of the participants, respectively, were >60 years of age. Two-thirds of the participants were women, and their mean age was 1 year less than that of the male

participants. No significant differences were observed in BMI values between the genders, but the proportions of both current smokers and alcohol consumers were significantly higher among men than among women.

All participants provided written informed consent, and the study was conducted with the approval of the ethics committees of the University of Tokyo (nos 1264 and 1326) and the Tokyo Metropolitan Institute of Gerontology (no. 5). Careful consideration was given to ensure a safe experience for the participants during the examination and during any other study procedures.

How often have they been followed up?

We intend to follow-up the three population-based cohorts of the ROAD study for at least 10 years. In October 2008, after a follow-up period of 3 years, a second comprehensive clinical examination

was started and is ongoing. We will repeat the baseline measurements during the second examination. A third and fourth examination will be performed at 6 and 10 years, respectively, after the baseline examination.

What has been measured?

The baseline examination of the ROAD study consisted of the following: interviewer-administered questionnaire, dietary assessment, anthropometric measurements, visual and neuromuscular function assessment, biochemical measurements, medical history taking, radiographic assessment and bone mineral density (BMD) measurement (Table 2).

Interviewer-administered questionnaire

A questionnaire was prepared by modifying the questionnaire used in the Osteoporotic Fractures in Men Study (MrOS),¹² and adding some new items to the modified questionnaire. Knee symptoms were

Table 2 Summary of data collected in the ROAD study

Interviewer-administrated questionnaire

Cigarette smoking, alcohol consumption
 Medical history, medications
 Reproductive variables, lactation
 Dietary history, history of falls and fractures
 Physical activity using PASE
 Family history
 Evaluation of knee symptoms using WOMAC
 Health-related QOL (EQ5D, SF-8)

Dietary assessment

Nutrient intake calculated using BDHQ

Anthropometric measurements

Height, weight, arm span, grip strengths
 Circumference of both wrists, circumference of waist
 Heart rate, systolic and diastolic blood pressure

Visual and neuromuscular function

Visual acuity
 Walking speed with tandem walking 6 m x 20 cm
 Rise from a chair

Biochemical measurements

Blood samples Blood counts, haemoglobin, haemoglobin A1C, blood sugar
 Sera Total protein, AST, ALT, GGT, total cholesterol, HDL-cholesterol, triglyceride
 BUN, uric acid, creatinine

DNA samples extracted

Urine samples Urinary protein, occult blood, sugar, urobilinogen

Medical information

Pain in back, lumbar, knee and hip
 Swelling and range of motion of the joints
 Tendon reflexes
 Cognitive function used by Mini-Mental Status Examination

Radiographic assessment

Anteroposterior and lateral views of lumbar spine
 Anteroposterior view of both knees
 Anteroposterior view of both hips

BMD measurements

Lumbar spine and proximal femur (mountainous and coastal areas)

AST=aspartate aminotransferase; ALT=alanine aminotransferase; GGT= γ -glutamyltranspeptidase; HDL=high-density lipoprotein; BUN=blood urea nitrogen; BDHQ=Brief Diet History Questionnaire; PASE=Physical Activity Scale for the Elderly; WOMAC=Western Ontario and McMaster University Osteoarthritis Index; EQ5D=European QOL-5 dimensions instrument; SF-8=Medical Outcomes Study 8-item Short Form.