Appendix A. Data Collection Forms
1. Does the article report original data on the prevalence or incidence of any of the following in men?
   (Check all that apply)
   Osteopenia ....................................................
   Osteoporosis..................................................
   Fractures ....................................................
   None of the above ........................................

2. Does the article report original data on risk factors for osteopenia, osteoporosis, or fractures in men?
   (Circle one)
   Yes................................................................1
   No.................................................................2

3. Does the article report on a tool to screen for osteoporosis in men?
   [tool=radiologic studies, surveys, etc]
   (Circle one)
   Yes............................................................. 1
   No....................................................................2

4. Does the article report associations between BMD levels as determined by DXA and fractures in men?
   (Circle one)
   Yes................................................................1
   No....................................................................2

5. Study design
   (Circle one)
   RCT/CCT..................................................... 1
   Cohort/case series ...........................................2
   Case control ..................................................3
   Review article: systematic or M-A ............... 4
   Review article: not systematic .................... 5 (STOP)
   Review article: letter, editorial, other syst review .......... 6 (STOP)
   Other........................................................... 7 (STOP)

6. Are any of the subjects identified as veterans?
   (Circle one)
   Yes............................................................ 1
   No.............................................................. 2

7. Should this article be saved for background?
   (Circle one)
   Yes............................................................ 1
   No.............................................................. 2

NOTES:
VA Male OP Project-Detailed Review Form- Diagnostic Studies

Do you think that this article might include the same data as another study? (CIRCLE ONE)
Yes 1
No 2

If YES enter Trial name and/or IDs:
Trial name: ___________________________
ID(s): ________________________________

What is the study test? (CHECK ALL THAT APPLY)
- Ultrasound, BUA ....................................................
- Ultrasound, SOS ....................................................
- Ultrasound, QUI ......................................................
- Peripheral bone density, pDXA ..............................
- Peripheral bone density, SXA ................................
- Peripheral bone density, other: _______________.
- Central DXA ..........................................................
- Quantitative CT ......................................................
- Bone markers ........................................................
- Questionnaire, OST..............................................
- Questionnaire, other: ___________________________
- Other: __________________________________________
- Other: __________________________________________

If applicable, at what anatomic site was the study test performed? (CHECK ALL THAT APPLY)
- Spine........................................................................
- Femur ....................................................................
- Radius....................................................................
- Patella ....................................................................
- Calcaneus ...............................................................}
- Finger ....................................................................
- Other: __________________________________________
- Not applicable .......................................................}
- Not reported .........................................................

What is the reference test? (CHECK ALL THAT APPLY)
- Ultrasound, BUA ....................................................
- Ultrasound, SOS ....................................................
- Ultrasound, QUI ......................................................
- Peripheral bone density, pDXA ..............................
- Peripheral bone density, SXA ................................
- Peripheral bone density, other: _______________.
- Central DXA ..........................................................
- Quantitative CT ......................................................
- Questionnaire, OST..............................................
- Questionnaire, other: ___________________________
- Prior fractures ........................................................
- Prior self-reported osteoporosis ............................
- Other: __________________________________________
- Other: __________________________________________
If applicable, at what anatomic site was the reference test performed?  
(CHECK ALL THAT APPLY)
- Spine
- Femur
- Radius
- Patella
- Calcaneus
- Finger
- Other: _____________________________
- Not applicable
- Not reported

Who is studied?  
(CHECK ALL THAT APPLY)
- A. Not reported
- B. Unselected population
- C. Selected population
- Elderly
  - Nursing home
  - Referred
  - Prior glucocorticoid use
  - COPD
  - Hypogonadal
  - Excess alcohol
  - Malabsorption
  - Other: ____________________________

What were the characteristics of the patient population?  
(CHECK ALL THAT APPLY)
- Caucasian
- African Ancestry
- Hispanic
- Asian (non-Filipino)
- Filipino
- Native American
- Eskimo/Inuit
- Other: __________________________
- Veteran
- Characteristics not reported

In what region did the study take place?  
(CHECK ALL THAT APPLY)
- US/Canada
- Scandinavia
- Australia/NZ
- Western Europe
- Eastern Europe
- Latin America
- Middle East
- India
- Africa
- Asia
- Other: __________________________
- Not reported

Does the article report sensitivity, specificity or data to construct 2 X 2 table?  
(CHECK ALL THAT APPLY)
- Sensitivity
- Specificity
- Correlation
- Other: __________________________
- Not reported

What was the male sample size data?  
Enter number or 9999 for not reported
Enrolled: ________ Followed up: ________
<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Was the spectrum of patients representative of the patients who will receive the test in practice?</td>
<td>Yes 1 No 2 Unclear 3</td>
<td>*How to score: Score ‘yes’ if based on information reported from study’s authors, you believe the spectrum of patients included in the study is representative of those in whom the test will be used in practice. Judgment should be based on both method of recruitment and the characteristics of those recruited. Score ‘no’ if you think the population studied does not fit into what was specified as acceptable. Score ‘no’ if studies recruit a group of healthy controls and a group known to have the target disorder.</td>
</tr>
<tr>
<td>2. Were selection criteria clearly described?</td>
<td>Yes 1 No 2 Unclear 3</td>
<td>*How to score: Score ‘yes’ if you think all relevant information regarding how participants were selected for inclusion has been provided. Score ‘no’ if study selection criteria are not clearly reported.</td>
</tr>
<tr>
<td>3. Is the reference standard likely to correctly classify the target condition?</td>
<td>Yes 1 No 2 Unclear 3</td>
<td>*How to score: Score ‘yes’ if you believe the reference standard is likely to correctly classify the target condition or is the best method available. Score ‘no’ if you do not think the reference standard was likely to have correctly classified the target condition.</td>
</tr>
<tr>
<td>4. Is the time period between reference standard and index test short enough to be reasonably sure that the target condition did not change between the two tests?</td>
<td>Yes 1 No 2 Unclear 3</td>
<td>*How to score: For conditions that progress rapidly, should be scored ‘yes’ if delay between performance of index and ref test if very short. If condition is chronic, longer delay periods may be appropriate. You will have to determine what is ‘short enough.’ Score ‘no’ if you think performance of index test and reference standard was sufficiently long that disease status may have changed between the performance of the two tests.</td>
</tr>
<tr>
<td>5. Did the whole sample or a random selection of the sample, receive verification using a reference standard?</td>
<td>Yes 1 No 2 Unclear 3</td>
<td>*How to score: Score ‘yes’ if it is clear that all patients or a random selection of patient who received index test went on to receive verification of disease status using reference standard. Score ‘no’ if some patients did not receive verification of disease status and selection of patient to receive reference standard was not random.</td>
</tr>
<tr>
<td>6. Did patients receive the same reference standard regardless of the index test result?</td>
<td>Yes 1 No 2 Unclear 3</td>
<td>*How to score: Score ‘yes’ if it is clear that patients received verification of their true disease status using the same reference standard. Score ‘no’ if some patients received verification using a different reference standard.</td>
</tr>
</tbody>
</table>
7. Was the reference standard independent of the index test (i.e. the index test did not form part of the reference standard)?

(CIRCLE ONE)
Yes 1
No 2
Unclear 3

*How to score: Score ‘yes’ if it is clear from the study that the index test did not form part of the reference standard. Score ‘no’ if it appears that the index test formed part of the reference standard.

8. Was the execution of the index test described in sufficient detail to permit replication of the test?

(CIRCLE ONE)
Yes 1
No 2
Unclear 3

*How to score: SEE # 9

9. Was the execution of the reference standard described in sufficient detail to permit its replication?

(CIRCLE ONE)
Yes 1
No 2
Unclear 3

*How to score: Score ‘yes’ if study reports sufficient details or citations to permit replication of the index test and reference standard. Score ‘no’ in other cases.

10. Were the index test results interpreted without knowledge of the results of the reference standard?

(CIRCLE ONE)
Yes 1
No 2
Unclear 3

*How to score: SEE # 11

11. Were the reference standard results interpreted without knowledge of the results of the index test?

(CIRCLE ONE)
Yes 1
No 2
Unclear 3

*How to score: Score ‘yes’ if study clearly states that the test results (index or reference standard) were interpreted blind to the results of the other test. Score ‘no’ if it does not appear that test results were interpreted blind to results of the other test.

12. Were the same clinical data available when test results were interpreted as would be available when the test is used in practice?

(CIRCLE ONE)
Yes 1
No 2
Unclear 3

*How to score: Score ‘yes’ if clinical data would normally be available when the test is interpreted in practice and similar data were available when interpreting the index test in the study and when clinical data would not be available in practice and these data were not available when the index test results were interpreted. Score ‘no’ if this is not the case.

13. Were uninterruptible/intermediate test results reported?

(CIRCLE ONE)
Yes 1
No 2
Unclear 3

*How to score: Score ‘yes’ if it is clear that all test results, including uninterruptible/indeterminate/intermediate results are reported. Score ‘no’ if you think that such results occurred but have not been reported.

14. Were withdrawals from the study explained?

(CIRCLE ONE)
Yes 1
No 2
Unclear 3

*How to score: Score ‘yes’ if it is clear what happened to all patients who entered the study, for example if a flow diagram of study participants is reported. Score ‘no’ if it appears that some of the participants who entered the study did not completed the study (i.e. did not receive both the index test and reference standard and these patients were not accounted for).
Are data in this article reported for MEN for the risk factors listed below?

### MODERATE RISK FACTORS

- Smoking (active)
- Low Sunlight Exposure (low or none)
- Family History of Osteoporotic Fracture
- Low Calcium Intake (<500-850 mg/day)
- Hyperparathyroidism (N/S)
- Hyperthyroidism
- Diabetes mellitus (type II or N/S)
- Rheumatoid arthritis

### UNCLASSIFIABLE RISK FACTORS

- Alcohol Intake
- Male hypogonadism
- Other hormonal factors in men, including
  - Anti-androgen therapy
  - Prostaglandin inhibitors (NSAIDs and aspirin)
  - Anti-ulcer agents
  - Thyroid disease including replacement therapy
  - Respiratory diseases – independent of steroid use
  - Dietary deficiency of Vitamin D
  - Metabolism and GI absorption disorders
  - SCI
  - Hyperhomocysteinemia

- This article does not include any of the risk factors listed on this form.
### VA Male OP Project-Detailed Review Form- RISK FACTOR STUDIES

<table>
<thead>
<tr>
<th>Article ID:</th>
<th>Reviewer:</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Author:</td>
<td>(Last Name Only)</td>
</tr>
</tbody>
</table>

**STUDY PARTICIPATION**

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Was the source population clearly defined?</td>
<td>☐</td>
</tr>
<tr>
<td>Was the study population described?</td>
<td>☐</td>
</tr>
<tr>
<td>Is the study population representative of the patients of interest (VA)?</td>
<td>☐</td>
</tr>
</tbody>
</table>

**STUDY DESIGN**

4. What is the study design? (Check one)
   - Case-Control
   - Cohort
   - Cross sectional

5. What is the study design? (Check one)
   - Case-Control
   - Cohort
   - Cross sectional

**STUDY ATTRITION**

FOR COHORTS ONLY

How many subjects were enrolled?

| _____ _____ _____ _____ | (ND=9999) |

6. How many subjects were included in the data analysis?

| _____ _____ _____ _____ | (ND=9999) |

7. What is the duration of the follow up?

<table>
<thead>
<tr>
<th>Duration</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>01. Days</td>
<td>04. Years</td>
</tr>
<tr>
<td>02. Weeks</td>
<td>05. NR</td>
</tr>
<tr>
<td>03. Months</td>
<td></td>
</tr>
</tbody>
</table>

OR

| _____ _____ _____ _____ | person-years |

FOR CASE CONTROL ONLY

8. How many cases were included?

| _____ _____ _____ _____ |

9. How many controls were included?

| _____ _____ _____ _____ |

FOR CROSS SECTIONAL STUDIES ONLY

10. What is the sample size?

| _____ _____ _____ _____ |

**RISK FACTOR MEASUREMENT**

Which of the following risk factors were assessed?

- Alcohol Consumption
- Diabetes Mellitus, type II or NOS
- Spinal Cord Injury

- If yes, how was alcohol consumption defined:

- If yes, how was the presence of diabetes defined:

- If yes, how was the presence and location of SCI defined:

---

**FINAL 12/01/06**
OUTCOME MEASUREMENT

12. What outcome was assessed?

BMD (cDXA) ..............................................................

If yes answer the following:

- Site
  - Spine ..........................................................
  - Femur ........................................................
  - Radius .....................................................
  - Patella ......................................................
  - Calcaneus .................................................
  - Finger ......................................................
  - Other: ________________________________ .......

- T-score: ________________________________

- Reference Standard
  - Male ...........................................................
  - Female .....................................................
  - Other ......................................................

Specify:____________________________________

Osteoporotic fracture ...........................................

If yes, how was the presence of fracture assessed:

(CHECK ALL THAT APPLY)

- X-ray ..........................................................
- Diary/Self Report ........................................
- Administrative data .....................................
- Medical Record Review ................................

Specify:____________________________________

POTENTIAL CONFOUNDING PROGNOSTIC FACTOR
MEASUREMENT

13. Which of the following risk factors were assessed?

(CHECK ALL THAT APPLY)

Age ..............................................................
Low body weight ...........................................
Weight loss ...................................................
Physical inactivity/prolonged immobilization
(Not SCI) ......................................................
Corticosteroid use ...........................................
Anticonvulsant use ........................................
Hyperparathyroidism ......................................
Diabetes Mellitus, type I .................................
Gastrectomy ...................................................
Hypogonadism, primary or secondary ............
Poor visual acuity ...........................................
Previous osteoporotic fracture .......................

Specify:____________________________________

ANALYSIS

14. Does the article present:

(CHECK ALL THAT APPLY)

- Bivariate .......................................................
- Multivariate ...................................................
- Other ...........................................................

Specify:____________________________________
STUDY PARTICIPATION
The study sample represents the population of interest on key characteristics, sufficient to limit potential bias to the results.

Yes ........................................................................ [ ]
Partly ................................................................. [ ]
No ........................................................................ [ ]
Unsure ................................................................ [ ]
*Population of interest is adequately described for key characteristics
*Sampling frame and recruitment are adequately described, including methods to identify the sample (number and type used, e.g., referral patterns in health care), period of recruitment, and place of recruitment (setting and geographic location).
*Inclusion and exclusion criteria are adequately described (e.g., including explicit diagnostic criteria or “zero time” description).
*There is adequate participation in the study by eligible individuals.
*The baseline study sample (i.e., individuals entering the study) is adequately described for key characteristics.

STUDY ATTRITION
Loss to follow-up (from sample to study population) is not associated with key characteristics (i.e., the study data adequately represent the sample), sufficient to limit potential bias.

Yes ........................................................................ [ ]
Partly ................................................................. [ ]
No ........................................................................ [ ]
Unsure ................................................................ [ ]
*Proportion of study sample completing the study and providing outcome data is adequate.
*Attempts to collect information on participants who dropped out of the study are described.
*Reasons for loss to follow-up are provided.
*Participants lost to follow-up are adequately described for key characteristics.
*There are no important differences between key characteristics and outcomes in participants who completed the study and those who did not.

PROG PROGNOSTIC FACTOR MEASUREMENT
The prognostic factor of interest is adequately measured in study participants to sufficiently limit potential bias.

Yes ........................................................................ [ ]
Partly ................................................................. [ ]
No ........................................................................ [ ]
Unsure ................................................................ [ ]
*A clear definition or description of the prognostic factor measure is provided (e.g., including dose, level, duration of exposure, and clear specification of the method of measurement.)
*Continuous variables are reported or appropriate (i.e., not data-dependent) cut-points are used.
*The prognostic factor measure and method are adequately valid and reliable to limit misclassification bias (e.g. may include relevant outside sources of information on measurement properties, also characteristics, such as blind measurement and limited reliance on recall).
*Adequate proportion of the study sample has complete data for prognostic factors.
*The method and setting of measurement are the same for all study participants.
*Appropriate methods are used if imputation is used for missing prognostic factor data.

OUTCOME MEASUREMENT
The outcome of interest is adequately measured in study participants to sufficiently limit potential bias.

Yes ........................................................................ [ ]
Partly ................................................................. [ ]
No ........................................................................ [ ]
Unsure ................................................................ [ ]
*A clear definition of the outcome of interest is provided, including duration of follow-up and level and extent of the outcome construct.
*The outcome measure and method used are adequately valid and reliable to limit misclassification bias (e.g., may include relevant outside sources of information on measurement properties, also characteristics, such as blind measurement and confirmation of outcome with valid and reliable test.)
*The method and setting of measurement are the same for all study participants.
CONFOUNDING MEASUREMENT AND ACCOUNT

Important potential confounders are appropriately accounted for, limiting potential bias with respect to the prognostic factor of interest.

Yes ................................................................. ☐
Partly .............................................................. ☐
No ................................................................. ☐
Unsure ............................................................ ☐

*All important confounders, including treatments (key variables in conceptual model), are measured.
*Clear definitions of the important confounders measured are provided (e.g., including dose, level and duration of exposures).
*Measurement of all important confounders is adequately valid and reliable (e.g., may include relevant outside sources of information on measurement properties, also characteristics, such as blind measurement and limited reliance on recall.)
*The method and setting of confounding measurement are the same for all study participants.
*Appropriate methods are used if imputation is used for missing confounder data.
*Important potential confounders are accounted for in the study design (e.g., matching for key variables, stratification, or initial assembly of comparable groups.)
*Important potential confounders are accounted for in the analysis (i.e., appropriate adjustment).

ANALYSIS

The statistical analysis is appropriate for the design of the study, limiting potential for presentation of invalid results.

Yes ................................................................. ☐
Partly .............................................................. ☐
No ................................................................. ☐
Unsure ............................................................ ☐

*There is sufficient presentation of data to assess the adequacy of the analysis.
*The strategy for model building (i.e., inclusion of variables) is appropriate and is based on a conceptual framework or model.
*The selected model is adequate for the design of the study.
*There is no selective reporting of results.
Appendix B. Evidence Table
## Evidence Table 1. Diagnostic Test Studies

Columns 1-10: Article, Population, Characteristics, Sample Size, Study test & site, Reference test & site, QUADAS, Results

<table>
<thead>
<tr>
<th>Author, Year, Region, Trial Name</th>
<th>Population</th>
<th>Characteristics</th>
<th>Male sample size</th>
<th>Study</th>
<th>Reference</th>
<th>QUADAS*</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adler, 2001 US/Canada</td>
<td>Referred for DXA</td>
<td>NR, Veteran</td>
<td>185</td>
<td>Ultrasound BUA &amp; QUI</td>
<td>Central DXA Spine, Femur</td>
<td>3,3,1,1,1,1,1,1,1,1,1,1</td>
<td><strong>Central DXA T-score&lt;1.5</strong>&lt;br&gt;Heel T-score&lt;0: Sens=0.89, Spec=0.40&lt;br&gt;Heel T-score&lt;0.5: Sens=0.79, Spec=0.48&lt;br&gt;Heel T-score&lt;1.0: Sens=0.65, Spec=0.75&lt;br&gt;Heel T-score&lt;1.5: Sens=0.49, Spec=0.84&lt;br&gt;Heel T-score&lt;2.0: Sens=0.30, Spec=0.94&lt;br&gt;Heel T-score&lt;2.5: Sens=0.07, Spec=0.98</td>
</tr>
<tr>
<td>Adler, 2003 US/Canada</td>
<td>Pulmonary Clinic</td>
<td>Asian, Veteran</td>
<td>107</td>
<td>Ultrasound BUA, SOS &amp; QUI, questionnaire</td>
<td>Central DXA Spine, Femur</td>
<td>1,1,1,1,2,1,1,1,1,1,1,1,1</td>
<td><strong>Central DXA T-score&lt;2.0</strong>&lt;br&gt;Heel T-score&lt;0: Sens=0.92, Spec=0.35&lt;br&gt;Heel T-score&lt;0.5: Sens=0.86, Spec=0.47&lt;br&gt;Heel T-score&lt;1.0: Sens=0.71, Spec=0.68&lt;br&gt;Heel T-score&lt;1.5: Sens=0.53, Spec=0.79&lt;br&gt;Heel T-score&lt;2.0: Sens=0.30, Spec=0.89&lt;br&gt;Heel T-score&lt;2.5: Sens=0.06, Spec=0.97</td>
</tr>
<tr>
<td>Adler, 2003 US/Canada</td>
<td>Pulmonary &amp; Rheumatology Clinic</td>
<td>Pulmonary &amp; Rheumatology Clinic, Veteran</td>
<td>181</td>
<td>Questionnaire OST</td>
<td>Central DXA Spine, Femur</td>
<td>1,1,1,1,1,1,1,1,1,1,1,1,1</td>
<td><strong>Central DXA T-score&lt;2.5</strong>&lt;br&gt;O斯塔 score&lt;1: Sens=0.91, Spec=0.27&lt;br&gt;O斯塔 score&lt;0.5: Sens=0.86, Spec=0.38&lt;br&gt;O斯塔 score&lt;1.0: Sens=0.74, Spec=0.59&lt;br&gt;O斯塔 score&lt;1.5: Sens=0.60, Spec=0.73&lt;br&gt;O斯塔 score&lt;2.0: Sens=0.34, Spec=0.86&lt;br&gt;O斯塔 score&lt;2.5: Sens=0.07, Spec=0.97</td>
</tr>
<tr>
<td>Cheng, 1997 Scandinavia</td>
<td>Elderly</td>
<td>NR</td>
<td>205</td>
<td>Peripheral bone density pDXA</td>
<td>Calcaneus Fracture Occurrence Multiple Sites</td>
<td>2,1,1,1,2,1,1,1,1,1,1,1,1</td>
<td>Determined that calcaneal BMD can be used as a predictor of fracture occurrence in 75-80 year old men.</td>
</tr>
<tr>
<td>De Laet, 1998 Western Europe</td>
<td>Elderly</td>
<td>NR</td>
<td>2778</td>
<td>Central DXA, Hiefty Risk using DCA</td>
<td>Femur, NA Fracture Occurrence NA</td>
<td>1,1,1,1,1,1,1,1,1,1,1,1,1</td>
<td>Evaluated a hip fracture risk equation which included age and femoral neck BMD and found that they were able to accurately predict hip fracture over an approximate four year period.</td>
</tr>
<tr>
<td>Donaldson, 1999 Western Europe</td>
<td>Elderly</td>
<td>NR</td>
<td>817</td>
<td>Ultrasound BUA</td>
<td>Calcaneus Fracture Occurrence NR</td>
<td>1,1,3,1,2,3,1,1,1,1,1,1,1,2</td>
<td>Found no significant difference between fixed or anatomic BUA values in men with or without a past fracture.</td>
</tr>
</tbody>
</table>

*QUADAS 1=Yes, 2=No, 3=Unclear; Order is: Spectrum representativeness, Selection criteria, Reference standard, Time period, Verification bias, Use of same reference test, Independence, Detail of index test, Details of reference test, Blinding #1, Blinding #2, Usefulness in practice, Intermediate results, Withdrawals

NR=Not Reported  BUA=Broad-band ultrasound attenuation  QUI=Quantitative Ultrasound Index  DXA=Dual energy x-ray absorptiometry

SOS=Speed of sound  OST=Osteoporosis Screening Tool  BMD=Bone Mass Density  QUS=Quantitative Ultrasound

SI=Stiffness Index  OSTA=Osteoporosis Screening Tool for Asians  MOST=Male Osteoporosis Screening Tool  AVU=Apparent velocity of ultrasound
<table>
<thead>
<tr>
<th>Author, Year, Region</th>
<th>Population</th>
<th>Characteristics</th>
<th>Male sample size</th>
<th>Study</th>
<th>Reference</th>
<th>QUADAS*</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gonnelli, 2005</strong>&lt;sup&gt;<strong>a</strong>&lt;/sup&gt; Western Europe</td>
<td>Bone Clinic</td>
<td>NR</td>
<td>407</td>
<td>Ultrasound BUA &amp; SOS; Central DXA</td>
<td>Spine, Femur, Calcaneus</td>
<td>Fracture Occurrence</td>
<td>Spine, Femur, Radius, Pelvis</td>
</tr>
<tr>
<td><strong>Grampp, 2001</strong>&lt;sup&gt;<strong>b</strong>&lt;/sup&gt; Western Europe</td>
<td>Referred for BMD</td>
<td>NR</td>
<td>501</td>
<td>Ultrasound QUS</td>
<td>Calcaneus</td>
<td>Central DXA</td>
<td>Spine, Femur</td>
</tr>
<tr>
<td><strong>Gudmundsdottir, 2005</strong>&lt;sup&gt;<strong>c</strong>&lt;/sup&gt; Scandinavia</td>
<td>Unselected</td>
<td>NR</td>
<td>589</td>
<td>Ultrasound BUA, SOS &amp; SI</td>
<td>Calcaneus</td>
<td>Central DXA</td>
<td>Spine, Femur</td>
</tr>
<tr>
<td><strong>Kaptoge, 2004</strong>&lt;sup&gt;<strong>d</strong>&lt;/sup&gt; Western Europe</td>
<td>Unselected</td>
<td>NR</td>
<td>2653</td>
<td>Simple Score Male Multivariate Model</td>
<td>Spine</td>
<td>Fracture Occurrence</td>
<td>Spine, Femur, Radius, Rib, Other</td>
</tr>
<tr>
<td><strong>Karlsson, 1996</strong>&lt;sup&gt;<strong>e</strong>&lt;/sup&gt; Scandinavia</td>
<td>Unselected</td>
<td>NR</td>
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<td>Femur</td>
<td>Fracture Occurrence</td>
<td>Femur</td>
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<td><strong>Kroger, 1999</strong>&lt;sup&gt;<strong>f</strong>&lt;/sup&gt; Scandinavia, Western Europe</td>
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<td>Spine, Femur</td>
<td>Fracture Occurrence</td>
<td>Spine, Femur</td>
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<td><strong>Kung, 2005</strong>&lt;sup&gt;<strong>g</strong>&lt;/sup&gt; Asia</td>
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<td>776</td>
<td>Ultrasound BUA; SOS &amp; QUI; OSTA</td>
<td>Calcaneus NA</td>
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<td><strong>Li-Yu, 2005</strong>&lt;sup&gt;<strong>h</strong>&lt;/sup&gt; Asia</td>
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<td>OSTA</td>
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<td><strong>Lynn, 2005</strong>&lt;sup&gt;<strong>i</strong>&lt;/sup&gt; Asia</td>
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<td>Bone Structural Parameters</td>
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<td>Central DXA, Fracture Occurrence</td>
<td>Femur</td>
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<td><strong>Montagnani, 2001</strong>&lt;sup&gt;<strong>k</strong>&lt;/sup&gt; Western Europe</td>
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<td>Central DXA; Ultrasound</td>
<td>Spine, Femur, Finger</td>
<td>Fracture Occurrence</td>
<td>NR</td>
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*QUADAS 1=Yes, 2=No, 3=Unclear; Order is: Spectrum representativeness, Selection criteria, Reference standard, Time period, Verification bias, Use of same reference test, Independence, Detail of index test, Details of reference test, Blinding #1, Blinding #2, Usefulness in practice, Intermediate results, Withdrawals

NR=Not Reported BUA=Broad-band ultrasound attenuation QUI=Quantitative Ultrasound Index DXA=Dual energy x-ray absorptiometry SOS=Speed of sound OST=Osteoporosis Screening Tool BMD=Bone Mass Density QUS=Quantitative Ultrasound SI=Stiffness Index OSTA=Osteoporosis Screening Tool for Asians MOST=Male Osteoporosis Screening Tool AVU=Apparent velocity of ultrasound
<table>
<thead>
<tr>
<th>Author, Year, Region.</th>
<th>Population</th>
<th>Characteristics</th>
<th>Male sample size</th>
<th>Study</th>
<th>Reference</th>
<th>QUADAS *</th>
<th>Results</th>
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<tr>
<td>Mulleman, 2002 [1274] Western Europe</td>
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<td>Ultrasound BUA, SOS &amp; SI</td>
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<td>Spine, Femur</td>
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<td>Odvina, 1988 US/Canada</td>
<td>Referral for Osteoporosis</td>
<td>NR, Veteran</td>
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<td>Quantitative CT</td>
<td>Spine</td>
<td>Fracture Occurrence</td>
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<td>Robinson, 1987 Australia</td>
<td>Referred by Hospital Staff</td>
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<td>Linear Photon Absorptiometry</td>
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<td>Quantitative CT, Fracture Occurrence</td>
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<td>Rothenberg, 2004 US/Canada</td>
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<td>Ultrasound Bone Density</td>
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<td>Fracture Occurrence</td>
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<td>Shin, 2005 Asia</td>
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<td>Asian</td>
<td>1225</td>
<td>Ultrasound BUA, SOS &amp; Stiffness</td>
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<td>Peripheral bone density pDXA</td>
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<td>Spine, Femur, Calcaneus</td>
<td>Fracture Occurrence</td>
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<td>Travers-Gustafson, 1995 US/Canada</td>
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<td>Peripheral Bone Density other; AVU</td>
<td>Radius, Patella</td>
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## Evidence Table 1. Diagnostic Test Studies

### Columns 1-10: Article, Population, Characteristics, Sample Size, Study test & site, Reference test & site, QUADAS, Results

<table>
<thead>
<tr>
<th>Author, Year, Region,</th>
<th>Population</th>
<th>Characteristics</th>
<th>Male sample size</th>
<th>Study</th>
<th>Reference</th>
<th>QUADAS*</th>
<th>Results</th>
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<td>Varenna, 2005 10 Western Europe</td>
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<td>Ultrasound BUA, SOS, &amp; SI</td>
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<td>Femur, Non-spinal</td>
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<td>Welch, 2004 11 Western Europe</td>
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<td>Ultrasound BUA</td>
<td>Calcaneus Fracture Occurrence</td>
<td>Spine, Femur, Radius</td>
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<td>Bauer, 2006 75 US/Canada</td>
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<td>NR</td>
<td>5608</td>
<td>Ultrasound BUA, Central DXA</td>
<td>Femur, Calcaneus Fracture Occurrence</td>
<td>Femur</td>
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