

FRAX® manual calculator (hand-held) – information for doctors

E. Czerwinski ^{1,2}, J. Osieleniec ², A. Kumorek ²

¹ Department of Bone and Joint Diseases, Jagiellonian University Medical College

² Krakowskie Centrum Medyczne, ul. Kopernika 32, 31-501 Krakow, www.kcm.pl

Scientific grounds for the development of FRAX®

The diagnosis of osteoporosis acc. to WHO definition as of 1993 is based on the measurement of bone mineral density (BMD). The critical threshold for therapeutic and diagnostic decision is the value of T-score ≤ -2.5 . Unfortunately, as recent investigations suggest, 55-70% of fractures occur in persons, who do not fulfill the densitometric criteria of the diagnosis of osteoporosis.

As a result a number of meta-analyses have been conducted in the last few years in order to identify clinical risk factors, which can be used with or without BMD, to identify persons at risk of fracture. In 2008 a group of WHO experts led by Prof. J.A. Kanis published a report on the treatment of osteoporosis, enumerating the most significant fracture risk factors. They include: small value of body mass index (BMI <20 kg/m²), history of low energy fractures, proximal femur fractures in parents, smoking, therapy with glucocorticosteroids, alcoholism, rheumatoid arthritis.

Next an algorithm was developed, which connects the influence of clinical fracture risk factors with and without BMD, and published in the Internet (www.shef.ac.uk/FRAX/) in the form of the FRAX® calculator (WHO Fracture Risk Assessment Tool). With the use of FRAX® calculator one can assess the fracture risk of proximal femur, or the risk of any significant osteoporotic fracture in the next 10 years, with the BMD result or based only on patient's

history and BMI, and the results obtained are comparable. The risk can be calculated directly on the above mentioned Internet page, using the electronic calculator, or indirectly – taken from tables addressed to individual countries.

Unfortunately so far no FRAX® model was developed for Poland, but data for the English population can be used for calculation.

Hand-held FRAX® calculator

Taking into account the realities of basic healthcare in Poland, where visit time per one patient is very limited, and the calculation of fracture risk using the FRAX® calculator published in the Internet is time consuming or simply impossible, a very simple tool, the so called hand-held FRAX® calculator, was created in cooperation with J.A.Kanis (WHO), which is a modification of the Internet calculator.

The hand-held FRAX® calculator contains all data necessary to calculate 10-year absolute fracture risk, and the result is obtained in less than a minute. If the result of DXA examination of femoral neck is available, option with BMD should be selected, if there is no such result – option with BMI (the calculator can also be used to calculate patient's BMI).

In the first place patient's age range should be selected on the disc of the calculator, next the smaller disc should be rotated so that patient's BMI or T-score result, if the risk is calculated based on BMD, appears in the upper window. Next the number of clinical risk factors should be selected (listed on the calculator), determined on the basis of the interview, and the 10-year fracture risk can be read.

Coloured diagrammes on the discs of the calculator allow to qualify patient into one of 3 groups: high fracture risk – patient needs immediate treatment, medium fracture risk – densitometric examination is suggested (if FRAX® was calculated only on the basis of BMI), or low fracture risk – the patient requires no treatment or further diagnosis.

The calculator is a relatively simple tool which allows to quickly assess fracture risk; it may be a useful tool for family doctors who assess fracture risk, especially in case of limited access to densitometry.

10-year fracture risk calculated in this way appears to be the optimal solution for the identification of threshold for therapeutic treatment in accordance with current knowledge. Consent of International Osteoporosis Foundation has been obtained to distribute the FRAX® clock on the territory of Poland (P. McKenney). More information on: www.osteoporoza.pl.

Link to the instructional video available [here](#).

1. World Health Organization: Assessment of fracture risk and its application to screening for postmenopausal osteoporosis. Technical Report Series 843, Geneva 1994]
2. Siris ES, Chen YT, Abbott TA et al.: Bone mineral density thresholds for pharmacological intervention to prevent fractures. Arch Intern Med. 2004 May 24;164(10):1108-12.
3. Kanis JA.: Diagnosis of osteoporosis and assessment of fracture risk. Lancet (2002) 359: 1929-1936 2003.
4. Kanis J.A; Word Health Organisation Scientific Group: Assessment of osteoporosis at primary health-care level. Technical Report. WHO Collaborating Centre, University of Sheffield, UK, 2008.
5. Kanis J. A., Burlet N., Cooper C. et al. on behalf of the European Society for Clinical and Economic Aspects of Osteoporosis and Osteoarthritis (ESCEO). European guidance for the diagnosis and management of osteoporosis in postmenopausal women. Osteoporos Int (2008) 19:399–428

[Photograph of the FRAX hand held calculatorDownload](#)