CubaClinical® Bone Scan

Results Booklet

BRITISH COLLEGE OF OSTEOPATHIC MEDICINE
BCOM

ESO European School of Osteopathy

Part of BCNO Group

BCOM 6 Netherhall Gardens
London NW3 5RR
+44(0)20 7435 6464

ESO Boxley House, The Street
Maidstone, Kent, ME14 3DZ
+44(0)1622 671 558

Summary of Results

Thank you undertaking a CubaClinical® ultrasound bone densitometry test at the British College of Osteopathic Medicine (BCOM) on 20/06/2022.

Name: [redacted]
Date of Birth (Age): [redacted]
Body Mass (Kg): [redacted]
Height (m): [redacted]

With your consent the detailed results with their interpretation will be forwarded to your GP.

Consent: Given / **Not Given**

Risk Factors identified [redacted]

Summary Result: Ultrasound impedance average for what would be expected for your age. Medium risk of fracture compared to a healthy 20 year old – this is due to age related decline in bone density, particularly following menopause (see next pages for more detailed analysis).

[redacted]

Recommendations:

General: Ensure that you continue to take adequate weight bearing exercise and a balanced diet with sufficient calcium, magnesium, vitamin D and zinc.

Follow Up scan suggested in 2 years.

Yours sincerely,

Will Gowers
Research Assistant and Exercise Physiologist @ BCOM

Your Data = Right Foot

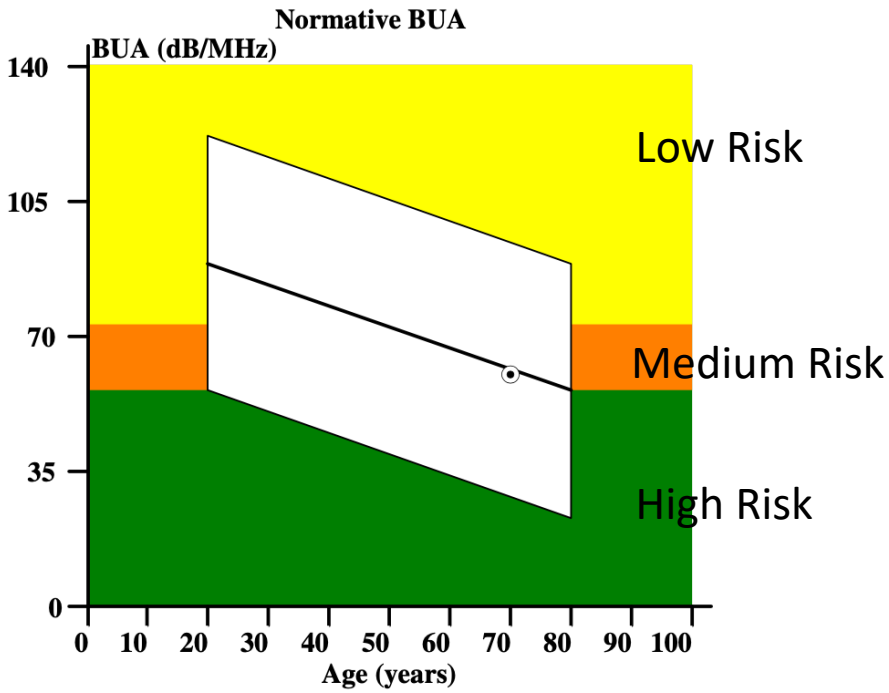
McCue CUBAclinical

British College of Osteopathic Medicine

CUBAclinical Ultrasound Bone Densitometry

Patient Data:

Scan Date	*Site*	*Separation*	*BUA*	*%Exp*	*Zu*	*Tu*
20/06/2022	R	49	61	98	-0.07	-1.73



The ◉ symbol shows your broadband ultrasound attenuation (BUA) result for your right foot. A BUA of 61 db/MHz is 2% below what would be expected for your age (98% Exp). The Zu score is -0.07 and Tu score -1.73.

The slanting oblong box defines the normal distribution relative to increasing age. The middle line being the average and the upper and lower limits being + and - 2 SD's respectively (the "Zu score"). Your result is therefore AVERAGE FOR YOUR AGE by -0.07 SD (very small deviation from average).

The graph shows 3 horizontal bands corresponding to High, Medium and Low risk of fracture relative to a healthy 20-year-olds profile (the "Tu score"). Your results indicates that you are at MEDIUM RISK of fracture compared to a healthy 20-year-old, with the reading being -1.73 SD the reading for a 20-year-old.

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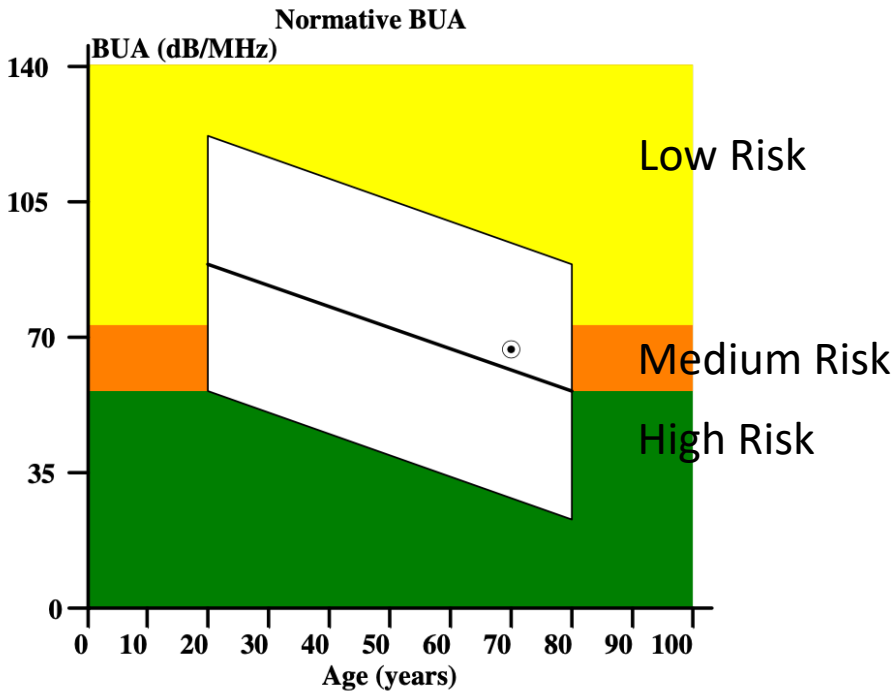
Your Data = Left Foot

British College of Osteopathic Medicine

CUBAclinical Ultrasound Bone Densitometry

Patient Data:

Scan Date	*Site*	*Separation*	*BUA*	*%Exp*	*Zu*	*Tu*
20/06/2022	L	47	68	109	0.35	-1.31



The ◉ symbol shows your broadband ultrasound attenuation (BUA) result for your left foot. A BUA of 68 db/MHz is 109% expected for your age. The Zu score is 0.35 and Tu score -1.31.

The slanting oblong box defines the normal distribution relative to increasing age. The middle line being the average and the upper and lower limits being + and - 2 SD's respectively (the "Zu score"). Your result is therefore ABOVE AVERAGE FOR YOUR AGE by 0.35 SD.

The graph shows 3 horizontal bands corresponding to High, Medium and Low risk of fracture relative to a healthy 20-year-olds profile (the "Tu score"). Your results indicates that you are at MEDIUM RISK of fracture compared to a healthy 20-year-old, with the reading being -1.31 SD below the reading for a 20-year-old.

Osteoporosis Prevention Information

Osteoporosis Prevention

How much calcium should I be having?

For adults at least **700mg per day**
if you have been diagnosed with osteoporosis **1200mg per day.**

Other nutrients important for the bones

- **Vitamin D** – Sunshine, margarines, oily fish
- **Boron** – apples, pears, grapes. Nuts, leafy vegetables and most dairy products
- **Copper** – nuts, seeds, fruit, beans, sunflower oil, mushrooms and crab
- **Magnesium** – green vegetables, nuts and dairy produce
- **Vitamin K** – broccoli, cauliflower, soya beans and dark green leafy vegetables
- **Zinc** – eggs, brazil nuts, pecans and yoghourt

All these can be obtained by eating a well balanced diet with at least 5 portions of fruit and vegetables every day.

Exercise Suggestions

- Ten minutes of brisk walking daily (Avoid if you have osteoarthritis or knee pain)
- Join an exercise class with a friend
- Weight training (supervised)
- Stair climbing, 5 flights a day
- Join a dance class
- Join a rambling club
- If you can swim, go once a week (strictly speaking not weight bearing but is helpful)
- Tai Chi
- Pilates

Choose the exercise which suits you best and you enjoy

Safe Exercise

- Begin gradually with things you know you can do comfortably
- Exercise must be done regularly to have any benefit and must be adopted permanently
- Wear comfortable clothing and flat shoes / trainers
- Warm up
- Don't exercise if you are feeling unwell
- Always stretch after your warm –up and again after your main exercise
- Don't do sit-ups and touching toes with straight legs.

Further information and support for osteoporosis can be found via the Royal Osteoporosis Society : https://theros.org.uk/information-and-support/

Typical Calcium content of food

Food	Quantity	Mg of calcium
Dairy Products		
Milk skimmed	1/3 pt/190 ml	235
Milk semi skimmed	1/3 pt/190 ml	231
Milk whole	1/3pt/190 ml	224
Milk soya *	1/3pt/190 ml	25
Cream double	3½ oz/100 g	50
Cream single	3½ oz/100 g	91
Cream whipping	3½ oz/100 g	62
Cheese cheddar	3½ oz/100 g	720
Cheese low fat (hard)	3½ oz/100 g	840
Cheese Camembert	3½ oz/100 g	350
Cheese Cottage	3½ oz/100 g	73
Cheese Edam	3½ oz/100 g	770
Yoghurt fruit low fat	3½ oz/100 g	150
Yoghurt fruit	3½ oz/100 g	160
Fromage frais fruit	3½ oz/100 g	86
Ice Cream dairy	3½ oz/100 g	130
Ice Cream non dairy	3½ oz/100 g	120
Custard from powder	3½ oz/100 g	140
Rice pudding	3½ oz/100 g	93
Fish		
Pilchards in Tom Sauce	3½ oz/100 g	300
Sardines in Tom Sauce	3½ oz/100 g	460
Sardines in oil	3½ oz/100 g	550
Whitebait fried	3½ oz/100 g	860
Salmon tinned	3½ oz/100 g	93
Tuna in oil tinned	3½ oz/100 g	12
Vegetables		
Curly kale boiled	3½ oz/100 g	150
Okra stir fried	3½ oz/100 g	220
Spinach boiled	3½ oz/100 g	160
Spring Greens boiled	3½ oz/100 g	75
Watercress	3½ oz/100 g	170
Pulses Beans & Seeds		
Red kidney beans	3½ oz/100 g	71
Tofu steamed **	3½ oz/100 g	510
Green/French beans	3½ oz/100 g	56
Baked beans	3½ oz/100 g	53
Sesame seeds	3½ oz/100 g	670
Tahini (sesame paste)	3½ oz/100 g	680
Cereal products		
White bread *	1 slice	33
Wholemeal bread	1 slice	16
Muesli Swiss style	3½ oz/100 g	110
Special K	3½ oz/100 g	70
Ready Brek	3½ oz/100 g	65
Snacks		
Tortilla chips	3½ oz/100 g	150
Milk chocolate	3½ oz/100 g	220
White chocolate	3½ oz/100 g	270
Creme eggs	3½ oz/100 g	120
Kit Kat	3½ oz/100 g	200
Mars bar	3½ oz/100 g	160
Fruit		
Apricots dried	3½ oz/100 g	92
Figs dried	3½ oz/100 g	250
Currants	3½ oz/100 g	93
Mixed Peel	3½ oz/100 g	130
Olives in brine	3½ oz/100 g	61
Orange peeled	3½ oz/100 g	33
Convenience Foods		
Moussaka homemade	3½ oz/100 g	81
Lasagne frozen	3½ oz/100 g	71
Sausage low fat grilled	3½ oz/100 g	130
Cornish pasty	3½ oz/100 g	60
Omelette cheese	3½ oz/100 g	280
Quiche cheese & egg	3½ oz/100 g	260
Macaroni cheese	3½ oz/100 g	170
Pizza cheese & tomato	3½ oz/100 g	210

* may be calcium enriched
** different products vary considerably

Please note, the calcium contents (with the exception of milk and bread), have been calculated per 100 g and are therefore not portion size. This has been done to make comparisons between various foods easier.

Ref: Information provided courtesy of The Royal Society of Chemistry, Ministry of Agriculture, Fisheries & Food publication "The Composition of Foods" 1992.
www.nos.org.uk

CubaClinical® Ultrasound Bone Densitometry Testing Principle

Ultrasound application in the field of osteoporosis and fracture risk assessment draws upon more than 10 years of technical development and clinical assessment trials [1]. The Cubaclinical equipment uses broadband ultrasound attenuation (BUA) in db/Mhz, as the measurement used for fracture risk assessment. Several studies have reported statistically significant relationships between BUA and BMD (bone mineral density) as measured by DXA with correlation coefficients in the region of 0.7 [2].

The hip shows a higher level of correlation than the spine. Despite a large population variance, age related bone loss has been demonstrated by the technique, and BUA values are significantly lower in patients with hip fractures than in controls [1]. The technique can discriminate patients with and without osteoporosis at least as well as measurements of bone mineral density. Two earlier studies concluded that BUA predicts hip fracture in the elderly as well as DXA [3,4]. The first prospective study using the CubaClinical® ultrasonometer confirmed this relation [5].

Whilst BUA correlates best with hip fracture risk it also relates to spine fracture. A study on 442 postmenopausal women concluded that a low BUA reading was associated with the presence of vertebral fracture [6]. Results of a long-term study on 3883 peri-menopausal women who were measured using both Ultrasound and DXA and then followed for 10 years showed that BUA may be an improved predictor of osteoporotic fractures in comparison with DXA [7]. McCloskey et al (2015) performed an individual level meta-analysis of 9 different cohort studies including 46,124 subjects with 3018 incident fractures. Quantitative Ultrasound was found to be a significant predictor of osteoporotic fractures much like other axial or peripheral measures of bone strength [8].

Investigation Site for Fracture Risk Assessment

The Calcaneum (heel bone) is used as the assessment site as it is readily accessible with a large percentage of cancellous bone, approximately flat parallel medial and lateral surfaces, and is located on the same axis as the hip. Whereas the femoral neck is relatively small and surrounded by a large muscle mass making it difficult to locate and assess using ultrasound, and the spine is obscured by air through which ultrasound will not penetrate. Calcaneal bone assessment techniques including the CubaClinical were assessed and shown to discriminate between osteoporotic patients and young normal controls [9].

Normative Data

U.K. normative data was obtained by the manufacturers of the Cubaclinical equipment using published data from normal male and female subjects between the ages of 20 – 80 [10,11]. In this data a moderate exclusion criteria were applied including removal of participants with past fracture, HRT, oophorectomy, rheumatoid arthritis and steroid treatment. The male normative database was produced at BCOM. Normative data is a graphical representation of the BUA result within the "Normal" male and female population.

Example Data/Reading the BUA Graphic

Percent of expected for age.

Standard deviation from age matched individual.

Patient Details:

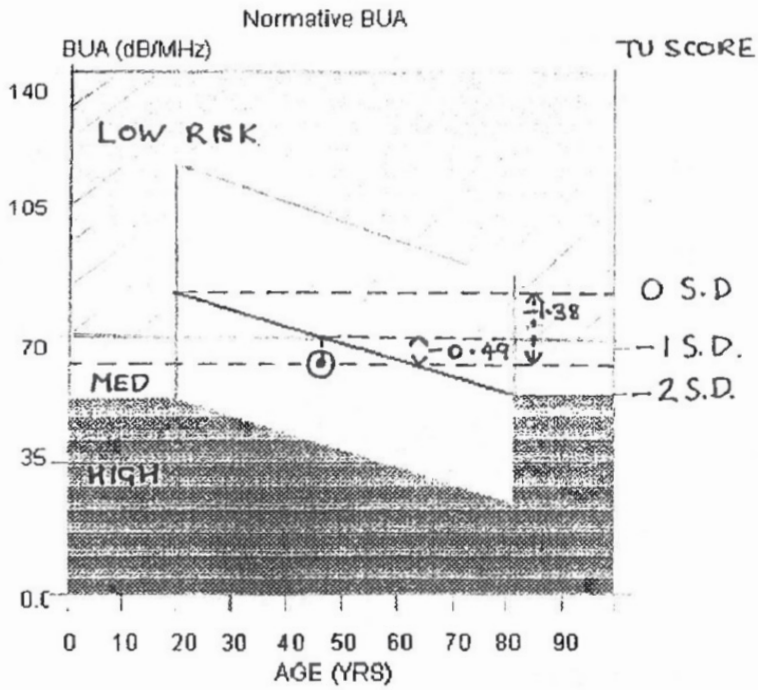
Surname: Example
D.O.B. 17/02/51

First name: A.N.
Sex: F

Patient Data:

Scan Date	Site	BUA	%Exp	Zu score	Tu score
09/07/98	L	67	89	-0.49	-1.38

Standard deviation from 20 year old.



The ⊙ symbol shows the result for a 47 year old female. This patient has a BUA of 67 for her left foot and her reading is 11% below what would be expected for her age (89% Exp). Her Zu score is -0.49 and Tu score -1.38.

The slanting oblong box defines the normal distribution relative to increasing age. The middle line being the average and the upper and lower limits being + and - 2 SD's respectively (Zu score). This patient's reading is therefore BELOW AVERAGE FOR HER AGE by 0.49 SD.

The graphs 3 horizontal bands correspond to High, Medium and Low risk of fracture relative to a healthy 20 . year olds profile (Tu scores). This patient's reading indicates that she is at MEDIUM RISK of fracture compared to a healthy 20 year old. Her reading is 1.38 SD below the reading for a 20 year old.

References

1. Langton C.M., Ali A.V., Riggs C.M., Evans G.P. and Bonfield W. (1990). A contact method for the assessment of velocity and BUA in cortical and cancellous bone. Clinical Physiology Measurement *11,243* -9.

2. McCloskey E.V., Murray S.A., Miller C., Charlesworth D., Tindale W., O'Doherty D.P., Bickerstaff D.R., Hamdy N.A.T. and Kanis J.A. (1990). BUA in the Os calcis: relationship to BMD at other skeletal sites. Clinical Science *78*, 227 - 233.

3. Hans D., Dargent-Molina P., Schott A.M., Sebert J.L., Cormier C., Kotzki P.O., Delmas P.D., Pouilles J.M., Breart G. and Meunier P.J. (1996) Ultrasonic heel measurements to predict hip fracture in elderly women: the EPIDOS study. Lancet *348*, 511 - 514.

4. Bauer D.C. et al (1995). BUA and the risk of hip fracture: A prospective study. Paper presented at the American Society for Bone Mineral Research, USA. Abstract.

5. Pluijm S.M.F., Graafmans W.C., Bouter L.M., and Lips P. (1997). Ultrasound measurements for the prediction of osteoporotic fractures in elderly people. ASBMR, USA, Abstract. September 1997.

6. Bauer D.C. (1995). Quantitative ultrasound and vertebral fracture in postmenopausal women. Journal of Bone Mineral Research 3, 353 - 358

7. Stewart A, Kumar V, Reid DM (2006) Long term fracture prediction by DXA and QUS: a IO-year prospective study. J. Bone Miner. Res.21 (3): 413- 8

8. McCloskey E.V. et al 2015 Predictive ability of heel quantitative ultrasound for incident fractures: an individual-level meta-analysis Osteoporos Int 26(7) :1979-87

9. Greenspan S.L., Bouxsein M.L., Melton M.E., Kolodny A.H., Clair J.H., Delucca P.T., StekM.Jr., Faulkner K.G. and Orwoll E.S. (1997). Precision and discriminatory ability of calcaneal bone assessment technologies. J. Bone Miner. Res. 12 (8) 1303-13

10. Langton C.M, Langton DK. Male and female nonnative data for ultrasound measurement of the calcaneus within the U.K. adult population. Br J Radiology 1997;70:580-5

11. Hinkley H.J., Drysdale LP., Bird D., Walters N.J. A normative data for ultrasound measurement of the calcaneus within a male Caucasian population. #SA104. American Society for Bone and Mineral Research, 23rd Annual Meeting, Phoenix, USA. 2001