Royal Osteoporosis Society

Better bone health for everybody

Summary Statement on the use of radiofrequency echogenic multi spectrometry (REMS) technologies for bone mineral density measurements.

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This summary considers radiofrequency echogenic multi spectrometry (REMS) technologies.

What is REMS technology?

REMS technology uses sound waves at very high frequency (ultrasound) in conjunction with radio wave (radiofrequency) analysis to make measurements of bone. These measurements are converted into an estimated bone mineral density "BMD_{US}" measurement.

What is it used for?

REMS is used in diagnostic scanning equipment with the aim of assessing risk for osteoporosis-related fractures.

The REMS scanner names include: Echolight and EchoS.

What happens at a scan?

REMS scanners require a gel covered 'probe' to be placed on the skin of the abdomen (to measure the lumbar spine) and the groin (to measure the femoral neck or" hip") of the patient. Measurements are made with the patient lying down and with clothing removed from the area being scanned

Are they safe?

Radiofrequency can cause a heating effect, however the levels used in REMS technology are lower than this and are therefore considered safe.

Can REMS be used in place of or are they comparable to DXA?

Dual energy x-ray absorptiometry (DXA) is currently regarded as the "gold standard" test to measure Bone Mineral Density (BMD) and diagnose osteoporosis, and WHO diagnosis thresholds are based on these measurements.

REMS scanners are very new and have not yet been extensively evaluated. In the studies available, REMS measurements correlate better with DXA femoral neck and lumbar spine BMD than ultrasound only technologies which assess hands, feet and wrists.

One study which has compared REMS and DXA measurements of the spine and hip in a group of postmenopausal women suggests that the BMD_{US} obtained with REMS gives similar results on average to BMD measured by DXA.

Further research studies are underway to assess whether the initial study results are consistent across other groups of patients and to further validate the technique.

There are no published data yet to show whether REMS measurements can predict which patients will sustain fractures. REMS measurements are reported to be reproducible (similar on repeated measurement), but it is not known whether REMS measurements are stable over time or if they change in response to osteoporosis treatment in the same way as DXA BMD results.

As there are limited studies that help us understand how this technique should be used to make decisions about starting treatment, validated techniques such as DXA remain the preferred method at this time.

Can osteoporosis be diagnosed, and treatment started with these tests?

Because ultrasound-based scanners vary greatly in their technology there are no single WHO applicable criteria for the diagnosis of osteoporosis using these technologies, further research is needed to develop consistent thresholds for diagnosis.

REMS technology studies have reported very limited data for fracture prediction, therefore there is insufficient data to compare this technology with DXA measurements and more research is needed.

In conclusion:

REMS technology holds promise in the evaluation of people at risk of osteoporosis. The emerging evidence base for REMS technology suggests good correlations with DXA, however the research is still at an early stage and more evidence on fracture prediction, and treatment monitoring is needed before its role in routine clinical practice becomes clear.

Quality assured DXA remains the preferred method of measuring bone mass for the diagnosis of osteoporosis, informing fracture prediction and monitoring changes in bone mass.

2022 update info on US and REMS

Most ultrasound only devices for bone measurement use the heel bone

Because they use the heel bone the measurements can't be interpreted with WHO guidance so people having an ultrasound test that shows a low bone mass may still need to go on to have a DXA to have a formal diagnosis and access treatment. Also are no treatment thresholds or good understanding of how these measurements can add to fracture risk assessment.

REMS technology uses ultrasound in conjunction with radio waves to make measurements of bone

These scanners are very new in terms of medical technology and are still being evaluated by researchers to understand how we can best use them to benefit patients. It looks really promising as a new technology to assess bone mass but at the moment there is not enough evidence to be certain that it is the best technique for routine clinical practice.

What we know:

- there's no x-ray so are safe in terms of radiation dose,
- they are similar in accuracy to DXA measurements
- They are smaller and portable in the sense that they can be moved from room to room easily but not in being able to put into a car to take into community settings easily

What we don't know:

- How reliable they are in being able to monitor changes in bone mass
- Whether they can be used to support fracture risk assessments across all patient groups- the studies have mostly been in post-menopausal women
- Because REMS doesn't have to be regulated by CQC like DXA is we cannot be sure:
    - how the service is quality assured,
    - who is carrying out the scan,
    - what training they have had
    - how reliable their results are