

# The Role Of Breast Cancer Oestrogen/Progesterone Receptor Status In Bone Mineral Density

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## Introduction

Dual Energy X-ray Absorptiometry (DXA) scan before commencing any hormone therapy is recommended to assess the bone mineral density (BMD) of patients with breast cancer and the need for osteoporosis prophylaxis. It was previously noted that some patients with breast cancer may have an above average BMD (1); however there was no clear explanation for this difference.

The aim of this study was to investigate the association between the tumour oestrogen/progesterone (ER/PR) receptor status and bone mineral density (BMD) in breast cancer patients awaiting hormone therapy.

## Method

In the current cross-sectional study, data were gathered on demographics, BMD of the left hip and spine via Dual Energy X-ray Absorptiometry (DXA), and breast cancer receptor status in 66 patients.

Independent t-tests were used to examine differences between tumour ER/PR status in continuous hip and spine T- and Z-score variables. Cohen's d effect sizes were calculated and interpreted as small (0.2), medium (0.5) and large (0.8). Chi square analysis was used to compare T-scores ( $\geq -1$  vs.  $< -1$ ) and Z-scores ( $\geq 0$  vs.  $< 0$ ) categories and tumour ER/PR status.

## Results

Of the 66 participants (mean  $\pm$  SD age = 60  $\pm$  12 years), 44 (67%) patients had both ER+ and PR+ tumours, and 22 (33%) had ER- and/or PR- tumours.

On average for each measure, participants who had ER+PR+ tumours had higher scores than those with ER-/PR- tumours(see table 1).

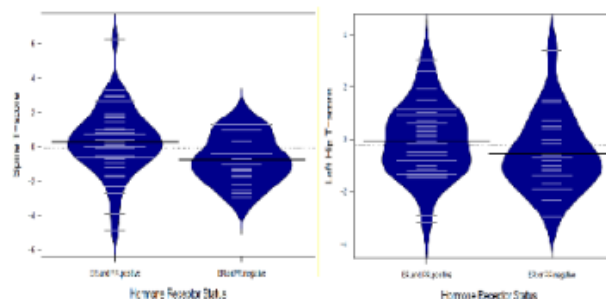
## Results continued

Moderate statistically significant differences were found only for spine T-scores ( $P=0.03$ ;  $d = 0.60$ ).

**Table 1.** Descriptive statistics and effect sizes for bone mineral density outcomes

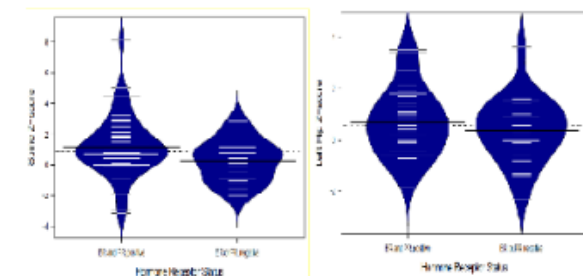
	Overall	ER+PR+	ER-/PR-	MD (95% CI)	Effect size (d)
Left Hip Z score	0.59 $\pm$ 1.31	0.70 $\pm$ 1.33	0.38 $\pm$ 1.27	0.32 (-0.37 to 1.00)	0.24
Left Hip T-score	-0.24 $\pm$ 1.39	-0.08 $\pm$ 1.35	-0.55 $\pm$ 1.45	0.46 (-0.26 to 1.19)	0.34
Spine Z score	0.87 $\pm$ 1.86	1.19 $\pm$ 2.01	0.26 $\pm$ 1.33	0.93 (-0.02 to 1.88)	0.51
Spine T-score	-0.09 $\pm$ 1.81	0.26 $\pm$ 1.93	-0.79 $\pm$ 1.32	1.05* (0.13 to 1.96)	0.60

**Key:** MD = mean difference (ER+PR+ minus ER-/PR-); 95% CI = 95% confidence intervals. \* Significant at  $p < 0.05$ .



## Results continued

There was a significant medium association between tumour ER/PR status and Spine T-score category ( $\chi^2 (1) = 8.59$ ,  $P = 0.003$ ,  $\phi = 0.36$ ). Based on the odds ratio, patient with ER+PR+ tumour having a spine T-score of below -1 was more than 80% (OR = 0.19; 95% CI = 0.06 to 0.60) less likely than a patient with ER-/PR- tumour.



## Conclusion

Our data suggest patients with breast cancer with ER-/PR- tumours have significantly lower BMD at the spine but not at the hip compared to patients with ER+/PR+ tumours.

These data also suggest that compared to BMD of patients with ER-/PR- tumours, the BMD of patients with ER+PR+ tumours is more likely to be in the normal range, hence suggesting a protective role of tumour ER+PR+ status against bone loss.

## References

1.Sheldon P. The DXA scan as a predictor of breast cancer. NOS Conference 2012.

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