PRODIGY Quantitative Lateral Vertebral Assessment (LVAq) – Accuracy and Precision

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(Ilościowa ocena projekcji bocznej kręgosłupa (LVAq) aparatem prodigy – dokładność i precyzja)

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Low bone density and prevalent vertebral fractures, the classic hallmark of osteoporosis, are associated independently with a dramatically increased risk of future vertebral and non-vertebral fractures. The advent of the GE LUNAR PRODIGY bone densitometer has made accurate measurement of vertebral deformities a reality through its quantitative assessment application, LVAq. The PRODIGY utilizes a narrow-angle (4°) fan-beam to acquire high-resolution dual-energy images, which can be used for qualitative and quantitative determination of deformation as well as lateral spine BMD. Scans of the lumbar spine can be acquired in less than 90 seconds and the lumbar and thoracic spine in about 180 seconds. Accuracy of the LVAq measurements were determined by comparing LVA results with biomechanical measurement of vertebral heights *in vitro*. Error was found to be less than 1 mm. We also

compared PRODIGY LVAq with GE LUNAR EXPERT-XL morphometry data using the European COMAC phantom, and a GE LUNAR lateral spine phantom. Excellent comparability was found ($r = 0.99$, $p = 0.3$), which indicates the large EXPERT-XL morphometry reference data can be used. Vertebral height precision *in vivo* was determined from repeat observations of 5 patients with repositioning. Semi-automated analysis tools were used to calculate intra- and inter-individual variation using four different operators (untrained, following written procedures) measuring ten vertebral bodies multiple times.

	SD	%CV
Between Scan	0.5 mm	2.3 %
Intra-Operator	0.5 mm	2.5 %
Inter-Operator	0.6 mm	2.9 %

These results indicate the precision error is comparable to that of repeat measurements using standard lateral radiographs (%CV=3-4%).