



## Resilient Bone Insurance Test Report

- **Patient's Name:** \*\*\*\*\*
- **Age:** 28 Years
- **Date of sample collection:** 26/12/2009
- **Referred by:** Dr. \*\*\*\*\*
- **Date of reporting:** 04/01/2010
- **Report ID:** gOsteo-\*\*
- **Gender:** Female
- **Sample Type:** \*\*\*\*\*

### Osteoporosis Profile

Five genes that play an important role in determining how human body manages bone health are analyzed in Osteoporosis Gene Assessment.

Bones are not a fixed structure; in fact, body breaks down and rebuilds bone all the time to make calcium available for vital functions. For an individual his genes, diet, and lifestyle each are important factors to maintain balance in this process. An imbalance in one or more of these factors can lead to a breakdown in the creation of new bone tissue.

In this test, we identify presence of certain variations in bone health genes which can lead to the formation of altered proteins that can have an effect on bone structure. These altered proteins may lead to bone loss, particularly if diet lacks certain nutrients vital for bone health or if an individual is not physically active enough. Another contributing factor is age. From thirty on, both men and women naturally start losing bone mass. This is particularly marked in women after menopause. This bone loss can be slowed with proper attention to nutrition and lifestyle.

*This profile identifies single nucleotide polymorphisms associated with increased risk of developing osteoporosis.*

<p style="text-align: center;"><b>VDR</b> <b>Vitamin D Receptor gene</b></p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td><b>VDR (rs731236)</b></td> <td style="background-color: #d3d3d3;">+</td> <td style="background-color: #d3d3d3;">+</td> </tr> <tr> <td><b>VDR (rs1544410)</b></td> <td style="background-color: #d3d3d3;">+</td> <td style="background-color: #d3d3d3;">-</td> </tr> </table>	<b>VDR (rs731236)</b>	+	+	<b>VDR (rs1544410)</b>	+	-	<p>HEALTH IMPLICATIONS:</p> <p>The role of vitamin D in maintaining bone health: low serum Vitamin D is associated with low BMD in a large group of postmenopausal osteoporotic women. Furthermore, low serum levels of Vitamin D have been correlated with low BMD in men also.</p> <ul style="list-style-type: none"> <li>• Normal Genotype: VDR gene functions properly: Normal bone health</li> <li>• Heterozygous: VDR gene moderate function: Moderate bone health</li> <li>• Mutated genotype: Abnormal VDR function: Affected bone health</li> </ul> <p>ASSOCIATED RISK:</p> <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Locus</th> <th>Risk</th> <th>#Score</th> </tr> </thead> <tbody> <tr> <td><b>VDR (rs731236)</b></td> <td><b>High risk</b></td> <td><b>2</b></td> </tr> <tr> <td><b>VDR(rs1544410)</b></td> <td><b>Moderate risk</b></td> <td><b>1</b></td> </tr> </tbody> </table>	Locus	Risk	#Score	<b>VDR (rs731236)</b>	<b>High risk</b>	<b>2</b>	<b>VDR(rs1544410)</b>	<b>Moderate risk</b>	<b>1</b>
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<p style="text-align: center;"><b>IL-6</b> <b>Interleukin-6 gene</b></p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td><b>IL-6 (rs1800795)</b></td> <td style="background-color: #d3d3d3;">+</td> <td style="background-color: #d3d3d3;">+</td> </tr> <tr> <td><b>IL-6 (rs1800796)</b></td> <td style="background-color: #d3d3d3;">+</td> <td style="background-color: #d3d3d3;">+</td> </tr> </table>	<b>IL-6 (rs1800795)</b>	+	+	<b>IL-6 (rs1800796)</b>	+	+	<p>HEALTH IMPLICATIONS:</p> <p>Certain genes (e.g., cytokines such as interleukin-1, interleukin- 6, or tumor necrosis factor-alpha) are capable of regulating the metabolism, formation, and resorption of bone, processes that determine bone mass.</p> <ul style="list-style-type: none"> <li>• Normal Genotype: IL-6 gene functions properly: Normal bone health</li> <li>• Heterozygous: IL-6 gene moderate function: Moderate bone health</li> <li>• Mutated genotype: Abnormal IL-6 function: Affected bone health</li> </ul> <p>ASSOCIATED RISK:</p> <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Locus</th> <th>Risk</th> <th>#Score</th> </tr> </thead> <tbody> <tr> <td><b>IL-6 (rs1800795)</b></td> <td><b>High risk</b></td> <td><b>2</b></td> </tr> <tr> <td><b>IL-6 (rs1800796)</b></td> <td><b>High risk</b></td> <td><b>2</b></td> </tr> </tbody> </table>	Locus	Risk	#Score	<b>IL-6 (rs1800795)</b>	<b>High risk</b>	<b>2</b>	<b>IL-6 (rs1800796)</b>	<b>High risk</b>	<b>2</b>
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<p style="text-align: center;"><b>TNF-<math>\alpha</math></b> <b>Tumor Necrosis Factor- <math>\alpha</math> gene</b></p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td><b>TNF-<math>\alpha</math> (rs 1800629)</b></td> <td style="background-color: #d3d3d3;">-</td> <td style="background-color: #d3d3d3;">-</td> </tr> </table>	<b>TNF-<math>\alpha</math> (rs 1800629)</b>	-	-	<p>HEALTH IMPLICATIONS:</p> <p>The cytokine TNF-a is an important stimulator of bone resorption by enhancing osteoclast development both through a direct effect on osteoclast precursor differentiation and indirectly by inducing stromal and osteoblastic cell secretion of essential 'downstream' cytokines such as interleukin-6 and interleukin-11. The stimulatory effect by TNF-a on osteoclast differentiation seems to involve both TNF receptor 1 and 2 and, most interestingly, by a pathway independent of RANKL-RANK interaction.</p> <ul style="list-style-type: none"> <li>• Normal Genotype: TNF-a gene functions properly: Normal bone health</li> <li>• Heterozygous: TNF-a gene moderate function: Moderate bone health</li> <li>• Mutated genotype: Abnormal TNF-a function: Affected bone health</li> </ul>												
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<p style="text-align: center;"><b>COL1A1</b> Collagen type 1 alpha 1</p> <table border="1"> <tr> <td>COL1A1 (rs1800012)</td> <td style="text-align: center;">+</td> <td style="text-align: center;">-</td> </tr> </table>	COL1A1 (rs1800012)	+	-	<p>HEALTH IMPLICATIONS:</p> <ul style="list-style-type: none"> <li>• Collagen type 1, alpha-1 is the primary collagen matrix used for bone synthesis.</li> <li>• COL1A1 polymorphisms have been associated with reduced bone mineral density (BMD) and increased prevalence of osteoporosis with increased risk of osteoporotic fracture.</li> <li>• There appears to be a continuum of bone density depending on genotype: homozygous negatives (- -) have the greatest bone density; heterozygotes (+ -) have less bone density, and homozygous positives (+ +) have the least bone density.</li> </ul> <p>ASSOCIATED RISK:</p> <table border="1"> <thead> <tr> <th>Locus</th> <th>Risk</th> <th>#Score</th> </tr> </thead> <tbody> <tr> <td>COL1A1(rs1800012)</td> <td>Moderate risk</td> <td>1</td> </tr> </tbody> </table>	Locus	Risk	#Score	COL1A1(rs1800012)	Moderate risk	1
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*Keys: (-,-)Homozygous wild type; (+,-) Heterozygous mutant; (+, +) Homozygous mutant*

*#For each SNP analyzed Osteoporosis associated genotypes are scored according to the nature of the allele (whether 'normal' with a scoring 0 or 'mutant' with a scoring of 1 for heterozygous and score of 2 for homozygous mutant genotype) and relies on the fact that higher score is linked to risk associated genotype. The grading is qualitative and essentially indicative in nature.*

*Scale of grading: Minimum Score=0 (good genetic background), Maximum Score=2 (poor genetic background).*

**References:**

Card T, West J, Hubbard R, et al. Hip fractures in patients with inflammatory bowel disease and their relationship to corticosteroid use: a population based cohort study. Gut 2004;53:251-5.

Eastell R, Reid DM, Compston J, et al. A UK Consensus Group on management of glucocorticoid-induced osteoporosis: an update. J Intern Med 1998;244:271-92.

Fishman D, Faulds G, Jeffery R, et al. The effect of novel polymorphisms in the interleukin-6 (IL-6) gene on IL-6 transcription and plasma IL-6 levels, and an association with systemic-onset juvenile chronic arthritis. J Clin Invest 1998;102:1369-76.

Mann V, Ralston SH. Meta-analysis of COL1A1 Sp1 polymorphism in relation to bone mineral density and osteoporotic fracture. Bone 2003;32:711-17.

Manolagas SC. Role of cytokines in bone resorption. Bone 1995;17:63S-7.

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Report prepared by	Checked by	Report Approved by
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