

## ADRB2 Arg16Gly (R16E) and Gln27Glu (Q27E) polymorphisms

The beta-2 adrenergic receptor (ADRB2) gene product ADRB2 protein is expressed in fat cells. This receptor protein is involved in the mobilization of fat from the fat cells for energy in response to hormones called catecholamines (adrenaline, noradrenaline and dopamine). Several polymorphisms of this gene that result in amino acid changes have been identified.

The two main well-characterized polymorphisms Arg16Gly and Gln27Glu are the most common in Caucasians. Laboratory studies indicate that these polymorphisms affect the overall expression (production) of the receptor (18). The recent obesity gene map (14) shows association between variants in the ADRB2 gene and obesity, with most of the positive findings involving the Arg16Gly or Gln27Glu polymorphisms. Multiple studies show association between Glu27 and Gly16 alleles carriers and abdominal (19, 20) and central obesity (21). A long-term clinical study showed that weight gain from childhood to adulthood (22) and weight gain during adulthood (23, 24) are higher in individuals who carry the Gly16 allele.

A clinical study involving women with high carbohydrate diet reported that women with 27Gln/Glu genetic makeup had increased risk of obesity, while no association of obesity was observed in 27Gln/Gln women (25). 27Gln/Gln was found to be a risk genetic profile in studies involving overfeeding of identical twins where higher weight gain and subcutaneous fat were observed compared to those with the Glu27 allele (26). A study of overweight Japanese men enrolled in a 24-month weight loss program (1,600 kcal/day and aerobic exercise one hour daily) showed that men with the Gly16 allele were more resistant to weight loss and more likely to regain body weight after 6 months (23). Women who were more active during their leisure time and were carriers of the Glu27 allele had higher BMI compared to similarly-active carriers, suggesting that these women may be more resistant to losing weight (27).

Results from intervention studies (exercise or diet) involving the Arg16Gly polymorphism indicate Gly16 allele is the high-risk allele, especially in studies involving exercise and endurance training. Long-term studies suggest that the Gly16 allele is associated with greater weight gain over time. Results from association studies suggest that the Glu27 allele is associated with an increased risk of obesity, abdominal obesity and obesity when adhering to a high carbohydrate diet.

ADRB2 receptor protein is involved in the mobilization of fat from the fat cells for energy in response to hormones called catecholamines(adrenaline, noradrenaline, and dopamine).

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