Noonan syndrome in diverse populations


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1 INTRODUCTION

Noonan syndrome (NS) is characterized by congenital heart disease, short stature, distinctive facial features, chest deformities, variable developmental delay, and other anomalies (Bambhani & Muenke, 2014; Noonan, 1968). Diagnostic criteria have been established (van der Burgt et al., 1994) as well as management guidelines (Roberts, Allanson, Tartaglia, & Gelb, 2013; Romano et al., 2010). The typical facial features of NS include widely spaced eyes, down slanted palpebral fissures, ptosis, and low-set ears. The prevalence of NS is roughly 1:1,000 to 1:2,500 and is inherited in an autosomal dominant manner (Romano et al., 2010). Although NS is a common genetic syndrome, there are few phenotype and genotype studies in non-European cohorts.

The genetic etiologies of NS occur in genes associated with the Ras/mitogen-activated protein kinase (Ras/MAPK) pathway. Genes in this pathway are involved in cell differentiation, growth, and death. Other syndromes associated with Ras/MAPK genes include Costello syndrome, Cranio-facio-cutaneous (CFC) syndrome, NS with multiple