

**Abstract Submission No.: A-0846**

## **Genetic Sequencing Unlocks Alport Spectrum-COL4A3: Tailored Insights and Evolving Frontiers in Clinical Decision-Making**

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**Case Study :** The diagnostic odyssey of our patient, initiated by isolated microhematuria at age 11, culminated in the identification of a heterozygous pathogenic variant (c.1855G>A p.(Gly619Arg)) in the COL4A3 gene, affirming an autosomal-semidominant manifestation of Alport syndrome type 3 (ADAS). This variant, previously observed in both autosomal recessive and dominant Alport syndrome cases, accentuates the clinical intricacies associated with the Alport Spectrum-COL4A3. Our comprehensive analysis embraced various diagnostic modalities, including urinary and audiometric evaluations, unveiling a nuanced presentation aligning with the milder renal phenotype and delayed extrarenal manifestations characteristic of ADAS. The rarity of ocular involvement in autosomal-dominant cases added a layer of complexity to the clinical narrative. The detected pathogenic variant finds its place within the broader Alport Spectrum-COL4A3 framework, encompassing ADAS, autosomal-recessive Alport syndrome type 2 (ARAS), and benign familial hematuria. This categorization, endorsed by ClinGen working groups, underscores the diverse phenotypic expressions linked to COL4A3 gene variants. With approximately 20% of Alport syndrome cases manifesting as autosomal dominant, our case emphasizes the importance of genetic sequencing for precise diagnosis and prognosis. The detection of this pathogenic variant holds critical implications, particularly in predicting the likelihood of end-stage renal disease in late adulthood, offering valuable insights for tailored patient care. This diagnostic journey contributes to the evolving landscape of genetic-based diagnostics, accentuating the necessity of precision in managing Alport Spectrum-COL4A3 cases. By highlighting the potential impact on clinical decision-making, our case underscores the growing importance of genetic sequencing in unraveling the complexities of Alport syndrome and shaping the future of personalized medicine in this realm.