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Contributions: MK designed and performed most of the experiments and wrote the first draft of the Manuscript. CN helped with the clinical correlations and data analysis. MD was involved in most of the experiments. MJ helped with the biobanking of patient material. HM designed the Halogenomics probes. PU performed bioinformatic analysis and variant calling. SL provided AML samples. JK supervised mutation detection at MAF. EHL provided MDS samples, supervised the project and critically edited the manuscript. SL, JK and EHL were main investigators. The authors have no conflicts of interest to disclose.