A NOVEL BIOMARKER ASSAY FOR THE IDENTIFICATION OF COLORECTAL CANCER CELLS BASED ON SPECIFIC METHYLATION PATTERNS

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A novel luminescence-based reporter system using methyl-binding domain protein and CRISPR deadCas9 technology has been developed to detect hypermethylated CpG islands as biomarkers for colorectal cancer diagnosis.

KEY POINTS

- The reporter system combines a methyl-binding domain from MBD1 protein with deadCas9 sgRNA targeting to detect hypermethylated genetic regions in vivo through quantifiable luminescence signals
- The system was validated using known methylation markers EN1 and SCTR, showing significantly increased luminescence compared to unmethylated housekeeping genes GAPDH and GPI
- Whole-genome bisulfite sequencing of colorectal carcinoma cell lines HCT116 and CaCo2 and patient-derived organoids identified additional differentially methylated regions as potential new biomarkers
- The method can be adapted to diagnose other tumor types by replacing the sgRNAs of deadCas9, making it a versatile platform for targeted screening of new methylation markers

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