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Advancing the Arizona State University Knowledge Enterprise

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Novel Methylation Specific DNA Binding Resins

Cancer is one of the biggest challenges facing the present healthcare community. Cancer diagnostics play a very important role in detecting the onset of disease and enabling continuous monitoring of patients in remission. Early detection of disease occurrence, progression and/or recurrence can significantly increase the chances of patient survival.

Aberrant DNA methylations (hyper and hypomethylation) is a key emerging biomarker in several diseases including cancer. Detection and isolation of hypermethylated DNA from cellular lysates or bodily fluids could allow for easy diagnosis of cancer and its progression. Commercially available resins that bind hypermethylated DNA use resins conjugated with methylation specific antibodies or DNA methyl transferase proteins which are expensive. Subsequently, there are no cost-effective resins available for the purification, detection and/or enrichment of hypermethylated DNA species.

Researchers at Arizona State University have developed a novel resin material composed of novel small molecule ligands that can selectively bind to hypermethylated DNA for isolation and disease diagnoses. Urine, blood or other bodily fluids that contain genomic DNA can be directly applied to the resin to bind and purify hypermethylated DNA. This system does not use antibody or methyl binding proteins to bind the hypermethylated DNA regions, making it more cost-effective. The ligands on the resins can be tuned to selectively bind hypermethylated DNA specific to cancer or other disease cells.

This novel resin for disease specific DNA binding and detection provides for an inexpensive diagnostic system poised to revolutionize the diagnostics, particularly cancer diagnostics, industry.

Potential Applications

- Cancer/disease diagnostics
- Monitoring disease progression
- Monitoring therapeutic efficacy
- Monitoring cancer patients in remission

- The hypermethylated DNA specific ligands could be used as targeted drugs for diseased tissue ablation

Benefits and Advantages

- Inexpensive – this system does not use antibody or methyl binding proteins to bind the hypermethylated DNA regions
- Noninvasive - can be used with urine, blood and other bodily fluids containing genomic DNA
- Allows for cancer screening in remote areas of the world without access to advanced diagnostic technologies
- Benefits patients needing daily monitoring of cancer
- Easy modification of the ligands conjugated on the resins toward selective binding of hypermethylated DNA with a diagnostic purpose

o Tuning ligand hydrophobicities

- Sensitivity - can distinguish cancer specific hypermethylated DNA from non-hypermethylated DNA

For more information about the inventor(s) and their research, please see Dr. Rege's laboratory webpage