Blood/Urine Test for Early Cancer Detection

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Motivation

- 1,685,210 New Cancer Cases (USA, 2016)
- 595,690 Cancer-related Deaths (USA, 2016)
- Relatively unchanged mortality rate for cancer over past 50 years

Solution

- Implement an annual cancer screening that will effectively detect cancer early saving lives and reducing medical costs
- Cost-effective
- At point-of-care
- Scientifically proven
- Utilizes circulating tumor cells as a detection metric
- Reduces subjectivity and error

Background

- Cancer is initially asymptomatic
- Existing methods for cancer screening involve visual inspection & imaging; not effective
- Circulating tumor cells (CTCs) are an effective metric for early cancer detection
- CTCs are very rare in the peripheral blood (one in a billion); challenging to detect

Design

- Lab-on-a-Chip concept
- Micro/Nano-textured PDMS substrate
- Aptamer-functionalized
- Composed of Microfluidic channels
- >90% capture efficiency
- Capable of capturing CTCs present quantities of 1 out of billion healthy cells
- Target over-expressed EGFR biomarker in tumor cells

Analysis

- Image processing and filter
- Identify and digitize Individual cells according to multiple parameters
- Analyze distinctive cell behavior and compare against database containing data from various cancer cell lines

References

- 1950 Mortality Data, CDC/NCHS, NVSS, Mortality Revised. 2011