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Approaches to biomarker discovery for cancer screening

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Despite considerable advancements, the development of effective cancer screening tools based on serum biomarker measurements has thus far failed to achieve a meaningful clinical impact. The incremental progress observed over the course of serum biomarker development suggests that further refinements based on novel approaches may yet result in a breakthrough. We will present complementary approaches that could considerable increase power of biomarker-assisted cancer screening including using alternative biofluids, such as urine, analysis of temporal biomarker dynamics prior to diagnosis, and using prospectively collected pre-diagnostic samples for biomarker discovery. Examples of utility of these approaches for development of ovarian and pancreatic cancers screening biomarkers will be presented.

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Molecular diagnostic strategies in prion disease and related neurodegenerative disorders

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Prion diseases are a group of untreatable and transmissible neurodegenerative conditions of humans and animals caused by the misfolding of prion protein (PrP). Transmissibility of disease between humans and animals is a key defining feature of the group, and has resulted in several high profile epidemics of acquired prion disease, including for example, kuru in humans and bovine spongiform encephalopathy (BSE) and its human counterpart variant Creutzfeldt-Jakob disease (vCJD). Prion diseases also occur more commonly without any obvious exposure to an infectious source, the typical clinical syndrome being a rapidly progressive dementia termed sporadic CJD. The diagnosis of CJD is typically made late in the clinical course by which time patients are in an advanced state of neurological decline. Pathology is detectable in many tissues, particularly those of the central nervous system but the invasive nature and risks associated with diagnostic tonsillar or brain biopsy, preclude investigation in the early stages of illness. The infectious agent itself is largely or solely comprised of a misfolded and aggregated conformer of the normal cellular prion protein which can catalyse the conversion of further PrP to disease associated forms by a templating process. Detection of these abnormal forms of PrP is the main focus of strategies to develop new early diagnostics in human biofluids.

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