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Short Communication

A Brief Note on Molecular Oncology

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ABSTRACT

Cancer prevalence and deaths are high in developing nations, wherever resources for cancer control are inadequate. About one-quarter of cancers in resource-limited countries are infection related, and molecular tests can capitalize on this relationship by recognizing germane pathogen genomes and human gene variations to distinguish those at highest risk for progression to cancer, to classify lesions, to predict effective therapy, and to monitor tumour burden over time. Prime cases are human papillomavirus in cervical neoplasia, Helicobacter pylori and Epstein-Barr infection in gastric adenocarcinoma and lymphoma, and hepatitis B or C virus in hepatocellular cancer. Research is underway to engineer devices that overcome social, financial, and technical barriers restricting viable laboratory support. Extra challenges incorporate an educated workforce, infrastructure for quality metrics and record keeping, and funds to sustain molecular test services. The combination of well-designed interfacing, novel and vigorous electrochemical innovation, and telemedicine devices will promote adoption by frontline providers. Quick turnaround is crucial for surmounting loss to follow-up, although increased utilize of cell phones, even in rural regions, improves choices for patient education and engagement. Links to a broadband network facilitate discussion and centralized capacity of restorative information. Molecular technology appears guarantee to address crevices in health care through quick, user-friendly, and cost-effective devices reflecting clinical priorities in resource-poor regions.

Key words: Cancer; Helicobacter pylori; Epstein-Barr virus; hepatitis B or C virus; molecular test

Molecular tests represent a powerful strategy for screening, early detection, tumour classification, and monitoring efficacy of intervention. Emerging technologies marry advanced biochemical methods with innovative fluidics and electronics to address the require for robust, automated test systems. These technologies are poised to facilitate a quantum leap forward in cancer diagnostics in low- and middle-income countries [1]. In parallel with improved communication innovation are advances in biochemical sensors that make feasible measurements of multiple DNA, RNA, or microRNA targets. Heightened capital investment in devices, often referred to as Lab on a Chip, is streamlining example handling, biochemical investigation, and information manipulation.1 Before a new device can be implemented, performance information must illustrate that the test system is systematically sound and clinically useful within the hands of the professionals who utilize it [2]. The bar for success might be lessened by innovative internal quality control, automation from input to reporting, and other engineering feats that promote good outcomes when implemented by minimally trained workers or patients. Thus, modern technology shows promise to address gaps in health care through fast, reasonable, computerized test systems that recognize and monitor the types of neoplasia prevalent in resource-poor regions [3].

CANCER LINKED TO INFECTIOUS DISEASE

In developing nations, nearly one-quarter of cancers are infection related,3 and four infectious agents account for >80% of the burden: human papillomavirus (HPV), Helicobacter pylori, hepatitis B virus (HBV), and hepatitis C virus (HCV). Epstein-Barr virus (EBV) adds a significant burden in several areas of the world [4]. Helicobacter pylori and EBV infection are linked to gastric adenocarcinoma and lymphoma, whereas HPV is uniformly found in cervical neoplasia. HBV or HCV infections often predate hepatocellular carcinoma. Research into the link between infection and cancer sheds light on the mechanisms of oncogenesis [5]. Interestingly, the aforementioned infection-related cancers that are prevalent in the developing world are the same three cancer types with the most complex genomic signatures as elucidated by mutation analysis. Mutations in infection-related cancer have been attributed to the following: i) pathogen-induced effects, such as heightened oxidation that damages DNA, ii) viral integration events disrupting human genes or their regulatory factors, iii) viral properties that prolong cell survival and resist apoptosis or immune destruction, and iv) suppression of DNA repair [6]. There's an unmet need for reasonable devices to detect cancer-related infections. Such devices might capitalize on the link between infection and cancer to

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assist in screening and early determination, tumour classification, pathogen-targeted treatment, and monitoring tumour burden over time [7].

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