SIMPLIFIED DETECTION OF EPSTEIN-BARR VIRUS FOR DIAGNOSIS OF ENDEMIC BURKITT LYMPHOMA

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Endemic Burkitt Lymphoma (eBL) is one of the most common cancers in sub-Saharan Africa, and the one-year survival remains close to 50% [1]. The low survival rate is partly attributable to patients lacking access to early diagnosis and presenting with advanced disease [2, 3]. eBL is often diagnosed via fine needle aspiration (FNA) cytology, which like regular histology requires timely staining, a microscope, and trained personnel [4, 5]. There is a particularly strong association of EBV with eBL, being present in almost all cases. In fact, it has previously been shown that histological detection EBV in cytological specimens obtained by FNA from tumor biopsies can distinguish EBV-driven tumors from other conditions such as non-malignant lymphadenopathies [4]. However, EBV detection is usually done using EBER in situ hybridization, which is expensive, requires highly specialized technical expertise and equipment, and is largely unavailable in low resource settings. We propose that simplified nucleic acid testing from a fine needle aspirate (FNA) offers a diagnostic solution, and that the presence of EBV can distinguish eBL from other conditions. However, sample preparation time, including DNA extraction, limits diagnostic tools that are aimed at the point-of-care. We have developed a process-free nucleic acid assay on FNA samples that seamlessly integrates into a previously developed point-of-care testing platform, called TINY, which was developed specifically for isothermal amplification and can be powered by electricity, flame, or sunlight.[6] The “cells-to-LAMP” (loop mediated isothermal amplification) system allows for direct loading of FNA samples for EBV detection requiring as few as 50 cells. We show that the assay works with un-processed material obtained from FNAs and that it can distinguish EBV+ lymphomas from reactive lymphoid tissues that contain sparse EBV+ cells. In combination with our established point of care system, this new approach will allow rapid diagnosis in local settings where eBL is most common.

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