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Point of Care Testing (POCT) in Food Safety and Authenticity

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COLUMN ARTICLE

Point-of-care testing (POCT) is an effective and innovative way to diagnose the presence or absence of targeted substance in a resource limited settings. Its existence date back to 1350 BCE where Egyptians utilized urine-based diagnostic testing for pregnancy [1]. In this test, pregnant woman urinates on wheat and barley seeds for several days and determines sex based on the growth of the plants. If both do not grow, she's not pregnant while growth in barley seed is considered as male and growth in wheat seed is a female.

Today, the global health care is centered towards patient and the advent of technological innovations have provided unprecedented resources in the diagnostic arena to compete with the growing demand. The very purpose of POCT is to make quick decisions onsite rather than relying on time, resource and cost bound central laboratory setup. To achieve this, World Health Organization has provided guidelines referred as "ASSURED" that features the requirements of POCT systems [2]. Briefly, the test should be affordable, sensitive, specific, user-friendly, rapid, robust, equipment free and deliverable to end users. It was originally designed for the detection of sexually transmitted infections in the developing world and the concept is applicable to other diagnostic investigations.

The existence and emergence of challenges associated with food borne infection and intoxication place POCT in the forefront especially in situations where time bound decisions are crucial. It appears to be a promising tool especially when rapid yet reliable decisions are to be made in ports of entry harboring numerous containers worth goods with short shelf life. Amongst several methods being considered, lateral flow assay is one of the few commercially feasible tool for POCT. The technique predominantly utilizes colloidal gold as labels for food quality monitoring [3]. Most of the lateral flow assays are qualitative producing visual response in 2 - 10 minutes after the application of the sample.

Other potential technologies being researched for rapid diagnosis include spectroscopy [4] and hyper spectral imaging [5]. Both techniques are emerging as rapid and effective methods to obtain a high order of spectral information related to the physical and chemical features of food samples. Unlike spectroscopy which measures point spectra, hyper spectral imaging data consist of spatially distributed spectra and hence both spectral and spatial information are acquired at the same time enabling the HSI technique to be optimized for complex object with mixture of different materials.

Although the existing lateral flow assays and emerging spectral image analysis are promising tool for POCT, they are not free from challenges. Rapid methods are generally less sensitive than the assays performed in the central laboratory from the quality perspective. The significance of quality control and quality assurance are not considered by people with limited knowledge on the analytical methods,

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their applications and interpretations. Thus the rate of pre analytical error are several fold higher than the central lab [6]. The cost associated with rapid technologies are usually higher than the conventional methods and may not suit all occasions. Analysis requiring quantitative measures for decision making is yet another challenge that needs to be addressed for effective utilization of POCT as most of these assays are qualitative in nature.

Food safety is becoming a serious concern in a globalized market and any instant tool to circumvent foodborne infection will not only save the community from outbreaks but also substantially reduces the logistics associated with it. Undoubtedly, POCT holds a lot of promise in food safety if it is applied cautiously and appropriately. It is an excellent tool for rapid screening of a lot in ports of entry and other areas where decision making is crucial in a very short time.

In conclusion, POCT in food safety and authenticity is a valuable tool that complements central lab testing if applied appropriately. Future research should focus on better sensitivity to meet the purpose and cost effectiveness so that POCT can be effectively utilized for food safety and authenticity issues.

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