Breast Cancer Detection

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INDEX TERMS: Point Of Care, Diffuse Optical Imaging, LED, Cancer Detection, LMICs, Arduino, Lesions.

INTRODUCTION

The project aims to create affordable resource-appropriate cancer detection technology at the point of care (POC) for Low Middle Income Countries (LMICs). Of all chronic diseases, cancer is the "Emperor of all maladies" and it is estimated that nearly two-thirds of the 8.2 million annual cancer deaths in the world occur in low- and middle-income countries (LMICs) as reported by (Pearlman et al., 2016).

The project enables superior cancer control by the detection of cancerous and precancerous lesions at early stages.

IDEA AND CONCEPTUAL DESIGN

A Diffuse Optical Imaging (DOI) device for non-invasive, safe and radiation free detection of breast cancer, rather than the traditional mammography and CT scans. Using optical imaging technology, the device uses Infrared light of the electromagnetic spectrum to identify cancerous lesions in the breast.

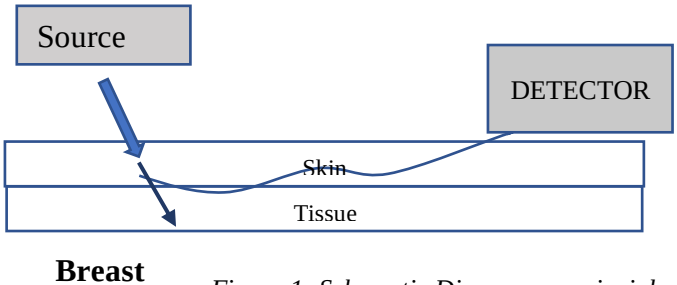

Figure 1: Schematic Diagram on principle of operation.

TECHNICAL FEASIBILITY

The project is cheap, viable and feasible, with the infrastructural capacity to be developed using efficient, low-cost, locally available LED diodes, sensors and Arduino based microcontrollers. It can be scaled up for mass production locally to deliver quality devices within requisite timescales for resource-constrained regions.

Safety is guaranteed as it is non-invasive and there is no radiation exposure.

TARGET AUDIENCE

The project is targeted for Oncologists in healthcare facilities in resource-constrained low-middle-income-countries (LMICs) across Sub-Saharan Africa – dispensaries, Level 3 & 4 hospitals in Kenya.

DISCUSSION

Diffuse Optical Imaging technique works by shinning near infrared light on the skin. Some is absorbed while some scatters. The scattered infrared gets to a detector which calculates how much the intensity of the light has decreased by.

Haemoglobin is a good absorber of infrared light. Cancer cells have a larger network of blood supply as they require more oxygen and glucose. More haemoglobin is therefore present in cancerous cells.

Cancerous cells absorb more infrared light and the detected intensity is lower compared to other areas.

The differences in the detected intensities is converted to images that can be easily processed.

(A. Godavarty *et al.,).*

Haemoglobin percent	Prognosis for breast cancer	
High	Positive	
Low	Negative	

Table 1: Binary state comparison for breast cancer based on haemoglobin concentration

CONCLUSION

Diffuse Optical Image technology will provide an effective, cheap, safe cancer detection technique for resource-poor areas with no access to mammography services.

REFERENCES

1. A. Godavarty *et al*.,
2. (Siddiqui et al.)
3. (Ching-Cheng Chuang et al.)
4. (Pearlman et al.)