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AN ADHESIVE PATCH BIOPSY BASED GENE EXPRESSION TEST TO NONINVASIVELY DIFFERENTIATE BASAL CELL AND SQUAMOUS CELL CARCINOMAS FROM ACTINIC KERATOSES AND OTHER SKIN LESIONS OF SIMILAR APPEARANCE

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INTRODUCTION

A data-driven evolution from subjective image recognition strategies to objective gene expression changes (that precede morphological changes) may contribute to a paradigm shift in how we practice dermatology and differentiate various skin conditions. A qRT-PCR-based non-invasive gene expression test that differentiates primary melanomas from similar looking benign pigmented lesions with high accuracy became available to dermatologists in the US recently.[1-4] It may become a tool to improve patient care and contribute to such a development. Demand by patients and clinicians for a similar test to non-invasively differentiate non-melanoma skin cancers (generally excised) from benign or precursor lesions (generally treated via non-surgical modalities such as cryotherapy or chemical and immunological destruction) has been growing.

STUDY APPROACH

We initiated the development of such a qRT-PCR gene expression test based on targets identified through microarray screening of human transcriptomes from adhesive patch skin biopsy samples and literature searches. The identified target candidates were evaluated in prospectively collected basal (BCC) and squamous cell carcinoma (SCC) as well as actinic keratosis (AK) and other control samples, also obtained via non-invasive adhesive patch biopsies. Cycle threshold (Ct) values from qRT-PCR analyses were used to demonstrate changes in target gene expression. Algorithms were developed, trained and subjected to primary validation in 160 histopathologically confirmed cases.

RESULTS

With a robust qRT-PCR strategy utilizing a novel 13-target gene panel, we successfully differentiated BCC and SCC cases from AK and other non-cancerous skin lesions of similar clinical appearance with a sensitivity of 91% (95% CI 86% - 95%) and a specificity of 87% (95% CI 80% - 92%) based on 160 non-invasively collected adhesive patch skin biopsies ($p<0.001$). An area under the curve (AUC) value of 0.95 was observed (Figure 1).

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CONCLUSION

The described approach of non-invasive gene expression testing differentiates primary cutaneous BCC and SCC cases from benign and precursor lesions such as AK with high sensitivity and specificity. Once fully validated in an ongoing large prospective study, such a test has the potential to reduce the number of avoidable surgical procedures while missing fewer cases of non-melanoma skin cancer.

REFERENCES

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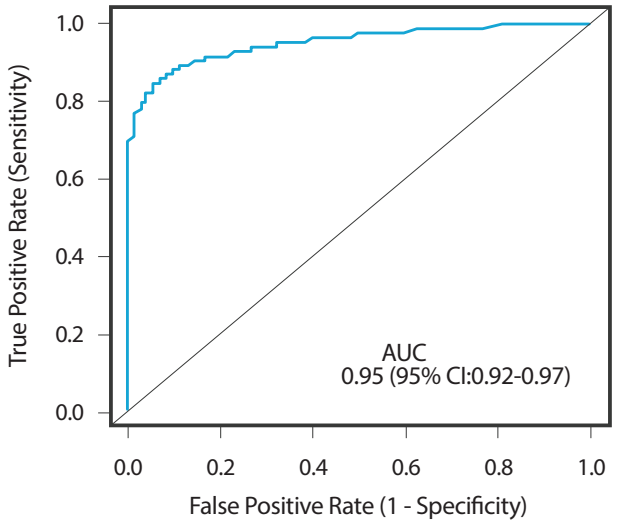

Figure 1. Receiver operating characteristic curve demonstrating the BCC and SCC samples from AK and other non cancer skin lesions. AUC, Area under the curve.