Patient Preference for Optical Coherence Tomography versus Punch Biopsy as Diagnostic Strategy for Diagnosis of Basal Cell Carcinoma: A Labelled Discrete Choice Experiment

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Non-invasive technologies, such as optical coherence tomography (OCT), are increasingly available for diagnosis of basal cell carcinoma (BCC), and might partly replace a punch biopsy, which is considered the current gold standard (1, 2). To examine patient preferences for OCT or punch biopsy as diagnostic strategy for BCC, a discrete choice experiment (DCE) was performed alongside a clinical trial (ClinicalTrials.gov number, NCT03848078). The selection of attributes and associated levels (**Table I**) was based on literature review and expert opinion (3–8).

MATERIALS AND METHODS

OCT and punch biopsy were described by 6 attributes, of which 3 were associated with diagnostic accuracy (sensitivity, false-positive rate, and physicians' confidence in diagnosis), 2 with side-effects (bleeding and infection, painfulness of procedure), and 1 with waiting time to diagnosis. Physicians' confidence in diagnosis was added as an attribute, in order to provide a realistic representation of clinical practice, where OCT will only partly substitute a biopsy in cases where a diagnosis of BCC can be made with high confidence. Recent studies report that in 30–40% of patients, diagnosis of BCC can be made with high confidence (3, 4). Part of the levels for the 3 attributes, sensitivity (94%), physicians' confidence in diagnosis (30%), and false-positive rate for OCT (9%), were based on a recently conducted prospective observational study at the Department of Dermatology of Maastricht University Medical Centre (3).

An efficient labelled design was created using Ngene software version 1.2.1 (Choice Metrics, Sydney, New South Wales, Australia) with information from a pilot study. In total, 18 hypothetical choice sets were generated, blocked into 2 questionnaires with 9 choice sets. A labelled design was chosen, because the diagnostic strategy differed in invasiveness, and consequently had specific levels for part of the attributes. Data analysis was performed using a multinomial logit (MNL) with Nlogit version 6. Based on the results of the MNL model, a simulation analysis was performed to examine the uptake of both strategies.

In total, 344 patients completed the DCE between May 2019 and September 2020. All patients provided informed consent. Median age was 72 (21–92) years. For OCT, the attributes "higher level of sensitivity" and "'lower false-positive rate" were preferred. For biopsy, respondents preferred a higher level of physicians' confidence in diagnosis and a longer waiting time for results, whereas severe short-lasting pain and a higher false-positive rate were negatively valued (**Table II**).

Overall, patients preferred a biopsy strategy in 55% of the choice sets, and an OCT strategy in 45% of the choice sets. However, when the highest levels were applied for OCT in a simulation analysis (sensitivity 94%, confidence in diagnosis 50% and false-positive rate 6%), the share numbers shift, and OCT was preferred by patients in 58% of choice sets.

DISCUSSION

This is the first study to evaluate patient preferences for OCT and punch biopsy for diagnosis of BCC. To date, previous DCEs that have been conducted focused on different treatment strategies for BCC instead of diagnostics (9–11). The preference for a biopsy was predominantly determined by the attributes "higher level of physicians' confidence in the diagnosis", "longer waiting time"', "'lower false-positive rate" and "'short-lasting severe pain". Unexpectedly, a longer waiting time was preferred, which might be explained by the fact that we chose a labelled design and, if there is a strong preference for biopsy, patients are willing to wait longer for the results. The preference for OCT was predominantly determined by the attributes "higher sensitivity" and "lower false-positive rate". Surprisingly, the attribute sensitivity did

Table I. Attributes and levels used in the discrete choice experiment

Attributes	OCT; alternative specific level*	Punch biopsy; alternative specific level*	References
Waiting time for results (days) The time patients need to wait before the results can be discussed	Not applicable	7, 10, 14	Expert opinion of 6 Dutch dermatologists
Confidence in diagnosis (%) How confident is the physician about presence of diagnosis of BCC	30, 40, 50	90, 95, 100	OCT: (3, 4) Punch biopsy: expert opinion
Sensitivity (%) The chance that a skin lesion is correctly identified as BCC	70, 81, 94	91, 94, 97	OCT: (3–5, 7) Punch biopsy: (6)
False-positive (%) The chance that a skin lesion is incorrectly identified as BCC	6, 9, 12	3, 6, 9	OCT: (3) Punch biopsy: (6)
Side-effects (%) Defined as severe bleeding requiring a suture or infection	Not applicable	3, 6, 10	Punch biopsy: expert opinion
Painfulness Pain associated with diagnostic procedure	Not applicable	A little, moderate, severe	(8)

*Numbers represent the levels of each attribute expressed in percentages.
BCC: basal cell carcinoma; OCT: optical coherence tomography.

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Table II. Results of the multinomial logit model for the whole sample

Attributes	Coefficient	95% CI	
OCT			
Confidence in diagnosis OCT	0.00866	−0.00053	0.01785
Sensitivity OCT	0.02583***	0.01754	0.03413
False-positive rate OCT	−0.03702**	−0.06884	−0.00520
Punch biopsy			
Waiting time for results[a]	0.03483***	0.00889	0.06077
Confidence in diagnosis punch biopsy	0.02672***	0.00701	0.04642
Sensitivity punch biopsy	−0.00571	−0.04073	0.02930
False-positive rate punch biopsy	−0.04244***	−0.07351	−0.01138
Side-effects[a]	−0.00960	−0.03622	0.01702
Moderate, short-lasting pain[a]	0.09901	−0.13594	0.33396
Severe, short-lasting pain[a]	−0.40236***	−0.58692	−0.21779

[a]Only applicable for punch biopsy.
Observations: $n = 2{,}906$, Respondents: $n = 344$, Log likelihood: −1,956.65
OCT: optical coherence tomography; 95% CI: 95% confidence interval. ***Significance at 1% level, **significance at 5% level.

not significantly impact the preference for biopsy. A possible explanation might be that the levels associated with this attribute were always very high for biopsy, with less variation in associated levels (91–97%) compared with OCT, in which there was greater variation in the levels of this attribute (70–94%). Completion difficulties in this elderly population have been reported by 24% of the patients in this study, as in the study by Tinelli et al. (10) (22.4%). Although explained in the choice sets, concepts such as "sensitivity" and "false-positive rate", might still be difficult to understand, since it requires insight into the consequences of a wrongly diagnosed skin lesion. The attribute "physicians' confidence in diagnosis" was added in order to most accurately reflect clinical practice, in which OCT only partly substitutes a biopsy in cases where the physician has high confidence in BCC diagnosis. In cases where the physician is not confident about BCC diagnosis, or another diagnosis is suspected, a biopsy is required to establish a diagnosis, a concept that was explained, but which might be difficult for patients to understand.

In conclusion, provided that optimum levels for sensitivity and false-positive rate are achieved, the preference of patients for OCT as an initial diagnostic strategy increases, indicating the potential uptake of this innovation in clinical practice.

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