# Non-melanoma skin cancer of the auricle is treated according to national guidelines

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## ABSTRACT

**INTRODUCTION:** Basal cell carcinoma (BCC) and squamous cell carcinoma (SCC) are non-melanoma skin cancers (NMSCs) and are the most common malignancies in Caucasians. The purpose of our study was to examine the frequency of the histological types of NMSC located on the auricle, and to determine whether national and international guidelines on NMSC treatment were followed in our ear, nose, and throat (ENT) department.

**MATERIAL AND METHODS:** The present study is a retrospective and descriptive cohort study of patients treated from 1996 to 2011 at the ENT department of The Regional Hospital Viborg. National guidelines issued in 2008 were compared with the given treatment.

**RESULTS:** A total of 54 patients were included in the study, 48 (89%) males and six (11%) females. BCC on the auricle was observed in 26 patients (48%) and SCC in 28 patients (52%). Six females and 20 males were in the BCC group; and only males were in the SCC group. National and international guidelines were followed sufficiently with respect to the treatment of choice – surgery and excision margins. These data were specified in half of the journals and they ranged from six to 20 mm. Not all patients were followed-up sufficiently according to the guidelines.

**CONCLUSION:** BCC and SCC were observed equally on the auricle in our study. This confirms that BCC and SCC of the auricle are represented differently than on the other parts of the body. The national and international guidelines on NMSCs are sufficiently followed with regard to treatment of choice and excision margins; however, the follow-up should be more precise.

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**TRIAL REGISTRATION:** This study was registered with and approved by the Danish Data Protection Agency (Datatilsynet).


Non-melanoma skin cancers (NMSCs), basal cell carcinoma (BCC) and squamous cell carcinomas (SCC) are the most common malignancies among Caucasian [1-6]. More than 90% of all cutaneous malignancies occur in the head and neck area [7]. 80% of NMSCs are BCC, and approximately 20% are SCC [2, 6-11]. NMSC of the ear represents 6-10% of all cutaneous neoplasms [3, 12, 13]. BCC is the most common type of head and neck skin cancer, it rarely metastasizes and has a very low mortality rate [2, 4, 6, 9, 10]. SCC is the second most common skin cancer and behaves more aggressively with a local metastasis rate of up to 10%, whereas distant metastases are rare [5, 7].

Mutation in DNA of the p53 tumour-suppressor gene due to long-lasting ultraviolet light exposure is the main external factor in NMSC development [1, 2, 4, 6, 14]. The incidence of NMSC in the Caucasian population increases proportionally with proximity to the Equator [1, 6]. Other aetiological risk factors include pre-existing skin conditions such as scars, burns, and ulcers, indoor tanning exposure, immunosuppression and/or organ transplantation, ionizing radiation, chemical agents (arsenic, tobacco etc.) and human papilloma virus (HPV) [1, 6, 11]. Older age-group populations and male gender populations have an increased NMSC incidence rate [1, 11].

The high-risk area of NMSC tumour location is the "mask" area of the face including the ears. This is presumably so because of the underlying embryonic fusion planes, which cause the skin and the subcutaneous tissue to be less resistant to tumour invasion and spread than other tissues [5, 15]. Additionally, the skin of the auricle is much thinner than the skin of the other areas of the head and neck, which facilitates tumour spread [5].

Treatment options are many. They include surgical approaches in the form of Moh's micrographic surgery and excision with postoperative margin assessment as well as non-surgical techniques such as curettage, cryotherapy, carbon dioxide laser, radiotherapy, topical therapy, photodynamic therapy, etc. Non-melanoma skin cancers located on the auricle are high-risk tumours and the treatment of choice is surgical excision [6, 14, 16-18].

The purposes of present study are two: first, to establish the ratio of the two histological types of NMSCs of the auricle observed at the ear, nose, and throat (ENT) department at our hospital and to compare our results with those of other studies; second, to analyze our patient material with respect to treatment of choice, excision margins and follow-up period and to establish to which extent national Danish guidelines on the treatment of NMSCs of the ear published in 2008 are being followed by the Department. Nemechek AJ et al found

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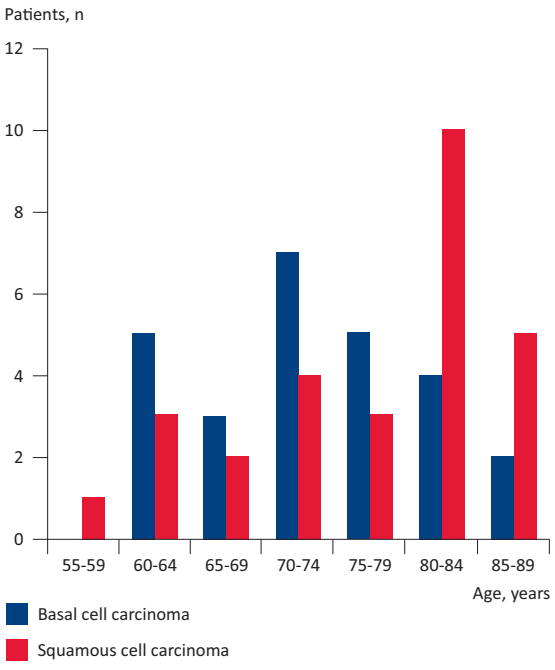
FIGURE 1

Age distribution of non-melanoma skin cancer on the auricle for basal cell carcinoma and squamous cell carcinoma.




that BCC is the more common NMSC in the auricle, whereas SCC is the more common NMSC in the external auditory canal [12]. Duffy KL et al found a BCC-to-SCC ratio of 3:1 in a population of 142 cases in a retrospective study of NMSCs of the ear [3]. Shockley WW et al found that SCC of the auricle represents about 55% of all malignant tumours of the auricle [19], whereas Ahmad I et al found that the BCC-to-SCC ratio of the auricle is 1.3:1 [8].

## MATERIAL AND METHODS

We performed a retrospective, descriptive cohort study, which was registered and approved by the Danish Data Protection Agency (Datatilsynet). Patient data were extracted from the records of patients who had been treated for NMSC of the auricle in the ENT department of The Regional Hospital Viborg in the period from 1996 to 2011. The following International Classification of Diseases (ICD) diagnoses were collected from the AS400 register system: C44.2 Neoplasma malignum cutis auris externa, C76.0 Neoplasma malignum cutis capitis, colli et faciei, C44.9 Neoplasma malignum cutis. Inclusion criteria for participants with the above-mentioned diagnoses in this study were: tumour localization only on the auricle and histological diagnoses of BCC, SCC and carcinoma in situ. Variables such as gender, age, tumour histological type, tumour location on the auricle, referring specialist, surgical management type, surgical margins, recurrence rate and follow-up period were recorded in Microsoft Office Excel 2010. The exclusion criteria were as follows: melanoma as histological diagnosis, tumour location in the external auditory canal, pre-auricular area and post-auricular area.

There are no written guidelines at the ENT department of The Regional Hospital Viborg for NMSC treatment. National Danish guidelines for treatment of BCC and SCC were published by the Danish Dermatologist Society in 2008 [16, 17]. High-risk SCC and BCC should be treated by surgery as the first choice, the margins of excision should at least be 6 mm for SCC and 6-12 mm for BCC, and recommendations prescribe a follow-up period of five years with regular inspection of the area, including regional lymph nodes after three, six and twelve months during the first year and once per year the next four years [16, 17]. We evaluated our treatment in view of the national guidelines.

A literature search for relevant studies was performed using the Pubmed.com database with the following words: ear auricle, skin neoplasm/therapy, and Scolar.google.com for non-melanoma skin cancer, national guidelines, international guidelines. Also, some articles were searched by hand and references gave links to additional articles related to our area of interest.

*Trial registration:* This study was registered with and approved by the Danish Data Protection Agency (Datatilsynet).

## RESULTS

A total of 54 patients were included in the study: 48 (89%) males and six (11%) females. SCC of the auricle was observed in 28 patients (52%), all males, and BCC was found in 26 patients (48%) of whom 20 were males and six females.

A total of 19 patients with NMSC of the ear were referred from ENT specialists: 16 patients from dermatolo-

TABLE 1

Tumour stage distribution of non-melanoma skin cancer on the auricle. The values are n (%).

| TNM stage | BCC | SCC | Total |
|---|---|---|---|
| Tis | 1 (4) | 2 (7) | 3 (5.5) |
| T1 | 13 (50) | 18 (64) | 31 (57.5) |
| T2 | 10 (38) | 3 (11) | 13 (24) |
| T3 | 2 (8) | 5 (18) | 7 (13) |
| T4 | 0 | 0 | 0 |
| Total | 26 (100) | 28 (100) | 54 (100) |

BCC = basal cell carcinoma; SCC = squamous cell carcinoma; TNM = tumour, node and metastasis.

TABLE 2

Follow-up period of non-melanoma skin cancer after surgical treatment. The values are n (%).

| Follow-up period | BCC | SCC | Total |
|---|---|---|---|
| < 3 months | 2 | 2 | 4 (7) |
| 3 months-< 1 year | 7 | 1 | 8 (15) |
| 1 year-< 3 years | 4 | 8 | 12 (22) |
| Stipulated in guidelines | 13 | 17 | 30 (56) |

BCC = basal cell carcinoma; SCC = squamous cell carcinoma.

gists, 11 from general practitioners and the type of referral was unknown in eight patients.

The age distribution of the patients with NMSCs of the auricle is shown in **Figure 1**.

Six patients were surgically treated with insufficient margins by pre-hospital ENT specialists for diagnostic purposes, and additional surgery had to be performed to eliminate positive excision margins in five cases, whereas one patient was treated sufficiently by the first excision, but was referred to the ENT Department for follow-up.

Tumour size according to the tumour, node and metastasis (TNM) classification is presented in **Table 1**. None of the patients had presented with regional or distant metastases by the time of diagnosis. One third of the cases were classified as T2 or T3 tumours.

Tumour location on the auricle is presented in **Figure 2**.

Surgical excision margins were specified in 27 journals (50%). We found excision margins ranging from six to 20 mm. Tumours larger than 2 cm are removed with up to 20 mm excision margins.

Fifty-one patients were surgically treated in the ENT department of The Regional Hospital Viborg: 38 patients were managed by simple excision; four patients had an excision with skin graft transplantation; in four cases, a total/subtotal auricular excision was performed; and in five cases, a reconstruction with a post-auricular subcutaneous island flap was used. Three patients did not receive surgical management in the ENT Department as one was referred the department of plastic surgery, one refused surgery, and one was managed by a pre-hospital ENT specialist who performed complete excision of the margins. In the latter case, follow-up was undertaken by the ENT Department.

Patient data for the follow-up period are of varying quality and we have divided the follow-up data as seen in **Table 2**.

Patients with a follow-up period of more than three years, patients who are still in observation, and dead patients represent 30 cases (56%). The remaining 24 patients (44%) have terminated their control check-up at the ENT department of The Regional Hospital Viborg.

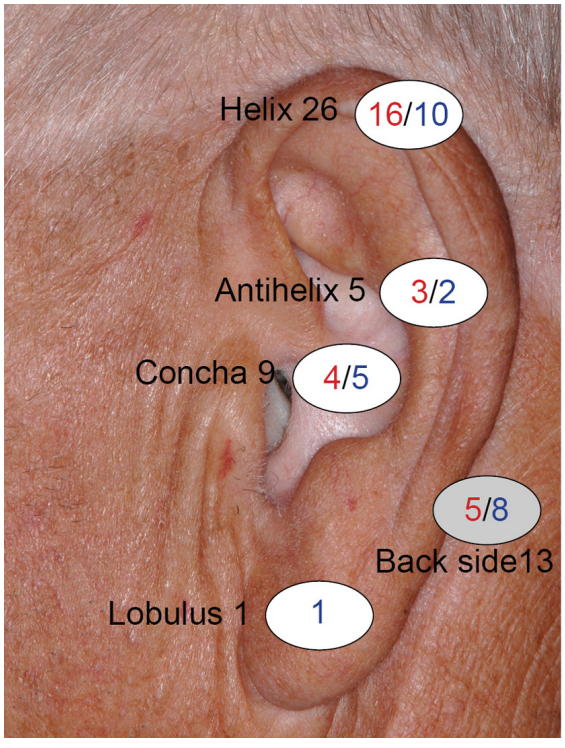
Recurrences of NMSCs of the ear appeared in six cases of which four were BCC, two were SCC of which one case was metastasizing.

## DISCUSSION

BCC is much more predominant than SCC in the face, head and neck areas, but this seems not be the case on the auricle. The external ear is a high-risk area easily exposed to the sun and, moreover, an area that is rarely protected against such exposure. Our study of 54 patients with NMSC of the auricle showed an equal distribution of SCC with 28 patients (52%) in one group and 26 (48%) BCC cases in another. The majority of studies report results which are in line with ours as far as NMSCs on the external ear are concerned [8, 13]. Duffy et al, on the other hand, described NMSCs of the ear in 142 patients and found BCC in 75.5% of cases and SCC in 23.9% [3]. Data obtained from the Danish National Cancer Registry covering a 15-year period from 1996 to 2010 show that BCC of the auricle is found in 60.5% and SCC of the auricle in 34.5% of cases, which gives a ratio of 1.8:1 [20]. The reason for the higher frequency of

FIGURE 2

Tumour locations on the auricle. The numbers of patients having basal cell carcinoma (BCC) or squamous cell carcinoma (SCC) respectively, are indicated on each location.



SCCs in our material may be that we found a surprisingly high number of larger tumours (T2 and T3). It should also be noticed that SCC was found only in the male population in our study.

All patients were offered the correct surgical treatment according to the national guidelines on NMSC treatment published by the Danish Dermatologist Society in 2008. The guideline describes NMSC as a high-risk area and recommends surgery as the first priority with excision margins of 6-12 mm [16, 17]. Huang et al claim that BCC margins of 12 mm are required in tumours which are > 2 cm, and 6-mm margin excision limits for SCC are required to secure complete removal in > 95% of cases [15]. European dermatological guidelines on BCC from 2006 recommend 13-15 mm margins to accomplish complete resection of > 95% the tumour [4]. Agreement between British dermatologists, plastic surgeons, oncologists and radiologists was achieved in 2002 according to which 6-mm excision margins are required in SCC [14]. The 2009 guidelines from the American Society of Dermatologic Surgery propose 10-mm margins in high-risk tumours > 2 cm in both BCC and SCC [18].

In our patients we found the size of the excision margins specified as ranging from 6 to 20 mm. This was sufficient and even more extensive than required by national and international guidelines. A generously wide excision margin was justified by the relatively large tumour size, and the choice of wide margins seems prudent as recurrences were seen despite these wide margins. However, data on the size of the margins were missing for half of the patients.

The follow-up period recommended by the American Dermatologist Society is a life-long skin check every 6-12 months [18]. The British Multiprofessional guidelines for SCC state that 95% of recurrences and metastases are detected within five years [14]. The European Dermatologist guidelines for BCC suggest the same time period for follow-up, but highlight that long-term hospital-based follow-up is neither necessary nor recommended [4]. Danish dermatological guidelines on basal and SCCs suggest a follow-up period of five years with inspection of the treated area and regional lymph nodes [16, 17]. Our follow-up period for non-melanoma skin cancers of the auricle is rather brief compared with the national and international recommendations. In 24 patients (44%), the follow-up period was ended before three years, 30 patients (56%) have been controlled for more than three years or are still in observation, or are dead.

## CONCLUSION

BCC and SCC on the auricle occurred with an equal frequency in our study. This confirms that BCC and SCC of the auricle are distributed in a different way than in the remaining parts of the body. SCC of the auricle was found only in the male population in our study. The national and international guidelines on NMSC have been followed sufficiently according to the treatment of choice and excision margins; however, the follow-up should be more precise.

Additionally, for tumours located on the auricle, we recommend an extension of excision margins up to 20 mm for in the more advanced stages.

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