Interventions for basal cell carcinoma of the skin: systematic review

Fiona Bath-Hextall, Jan Bong, William Perkins and Hywel Williams

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Interventions for basal cell carcinoma of the skin: systematic review
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Abstract

Objectives To assess the effects of treatments for basal cell carcinoma.
Methods Systematic review of randomised controlled trials.
Main outcome measure Recurrence of basal cell carcinoma at three years or beyond, assessed clinically.
Studies reviewed Randomised controlled trials of interventions for histologically confirmed basal cell carcinoma (published and unpublished material; no language restrictions).
Results 25 studies were identified, covering seven therapeutic categories. Only one study of surgical excision versus radiotherapy contained primary outcome data, which showed significantly more persistent tumours and recurrences in the radiotherapy group compared with surgery (odds ratio 0.99, 95% confidence interval 0.01 to 0.67). One study compared cryotherapy with surgery, with inconclusive results at one year. In a comparison of radiotherapy with cryotherapy, significantly more recurrences occurred at one year in the cryotherapy group. Preliminary studies suggest a short term success rate of 87-88% for imiquimod cream in the treatment of superficial basal cell carcinoma, although this cream has not been compared with surgery. No consistent evidence was found for the other treatment modalities.
Conclusions Little good quality research has been done on the treatments used for the most common cancer in humans. Most trials have included only people with basal cell carcinoma occurring at low risk sites. Only one trial measured recurrence at four years; recurrence rates at one year should be interpreted with caution. Surgery and radiotherapy seem to be the most effective treatments; surgery showed the lowest failure rates. Other treatments might have some use but need to be compared with surgery.

Introduction

Basal cell carcinoma (BCC) is a form of skin cancer and the most common cancer found in humans.1–4 BCCs are usually slow growing tumours that rarely spread to distant parts of the body. Growth of BCC is usually localised to the area of origin; however, some BCCs can infiltrate tissues in a three dimensional fash-
### Papers

We assessed the studies as high quality if randomisation and concealment of allocation were clear and analysis was done by intention to treat. We considered studies to be intermediate quality if it was not clear how randomisation was achieved or the analysis was not done by intention to treat. The main outcome examined was recurrence of BCC at three to five years, measured clinically. Secondary outcomes included early treatment failure within six months, measured histologically; adverse effects; and discom- fort to patients in terms of pain during treatment and thereafter.

**Results**

We included 18 trials (see bmj.com). Details of included trials and excluded trials are available in the Cochrane Library. Evidence was generally limited, as only one trial contained long term data on our primary outcome. Overall, we classified 14 trials as intermediate quality and four trials as high quality. Heterogeneity of the methods or failure to take into account the appropriate unit of analysis made the pooling of data impossible for many treatments.

### Surgical excision

One randomised controlled trial of 347 patients compared surgical excision with frozen section margin control versus radiotherapy in primary BCC of the face less than 40 mm diameter. At four years significantly more persistent tumours and recurrences had occurred in the radiotherapy group than in the surgery group (odds ratio 0.09, 95% confidence interval 0.01 to 0.67). Cosmetic outcome favoured surgery. After radiotherapy more than 65% of the patients developed dyspigmentations and telangiectasia, and radiodystrophy affected 41%.

### Cryotherapy

One study of 93 patients compared radiotherapy with cryotherapy for low risk primary BCC. Significantly more recurrences occurred in the cryotherapy group than in the radiotherapy group at one year—39% (17/44) versus 4% (2/49). Cosmetic results were not significantly different. The degree of pain and discomfort from the treated areas was the same in both groups. Hypopigmentation was more common than hyperpigmentation with both modes of treatment (81% in the radiotherapy group and 88% in the cryotherapy group). Seven patients treated with radiotherapy developed some radiation telangiectasia.

A second study of 96 patients compared cryosurgery with surgical excision for superficial and nodular BCC of the head and neck. Recurrence rates at one year were not statistically different for cryosurgery and surgery—6% (3/48) versus 0% (0/48). Cosmetic results were generally better after surgery. Patients in the cryo- therapy group (90%) complained of moderate to severe swelling of the treated area, with leakage of exu- date from the defect.

### Photodynamic therapy

Photodynamic therapy is a non-ionising radiation treatment modality under development that uses the interaction between visible light and tumour sensitising agents to cause cell death. We included two randomised controlled trials of this treatment. The first trial (n=88) compared photodynamic therapy with cryotherapy for superficial and nodular BCCs. Recurrence rates at a year (histologically verified) were comparable—25% (11/44) in the photodynamic therapy group and 15% (6/39) in the cryotherapy group. Clinical recurrences at one year were lower for photodynamic therapy (5%) and cryosurgery (13%). Scarring and tissue defects scored significantly better after photodynamic therapy. More patients indicated pain and discomfort during and after treatment with photodynamic therapy than with cryo- therapy, although the difference was not statistically significant.

<table>
<thead>
<tr>
<th>Study</th>
<th>Failures/patients</th>
<th>Odds ratio (95% CI fixed)</th>
<th>Weight (%)</th>
<th>Odds ratio (95% CI fixed)</th>
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<tbody>
<tr>
<td></td>
<td>Treatment 1</td>
<td>Treatment 2</td>
<td>Subtotal</td>
<td></td>
</tr>
<tr>
<td>Interferon alfa-2b v placebo</td>
<td>Cornell 1990</td>
<td>17/120</td>
<td>30/42</td>
<td>100.0</td>
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<tr>
<td>Interferon beta v placebo</td>
<td>Rogoziński 1997</td>
<td>8/15</td>
<td>18/18</td>
<td>100.0</td>
</tr>
<tr>
<td>Single dose of protamine zinc chelate interferon alfa-2b v same dose three times weekly</td>
<td>Edwards 1990</td>
<td>16/33</td>
<td>6/32</td>
<td>100.0</td>
</tr>
<tr>
<td>BEC-5 cream v vehicle</td>
<td>Punjabi 2000</td>
<td>21/82</td>
<td>24/32</td>
<td>100.0</td>
</tr>
<tr>
<td>Imiquimod 5% cream v vehicle</td>
<td>Beutner 1999</td>
<td>4/24</td>
<td>10/11</td>
<td>18.3</td>
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<tr>
<td></td>
<td>Geisse 2001</td>
<td>23/96</td>
<td>26/32</td>
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<tr>
<td>Subtotal</td>
<td>48/188</td>
<td>57/67</td>
<td>100.0</td>
<td>0.06 (0.03 to 0.13)</td>
</tr>
</tbody>
</table>

Test for heterogeneity: $\chi^2=1.01$, df=2, $P=0.6$

Early treatment failure within six months measured histologically. BEC-5=mixture of 0.005% solasodine glycosides found in solanaceous plants (aubergine)
The second trial (n = 83) compared the clinical and cosmetic outcome of superficial BCCs treated using either laser or broadband halogen light, in photodynamic therapy with topical 5-aminolevulinic acid. The analysis considered lesions rather than patients as the unit of analysis. Clinically verified early treatment failure was 14% (16/111) of lesions for the laser and 18% (24/134) of lesions for the broadband halogen group. No significant difference was found between the two light sources with regard to clinical response or cosmetic results. Discomfort was reported during illumination and during the first week after treatment (stinging, itching, pain, headache, sensation of warmth, or blushing). Multiple treatments were often needed.

**Intralesional interferon treatment**

We found four randomised controlled trials of intralesional interferon treatment (fig). Pain was experienced at the injection site in all studies, and all patients in the interferon groups experienced flu-like symptoms. Losses to follow up were mainly due to flu-like symptoms.

**Fluorouracil**

We identified two randomised controlled trials of fluorouracil. The first trial compared 5-fluorouracil cream 5% in phosphatidyl choline vehicle to aid penetration versus 5-fluorouracil 5% in petrolatum for non-superficial BCCs. No significant difference in early treatment failure, determined histologically, occurred in the phosphatidyl choline group compared with the petrolatum group—10% (1/10) versus 45% (3/7); odds ratio 0.15, 0.01 to 1.90. The analysis considered lesions rather than patients. Local irritation, erythema, ulceration, and tenderness were common reactions.

The second open label randomised study of 122 patients tested the safety, tolerance, and efficacy of six treatment regimens of 5-fluorouracil/epinephrine gel for superficial and nodular BCCs. Two doses and four treatment schedules were used. All regimens seemed to work well, with no statistically significant differences among them. However, the wide confidence intervals indicate that large differences between regimens cannot be ruled out. Overall, the six regimens had an average early treatment failure of 9% on the basis of histological analysis and no significant differences occurred for any of these comparisons. All patients had transient, moderate to severe stinging, burning, or pain at the time of injection. Local tissue reactions were confined to the treatment site and included erythema, swelling, desquamation, erosions, and eschar in most patients.

**Imiquimod**

Seven trials assessed imiquimod. Three of the trials used similar regimens to evaluate the safety and efficacy of imiquimod 5% cream in the treatment of superficial and nodular, superficial only, and nodular only BCC. Pooled data from the three trials showed a significant reduction in early treatment failure in the 5% imiquimod group compared with the vehicle group (fig).

Two further dose response trials tested different dosage frequencies of imiquimod 5% cream applied for six weeks for patients with primary superficial BCC and nodular BCC. Higher dosage frequencies of 5% imiquimod showed a trend towards fewer early treatment failures compared with lower dosage frequencies of 5% imiquimod in both trials (odds ratios 0.31, 0.10 to 1.01; and 0.43, 0.18 to 1.01).

Two further dose response trials in superficial BCC (n = 93) and nodular BCC (n = 90) compared imiquimod 5% cream with and without occlusion. Occlusion made no significant difference to early treatment failure for superficial BCC (odds ratio 0.66, 0.29 to 1.52) or nodular BCC (odds ratio 1.20, 0.52 to 2.75).

For all imiquimod trials drawbacks included redness, oedema, skin hardening, vesicles, erosion, ulceration, flaking, and scabbing at the treatment site. Local reactions were common, mostly mild to moderate, and well tolerated by patients and declined in incidence and severity with less frequent dosing.

**Discussion**

Despite the enormous workload associated with the treatment of BCC, very little good quality research has been done on the efficacy of the treatment modalities used. Most studies have been done on low risk BCCs, the results of which are probably not applicable to tumours of the morphoeic type and those occurring in difficult areas such as the nasolabial fold or around the ears and eyes. Specific trials or subgroup analyses are needed for morphoeic tumours. Two trials randomised patients with multiple BCCs, whereas all other trials randomised patients with one BCC. Pooling of data was not possible in many cases, as the trials did not have similar designs, methods, or outcome measures. Operator differences should also be taken into consideration, especially for cryotherapy and photodynamic therapy.

Nearly two thirds of all recurrent tumours appear in the first three years after treatment, and 18% appear...
between five and 10 years after treatment. Only one trial had a sufficient duration of follow up, and this found that the failure rate was significantly lower with surgery than with radiotherapy. For the other trials recurrence rates are difficult to judge as two trials had a follow up period of two years, four trials had a follow up period of one year, and 12 trials had a follow up period of six months or less.

In general, the quality of the trials was poor. In 13 of the 18 trials the method of randomisation was not described or was unclear. Only four of the trials clearly showed that concealment of allocation was adequate. Only 12 of the 18 trials used an intention to treat analysis, and seven of those involved the therapeutic option imiquimod. Blinding of outcome assessment was done or attempted for most of the trials. In conclusion, the evidence base for the most common cancer is poor.

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Competing interests: FB-H, JB, WP, and HW are all involved in running a five year randomised controlled trial comparing imiquimod against excisional surgery for the treatment of low risk superficial and nodular basal cell carcinoma, which is funded by Cancer Research UK.

Ethical approval: Not needed.