Prevalence of Immunocompromised Conditions among Patients with Advanced Cutaneous Squamous Cell Carcinoma: A Systematic Review

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INTRODUCTION

- Immunocompromised conditions (IC) elevate the risk and severity of advanced cutaneous squamous cell carcinoma (cSCC).
- However, the burden of IC in this population is not well defined, as most studies are from case reports or small studies with limited generalizability.
- This study estimated the overall and region-specific prevalence of IC among patients with advanced cSCC and those with advanced cSCC unamenable to curative surgery or radiation.

METHODS

- EMBASE, Web of Science, and PubMed, with additional citation searching, were searched from inception to 2025.
- ISPOR guideline for systematic reviews was used to establish eligibility criteria based on population, intervention, comparator(s) and outcomes (PICO).
- Two reviewers independently screened the titles and abstracts based on predefined eligibility criteria (Table 1). Full text screening and data extraction were conducted by one reviewer, with 10% validated by the second reviewer.
- Data was synthesized quantitatively using descriptive statistics, for instance:

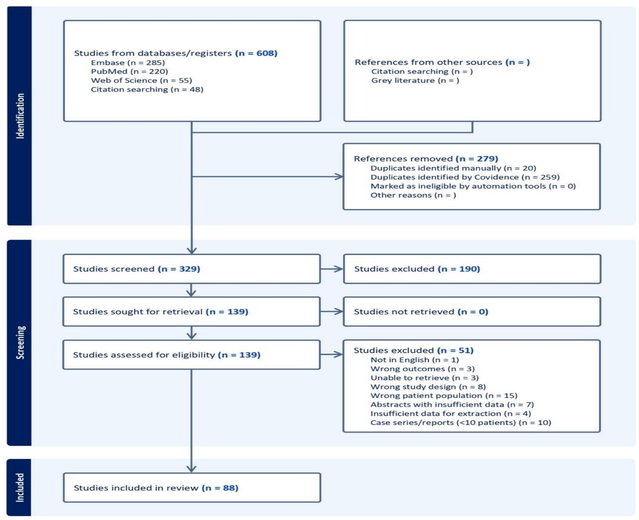
Prevalence of IC among patients with advanced cSCC = $\frac{Total\ number\ of\ all\ immunocompromised\ patients}{Total\ number\ of\ \text{all}\ patients\ with\ advanced\ cSCC} \times 100\%$

Table 1. Eligibility criteria

Criteria	Inclusion criteria	Exclusion criteria
Population	Adult patients (≥18 years) with advanced cSCC.	Adult patients (≥18 years) with other types of skin cancer, non-cutaneous SCC, or unspecified skin cancer.
Intervention	N/A	N/A
Comparators	N/A	N/A
Outcomes	Reported at least one immunocompromised condition (solid organ transplant recipients, hematological malignancies, autoimmune conditions, HIV/AIDS, long-term immunosuppressive therapy and chronic systemic corticosteroid use.	
Study design	Randomized or non-randomized clinical trials, observational studies, cross-sectional studies, case reports (>10 patients).	Case reports ≤10 patients.
Others	Studies published in English, abstracts/conference posters with sufficient data.	Studies not published in English, abstracts/conference posters without sufficient data.

RESULTS

Figure 1. PRISMA diagram



RESULTS

Patients with advanced cSCC

- Across the 88 eligible studies, 9,540 patients with advanced cSCC were included (mean age: 64-80 years) (Table 2).
- The overall prevalence of IC was 17.0% among patients with advanced cSCC.
- Hematological malignancies had the highest prevalence of 5.9% (Figure 2).
- Prevalence varied geographically, with the highest rates of IC in Canada, Israel, USA, and UK (22.5%-31.1%) (Figure 3).

Table 2. Clinical characteristics of patients with advanced cSCC

Characteristics	Patients with advanced cSCC
Age	
Mean age	64–80 years
Type of advanced cSCC (n=6,548)	
Metastatic	77.2%
Locally advanced	22.8%
Tumor differentiation (n=1,624)	
Well-differentiated	260 (16.0%)
Moderately differentiated	1,363 (83.9%)
Poorly differentiated	
T stage (n=1,373)	
T0	8 (0.6%)
T1	222 (16.2%)
T2	494 (36.0%)
T3	549 (40.0%)
TX	100 (7.3%)

Immunocompromised patients constitute a substantial proportion of patients with advanced cSCC (17%-23%).

Figure 2. Prevalence of specific immunocompromised conditions among patients with advanced cSCC (N = 9,540)

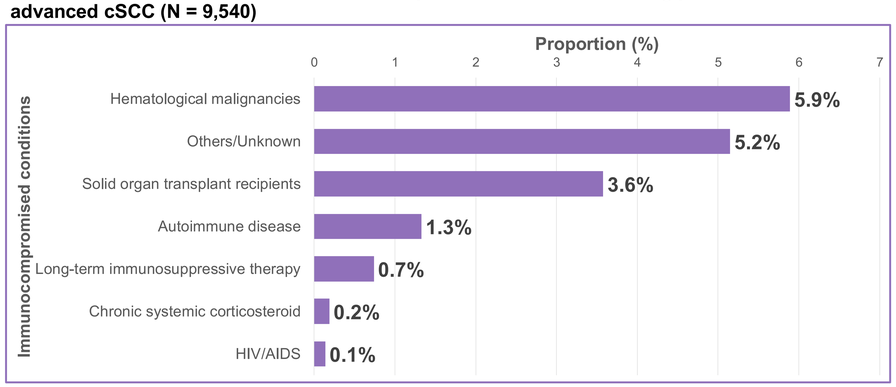
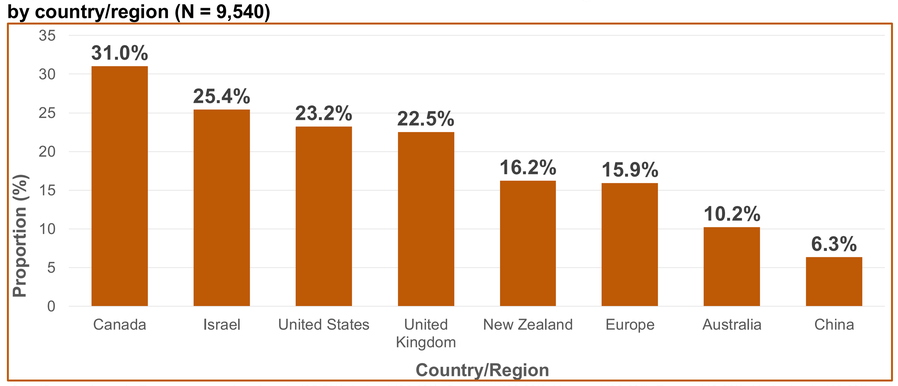


Figure 3. Prevalence of immunocompromised conditions among patients with advanced cSCC by country/region (N = 9,540)



Specific prevalence in European countries: Austria (35.5%); Ireland (22.3%); Germany (20.9%); Hungary (20.0%); France (18.0%); Netherlands (13.6%); Spain (13.3%); Finland (12.7%); Italy (12.0%); Portugal (10.7%).

Patients with advanced cSCC unamenable to curative surgery/radiation

- The subgroup (n=3,101) of patients with advanced cSCC unamenable to curative surgery/radiation were slightly older (mean age: 77-80 years) and metastatic cSCC was the most prevalent (56.6%).
- They had more clinically severe disease based on tumor differentiation (≥moderate = 90.5%) and T-stage (≥T3 = 46.2%) than those with advanced cSCC.
- The overall prevalence of IC was 22.8% among patients with advanced cSCC unamenable to curative surgery or radiation.
  - Hematological malignancies (11.8%) were the most prevalent IC (Figure 4).
- Geographical regions with the highest prevalence of IC were Canada, Australia, Israel, and USA (32.0%-23.6%) (Figure 5).

Figure 4. Prevalence of specific immunocompromised conditions among patients with advanced cSCC unamenable to curative surgery/radiation (N = 3,101)

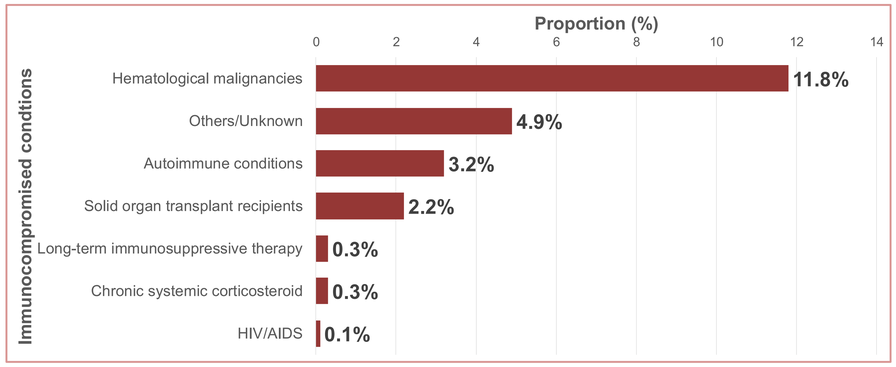
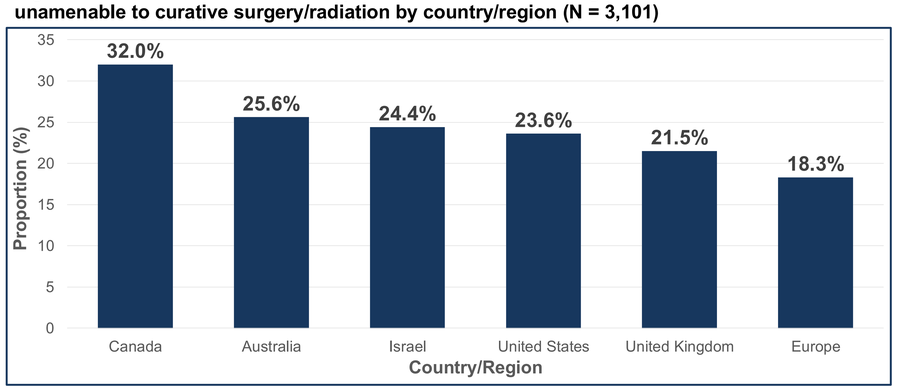


Figure 5. Prevalence of immunocompromised conditions among patients with advanced cSCC unamenable to curative surgery/radiation by country/region (N = 3,101)



Specific prevalence in European countries: Austria (35.5%); France (24.7%); Germany (20.9%); Hungary (20.0%); Spain (13.3%); Italy (12.0%); Portugal (10.7%).

LIMITATIONS

- Some studies did not specify the exact type of IC, which may reduce the accuracy of prevalence estimates for specific conditions.
- Treatment with immune checkpoint inhibitors was used as a proxy to identify patients with advanced cSCC unamenable to curative surgery/radiation.

CONCLUSIONS

- Approximately 1 in 6 patients with advanced cSCC is immunocompromised, with hematological malignancies being the most prevalent.
- This reflects a substantial, underserved population and the need to develop effective and safe therapies in this population.

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