RADIATION-INDUCED ALOPECIA - A SCOPING REVIEW

Sheona Leung[1*], Amy Lo[2*], Cindy Wong[3], Jessica Lai[1], Jennifer YY Kwan[4,5], Shing Fung Lee[6], Adrian W Chan[7], Julie Ryan Wolf[8,9], Corina van den Hurk[10], Jennifer Jones[11], Azael Freites-Martinez[12], Michael Jefford[13], Raymond J Chan[14], Viola Salvestrini[15], Edward Chow[7], Pierluigi Bonomo[15#], Henry C. Y. Wong[1#]

[1] Department of Oncology, Princess Margaret Hospital, Kowloon West Cluster, Hong Kong S.A.R., China, [2] Faculty of Medicine, The Chinese University of Hong Kong, Hong Kong S.A.R., China, [3] Union Oncology Centre, Hong Kong S.A.R., China, [4] Radiation Medicine Program, Princess Margaret Cancer Centre, Toronto, Canada, [5] Department of Radiation Oncology, University of Toronto, Toronto, Canada, [6] Department of Radiation Oncology, National University Cancer Institute, Singapore, [7] Department of Radiation Oncology, Odette Cancer Centre, Sunnybrook Health Sciences Centre, Toronto, Canada, [8] Department of Dermatology, University of Rochester Medical Centre, Rochester, NY, USA, [9] Department of Radiation Oncology, University of Rochester Medical Centre, Rochester, NY, USA, [10] Research and Development Department, Netherlands Comprehensive Cancer Organisation, Utrecht, The Netherlands, [11] Cancer Rehabilitation and Survivorship, Princess Margaret Cancer Centre, Toronto, Canada, [12] Oncodermatology Clinic, Hospital Ruber Juan Bravo and Universidad Europea, Madrid, Spain, [13] Department of Health Services Research, Peter MacCallum Cancer Centre, Melbourne, VIC, Australia, [14] Caring Futures Institute, College of Nursing and Health Sciences, Flinders University, Adelaide, Australia, [15] Department of Radiation Oncology, Azienda Ospedaliero-Universitaria Careggi, University of Florence, Florence, Italy

*Contributed equally as joint first authors, #Contributed equally as joint last authors

Introduction

- Radiation therapy (RT) for the treatment of brain and head and neck tumours can cause radiation-induced alopecia (RIA).
- Beyond therapeutic advances, addressing supportive care aspects, including RIA, contributes to holistic patient management.
- This scoping review examines the literature on the clinical presentation, dosimetric correlation, impact on quality of life (QoL), risk reduction strategies and treatment options for RIA.

Methods

This review was prepared following the PRISMA guidelines. Embase, MEDLINE, Cochrane CENTRAL and CINAHL were searched from inception to April 2024.

5070 studies screened

- Original research studies only
- Address the above aspects of RIA
- English articles only
- Human studies only

47 studies met the inclusion criteria

Scan to access the titles and authors of the 47 included studies

Table 1: Characteristics of included studies (n=47)

	Number of studies n (%)
Year of publication	
2020 and after	14 (30%)
2010-2019	20 (43%)
2000-2009	8 (17%)
Before 2000	5 (11%)
Country of study	
United States	15 (32%)
Japan	7 (15%)
Germany	6 (13%)
United Kingdom	5 (11%)
Others	14 (30%)
Age group	
Paediatric patients only	7 (15%)
Adult patients only	26 (55%)
Both paediatric and adult patients	7 (15%)
Not specified	7 (15%)
Intent of radiation therapy	
Radical	13 (28%)
Palliative	19 (40%)
Not specified	15 (32%)
Site of radiation therapy	
Whole brain	13 (28%)
Partial brain	10 (21%)
Total skin	3 (6%)
Head and neck	1 (2%)
Craniospinal	4 (9%)
Multiple sites	11 (23%)
Not specified	5 (11%)
Type of radiation therapy	
Photon	28 (60%)
Electron	3 (6%)
Proton	5 (11%)
Multiple types	1 (2%)
Not specified	10 (21%)

Results

- **Clinical presentation of RIA**
  - Nine studies commented on the onset of RIA, with a range of 7 to 58 days after the start of RT.
  - Patients developed persistent RIA (pRIA) in 18 studies, but the definition of pRIA was inconsistent and only provided in 7 studies, with a range of 6 to 12 months after completion of RT.
- **Negative impact on quality of life**
  - Eight studies assessed QoL and all reported that RIA is associated with high emotional burden.
- **Dosimetric correlation**
  - Development of RIA was dose- and volume-dependent in 17 of 25 studies that estimated scalp doses. However, definition of scalp or hair follicle volume and proposed scalp dose constraints varied across studies.
- **Risk reduction strategies**
  - Intensity-modulated radiotherapy (IMRT) and/or volumetric-modulated arc therapy (VMAT) techniques were discussed in13 studies. Shielding in electron therapy were employed in 3 studies. Application of boluses or compensators in proton therapy was explored in one study. All of these have shown to be effective in reducing the occurence of RIA.
  - Scalp cooling before whole brain RT was not effective in preventing RIA in one non-randomized trial.
- **Treatment options**
  - Scalp expansion, plastic surgical reconstruction and hair transplantation showed promising results in 6 retrospective studies.
  - Topical minoxidil showed hair regrowth in a retrospective cohort study and a case report.

Conclusion

RIA is a treatment-related side effect that negatively impacts patients' QoL. Randomised controlled trials with standardised outcomes of a quantitative reduction of hair loss and regrowth of hair are warranted to evaluate existing and emerging interventions for RIA. Prospective longitudinal studies are needed to understand scalp dose parameters that correlate with RIA.

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Correspondance: Sheona Leung (email: sheona.leung@gmail.com)