

Heat-induced cancer – A historical perspective

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Kangri cancer is a thermally-induced squamous cell carcinoma of the skin described in the Kashmir population. At variance with classical UV-induced skin squamous cell carcinoma, Kangri cancer is localised to the legs and abdomen because of the prolonged and recurrent use of Kangri, an earthenware container filled with ignited coal during wintertime and kept around the abdominal region to provide warmth. The first description of Kangri cancer is erroneously attributed¹ to a paper putatively published in 1819 by Theodor Maxwell (1847–1914), who was not even born at that time. The blunder was the result of a transcription error of ‘1879’, the correct publication date of Maxwell’s article.² The credit for the first description of Kangri cancer in 1866 goes to William Jackson Elmslie (1932–1872),³ whose observations were subsequently confirmed by Maxwell.

Diseases like Kangri cancer are similar to the Kang cancer of North-West China⁴ and the Kairo cancer of Japan.⁵ Kang cancer develops on the skin of the legs and pelvis in people sleeping on the Kang, an oven bed used to counter the extremely cold winters at high altitudes. On the other hand, Kairo cancer is due to a metal box containing embers kept close to the abdomen for warmth. According to the two-stage model of carcinogenesis, all these carcinomas exemplify the action of heat as a tumour promoter, favouring the expression of the initiating oncogenic DNA damage through the induction of chronic inflammation. Recent studies carried out on Kangri cancer patients from Kashmir revealed that the TP53 gene is a predominant target of chronic exposure to hyperthermia.⁶ Furthermore, genetic polymorphisms, such as Arg72Pro SNP of codon 72 of the TP53 gene, relate to higher susceptibility to Kangri cancer.⁷

Given their peculiar mechanism, tumours equivalent to Kangri and Kang cancers are rarely observed in the Western world, but a case from the past, that is, from the writings of

Sir Arthur Conan Doyle (1859–1930) is worth mentioning in this context. It is well-known that Conan Doyle was a physician. A graduate of the University of Edinburgh, before turning into a full-time writer, he had gained ten years of experience working in Southsea, a suburb of Portsmouth, where he combined his main activity as a general practitioner with that of a doctor for an insurance company and for the local British Army unit.

In the late spring and early summer of 1882, Arthur Conan Doyle, then a Bachelor of the Edinburgh Medical School, started practising at Plymouth, working in partnership with his old schoolmate Dr. George Turnavine Budd (1885–1889). He reported on this period in his autobiography, *Memories and Adventures*,⁸ as well as in *The Stark Munro Letters*, a deeply autobiographical story.⁹ During these 6 weeks, young Arthur, who was in charge of all the surgical cases, ‘went up country once, and operated upon an old fellow’s nose which had contracted cancer through his holding the bowl of a short clay pipe immediately beneath it’.⁸ In the *Stark Munro Letters*, where the medical experience at Plymouth is described in very close detail, Conan Doyle added more facts (letter VIII, *The Parade*, Bradfield, 6 April 1882). The patient ‘was an old soldier who had lost a good many teeth, but who had continued to find room between his nose and chin for a short black clay pipe. Lately, there appeared a small sore on his nose which had spread and become crusted. On feeling it, I found it as hard as a streak of glue, with constant darting passing through it. Of course, there could be no question as to diagnosis. It was epitheliomatous cancer, caused by the irritation of the hot tobacco smoke. Two days after I removed the growth, It was my first operation’.⁹ Similarly, Kangri cancer evolves from precancerous dermatosis to squamous cell carcinoma. Even at the end of the 19th century, it was well established that pipe smokers were prone to developing

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carcinoma, mostly of the lower lip. Suggesting a direct role of heat, lip cancer developed particularly in heavy smokers who used very short pipes.¹⁰

Elmslie had previously pointed out that the use of portable braziers was not limited to Kashmir, the custom being particularly known in Italy, where the use of the 'scaldino', a small portable earthenware brazier, was widely diffused, particularly throughout the south of Italy during wintertime.³ Figure 1 shows a collection of heating utensils collected from different regions of the world and held by the Smithsonian Institution.¹¹ Numbers 6–8 are Italian 'scaldini'. Number 4 is an example of Kangri. The 'scaldino' was very similar in size and shape to the Kashmiri Kangri. It is very interesting to note that Heywood W. Seyton-Karr, a British explorer and collector

of archaeological artefacts who travelled to Kashmir and the Himalayas between 1887 and 1888, wrote that 'early Italian missionaries have the credit of having introduced the Italian scaldino, here known as a Kangri, among the inhabitants of this place'.¹² Although Italian physicians had observed rashes in Italian women accustomed to sitting for many hours with the 'scaldino' under their clothes, a role in causing skin cancer had been dismissed. Elmslie explained this difference 'as the arrangement of the dress is considerably different to what obtains among the poverty-stricken inhabitants'³ of Kashmir.

Considering all these things, the nose cancer described by Conan Doyle lends itself to an interesting, additional example of heat-promoted cancer, like *Kangri* cancer.

Declaration of patient consent

Patient consent is not required as there are no patients in this study.

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Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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Figure 1: Plate 71 from Ref. 11, illustrates a variety of hand and foot warmers found at different latitudes. The Italian 'scaldini' are shown in figures 6–8. The Kangri vessel is shown in Figure 4. The fire vessels shown in Figures 1, 2, 3, 5 are from China. The other fire vessels shown are all from Europe.