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Over-expression of cyclo-oxygenase-2 predicts poor survival of patients with nasopharyngeal carcinoma: a meta-analysis

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Main Article

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Abstract

Objectives. The conclusive prognostic significance of cyclo-oxygenase-2 has been determined in various cancers but not in nasopharyngeal carcinoma. Therefore, this study aimed to evaluate the relationship of cyclo-oxygenase-2 expression with the survival outcome and treatment response of nasopharyngeal carcinoma patients via a systematic meta-analysis approach.
Methods. A meta-analysis was conducted in compliance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses ('PRISMA') checklist. The primary clinical characteristics of patients, and hazard ratios with 95 per cent confidence intervals of overall survival data, were tabulated from eligible studies. The relationship of cyclo-oxygenase-2 expression with survival outcome (expressed as hazard ratio) and treatment response (expressed as odds ratio) in nasopharyngeal carcinoma patients was analysed, and explained with the aid of forest plot charts.
Results and conclusion. The pooled hazard ratio for overall survival was 2.02 (95 per cent confidence interval = 1.65–2.47). This indicates that the over-expression of cyclo-oxygenase-2 is significantly associated with the poor survival of nasopharyngeal carcinoma patients. The pooled odds ratio of 0.98 (95 per cent confidence interval = 0.27–3.49) reveals that over-expression of cyclo-oxygenase-2 was not significantly related to the treatment outcome.

Introduction

Nasopharyngeal carcinoma is a form of malignancy at the tissue of the upper section of the pharynx behind the nose – the nasopharynx region.[1] Globally, the disease accounts for 65 000 deaths yearly and has a regionally varied incidence rate.[2] In endemic regions, such as Southern China, Southeast Asia and the Middle East, there are over 20 cases of nasopharyngeal carcinoma per 100 000 people, although it is rare in North America and Europe.[3]

Based on the World Health Organization classification, nasopharyngeal carcinoma is histologically categorised into three subtypes: type I is characterised by keratinising differentiated squamous cell carcinoma (SCC); type II (or 2a) is distinguished by non-keratinising differentiated SCC; and type III (or 2b) is typified by non-keratinising undifferentiated basaloid SCC.[4] The latter, more chemosensitive type III/2b is predominant among Asian cases, whereas types I and II/2a are mostly found in Western countries.[5]

Risk factors for nasopharyngeal carcinoma include genetic factors, viral infection (Epstein–Barr virus), environmental factors, lifestyle influences (smoking) and the consumption of certain preserved foods.[6] The early stages of malignancy usually involve invasion of nasopharyngeal carcinoma cells to surrounding tissue and cervical lymph nodes.[7,8] Despite the radio-sensitivity of nasopharyngeal carcinoma tumours, patients with advanced disease stages show poor survival.[9–12] Improved therapeutic techniques, such as concurrent chemotherapy with or without neo-adjuvant or adjuvant intensity-modulated radiotherapy (RT), and high-resolution magnetic resonance image monitoring, have been the standard treatment protocol for locally advanced nasopharyngeal carcinoma.[13–15] Nevertheless, relapse and metastasis still occur in approximately 20–50 per cent of patients.[16]

Studies have shown that nasopharyngeal carcinoma patients with the same disease classification present with different prognoses.[17,18] This suggests that consideration of ethnicity[19] and biomolecular factors associated with survival outcome[20] may be necessary to accurately distinguish nasopharyngeal carcinoma patients for individualised and tailored treatment. Hence, it is important to identify prognostic factors (particularly molecular and genetic factors) that correspond closely to the actual clinical outcomes for the improvement of therapies, to yield a better treatment outcome.

One candidate biomarker of potential prognostic significance to nasopharyngeal carcinoma is the cyclo-oxygenase-2 gene. Expression of cyclo-oxygenase-2 has clinical and prognostic significance in cancers of the head and neck.[21] Its involvement in nasopharyngeal carcinoma carcinogenesis is most probably during the formation of the inflammatory microenvironment associated with tumorigenesis and malignancy. Cyclo-oxygenase-2