Original paper

Efficiency of long-term high-dose intravenous ascorbic acid therapy in locally advanced basal cell carcinoma – a pilot study

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Abstract

Introduction: The anti-cancer properties of high-dose intravenous ascorbic acid have been demonstrated in various malignancies. In our recent study, we tested topically applied ascorbic acid to treat basal cell carcinoma (BCC), and achieved a good clinical response.

Aim: Based on these results, we decided to examine the efficacy and tolerability of high-dose intravenous ascorbic acid (IVA) for locally advanced BCC.

Material and methods: In this pilot study, patients diagnosed with locally advanced BCC who were not amenable to radiation, surgical or local therapy (no other treatment option was available at the time) received intravenous ascorbic acid (1–1.8 g/kg), in an outpatient setting, 1–3 times per week for a mean duration of 42 ±23.6 weeks. This therapy was generally well tolerated.

Results: Among 4 patients who had a total of 165 (mean: 41 ±51, range: 1–114) skin lesions, 3 patients achieved stable disease and one had progressive disease. There was substantial variability in individual tumor response to therapy. With the aid of two-photon microscopy and second harmonic generation imaging techniques, alterations in collagen structure were observed between tumor nests during IVA therapy.

Conclusions: Our results suggest that IVA is well tolerated in a small group of patients with extensive BCCs. However, in the era of smoothened (Smo) receptor inhibitors, it may only be considered as an adjuvant therapy in treatment-resistant cases.

Key words: basal cell carcinoma, vitamin C, ascorbic acid.

Introduction

Basal cell carcinoma (BCC) of the skin is the most common cutaneous malignancy in Caucasian patients [1]. Depending on the size, subtype and location of the cancer, there are various treatment options available. These include Mohs micrographic surgery (MMS)/surgical excision, other procedural solutions such as electrodesiccation and curettage, cryotherapy, photodynamic therapy and radiation therapy as well as topical application of various immunomodulatory and antimetabolite agents [2]. The vast majority of BCCs can be cured with these modalities and MMS provides the highest cure rate among all treatments. Challenging cases with high recurrence rates and spread to adjacent musculoskeletal structures – and rarely to distant organs – include large, infiltrating BCCs in the periocular and periauricular region and BCCs developing in patients with certain cancer syndromes, such as in nevoid basal cell carcinoma syndrome (BCNS, basal cell nevus or Gorlin-Goltz syndrome) [3]. To reduce the tumor burden in these patients, systemic tumor-targeted therapy is preferred.

Recently, two small-molecule inhibitors of smoothened (Smo) – vismodegib (GDC-0449, Roche) and sonidegib (LDE225, Novartis) – have been approved for this purpose. The former drug is approved to treat metastatic and locally advanced BCC, while the latter can be used to treat therapy-resistant locally advanced BCC [2, 4]. Unfortunately, they

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