CLINICAL PAPER /

BRAIN METASTASES

A phase I study of topical Tempol for the prevention of alopecia induced by whole brain radiotherapy.

Metz JM1, Smith D, Mick R, Lustig R, Mitchell J, Cherakuri M, Glatstein E, Hahn SM.

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ABSTRACT

PURPOSE:

Complete alopecia is a universal complication of whole brain radiation therapy which contributes to patient anxiety over treatment. Tempol, a nitroxide radioprotector, has been shown to protect against radiation-induced alopecia in an animal model. This phase Ib study was designed to evaluate the safety and side effect profile of topical Tempol in patients with brain metastases being treated with whole brain radiotherapy.

EXPERIMENTAL DESIGN:

Twelve patients with metastatic cancer to the brain were enrolled in the study between October 2000 and February 2003. Tempol (70 mg/ml concentration solution) was applied topically to the scalp 15 minutes before and washed off immediately after the completion of each of 10 fractions of whole brain radiation. Pharmacokinetic studies to evaluate the systemic absorption of Tempol were performed. Patients were assessed for toxicity before, during, and after Tempol administration. A secondary end point of the study, hair retention, was also scored.

RESULTS:

Eleven patients were treated with topical Tempol. Adverse events that were considered possibly, probably, or definitely related to Tempol, included asymptomatic grade 2 (two patients) and grade 1 (one patient) hypoglycemia, grade 1 forehead skin redness (one patient), grade 1 dry scalp (one patient), and grade 1 tingling sensation on the scalp (one patient). Tempol was not detected in blood samples from more than 50% of the patients. Mean maximum Tempol levels for individual patients at any time point varied from 0.4 to 3.1 micromol/L. Hair retention was localized to the base of the scalp where the Tempol solution pooled after application in the first four patients on the study. Subsequently, full scalp hair retention was seen in three of final five evaluable patients after gauze had been wrapped around the head to hold the solution against the scalp.

CONCLUSION

This study demonstrates that topical application of Tempol to the scalp before whole brain radiation is safe and well tolerated. Evidence of protection against radiation-induced alopecia was observed. A phase II study that uses a gel formulation to increase the exposure of scalp to Tempol has been initiated.