



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

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Project Title The Effect of Curcumin on Normal Human Fibroblasts and Human Microvascular Endothelial Cells

<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The project analyzes the effect of antioxidant curcumin on the proliferation and migration of normal human fibroblasts and microvascular endothelial cells, which are vital in wound healing.</p> <p>Methods/Materials Methods: The stock solution was created and was diluted into desired concentrations. Proliferation: Cells were divided into control and treatment groups and plated accordingly for cell counting. Curcumin was applied every other day for seven days. For MTT assay, cells were divided and plated for three days, whereupon MTT assay was performed. Migration: Cells were plated inside the cloning rings. After the cells attached, the cloning rings were removed. Indentures were made along the outer edge of where the cells were confined by the ring. The distances that the cells migrated outside these limits were measured at different points at different times.</p> <p>Results Low doses of curcumin stimulated the proliferation of normal human fibroblasts and hMVEC, whereas high doses inhibited it. There was not enough evidence to conclude that curcumin had a significant effect on the migration of either fibroblasts or hMVEC.</p> <p>Conclusions/Discussion Proliferation: Low doses of curcumin stimulated proliferation, possibly because of curcumin's effect on the cell signaling pathways. This could occur if curcumin stimulated the induction of Phase II (proliferation phase) defense genes, which would enhance cell survival and have a beneficial effect on homeostatic responses. This, in turn, would stimulate cell proliferation. Also, it is possible that low doses of curcumin may reduce the production of Interleukin-8 (IL-8), thus reducing inflammation. High doses of curcumin, however, may potentially stimulate apoptosis, or cell death, due to the activation of caspase pathways. As a result, it would inhibit cell proliferation. Migration: Curcumin did not significantly affect cell migration because normal cells are not able to migrate during proliferation; thus, by stimulating proliferation, curcumin did not change the patterns of cell migration. In addition, migration partially depends on additional external factors, such as fibronectin and tissue inhibitors of metalloproteinases. The migration of both fibroblasts and hMVEC in skin tissue depends on their interaction with the extracellular matrix (ECM). Curcumin's antioxidant properties may reduce inflammation, thus speeding up the wound healing process.</p>

Summary Statement The project tests the effect of an antioxidant on two aspects of wound healing.

Help Received Used lab equipment at University of California, Riverside under the supervision of Dr. Min Yao and direction of Dr. Manuela Martins-Green.
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