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# Increase in Collagen Turnover Induced by Intradermal Injection of Carbon Dioxide in Rats

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## Abstract

**Introduction:** Results from clinical observations have demonstrated that percutaneous infiltration of carbon dioxide improves the appearance of the skin in adjacent areas. No studies have been found in the literature that showed evidence of histological changes caused by carbon dioxide injections.

**Objectives and Methods:** A blind cross-sectional pilot study was performed in the Departments of Pharmacology and Morphology of the Federal University of Ceará, with the aim of histologically investigating whether intradermal and/or subcutaneous injection of medicinal carbon dioxide would increase collagen turnover in rats. Ten male Wistar rats were used, aged 3 months (2 animals) and 14 months (8 animals). The 2 younger rats were used as controls. Four of the older rats received injections of saline solution (0.9%), and were also considered to be controls. In the remaining 4, carbon dioxide was injected into the subcutaneous cellular tissue and intradermally. Biopsy samples were collected before and after treatment with carbon dioxide.

**Results:** Collagen turnover increased in the treated animals in comparison with the controls. Compression of collagen bundles in the tissue samples where intradermal injection was used was more intense than in the subcutaneous treatment. The histological characteristics of the samples with carbon dioxide injected

intradermally were similar to the characteristics of the younger rats (controls).

**Conclusions:** The results obtained corroborate clinical observations of aesthetic improvements in the facial skin with carbon dioxide injections. Future research should address the comparison between intradermal and subcutaneous injections, the volume of gas used, and the frequency of treatment sessions.

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