

UNIVERSITA' DEGLI STUDI DI PISA

FACOLTA DI SCIENZE MATEMATICHE, FISICHE E NATURALI

Corso di Laurea in Scienze Biologiche

Testi di Laurea

USO DI UNA SOSPENSIONE OLEOSA DI IDROSSIDO

DI CALCIO NELLA RIGENERAZIONE OSSEA

Relatore

Candidato

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Discussion

Histological research shows that there is predominantly minimal or even no foreign body reaction, thereby demonstrating the high degree of biocompatibility of Osteoinductal®. As was to be expected, the longer the product stays within the operating field, the more significant a maturation of the regenerated bone material can be detected. The osteoclasts detected in low numbers are not detrimental to the process. On the contrary, apart from their formation being an aspect of the natural healing process of the bone, they also serve to keep possible necrotic foci under control. These can form in the aftermath of traumatic surgical interventions, as emerges from the work of Veronelli and Rimondini on the “effect of heat on bone during preparation of the area of implantation” [*Effetti del calore sull'osso durante la preparazione del sito impiantare*]. In their work it is shown how the heat generated by a dental drill can cause extensive bone necrosis. From a histological point of view, it is not possible to determine the nature of the necrotic foci, which moreover were not once discovered in any of the analyzed samples, and which, irrespective of the method of drilling or burring, could in fact be put down to a reaction with the oleaginous calcium hydroxide suspension. Whatever the case, the scale of necrotic changes found within the present study is such that they cause minimum damage to the vitality of the analyzed tissue. Also, resorption of the necrotic elements could be detected. The released calcium appears even to be able to serve as a substrate for the regeneration of the bone tissue.

The data collected within the context of the studies by Dietz and Bartholmes, an account of which is given in the publication “Calcium Hydroxide and Bone Regeneration” [*Kalziumhydroxid und Knochenregeneration*] and which have never been confirmed on the basis of histological analysis on human tissue, have now been indubitably demonstrated in the control studies conducted within the framework of the present work. The low number of patients included in the present study (8 persons) unfortunately does not allow for statistical analysis. If one connects the data collected through *in vitro* analysis as well as that collected through animal experimentation with the data of the present study (clinical, radiological, and

histological), then one can hypothesize that Osteoinductal® stimulates bone regeneration to an above-normal degree. Although attempts to demonstrate its osteoinductive capacity were unsuccessful, the results are, from a clinical and physiological point of view, encouraging in terms of the use of the product in post-extractive situations.

The data of this study require retesting within the context of a study with larger scope. Yet, in view of the regeneration, they already suggest likely results.

Conclusion

Dietz developed a new product on the basis of his insights into the physiology of bone regeneration. Using a simple formula he was able to generate the initial conditions necessary for the regeneration of bone tissue immediately following a traumatic surgical intervention, whereby the risk of infection caused by the activation of osteoclasts and the onset of pain are at the same time significantly reduced.

The present study confirms the data published by Dietz and Bartholmes, which itself has however never been verified based on human histological preparations.

Accordingly, the particular value of the present work is that it constitutes the first study of human histological preparations whereby sufficient consideration has been given of its ethical aspects, with the histological tests on the regenerated material having been conducted on bone material that was removed as part of the preparation of the implantation area. The number of treated patients does not permit the generation of reliable statistics, but still the record it contains can serve as an aid for those advancing the analysis begun here.

The regeneration periods were not compared with those cases in which no regenerative technologies were utilized. Still, clinical practice indicates that, after a tooth extraction, a period of between six and twelve months normally needs to elapse before the mature bone necessary for an implantation exists. Additionally, in such cases a considerable loss of bone material in both a vertical and a horizontal direction can be assumed.

The submitted results are to be looked upon very favorably, both in terms of time (8 weeks) and also with respect to the scale of the regeneration. It appears that the healing process was considerably improved and accelerated.