

Polychrome tetracycline bone labelling – new possibilities using spectral image analysis [Abstract]

Thomas Tischer, Stephan Vogt, Cornelia Haczek, Horst Zitzelsberger, Stefan Milz, Christoph Pautke

Angaben zur Veröffentlichung / Publication details:

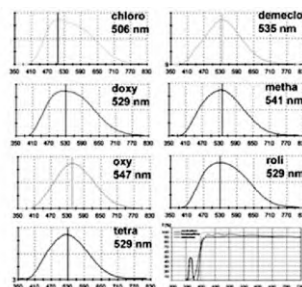
Tischer, Thomas, Stephan Vogt, Cornelia Haczek, Horst Zitzelsberger, Stefan Milz, and Christoph Pautke. 2008. "Polychrome tetracycline bone labelling – new possibilities using spectral image analysis [Abstract]." Bone 42 (Supplement 1): S32. <https://doi.org/10.1016/j.bone.2007.12.046>.

nique is mostly used in animal models. For human application, only the group of tetracycline derivatives are approved. Because the wavelength is very similar between the single tetracycline derivatives, the human eye can not discriminate between the different tetracyclines. To enable real polychrome fluorescent staining in humans, the aim of this study was to use differentiate tetracycline derivatives by spectral image analysis and thereby allow real polychrome staining in humans.

Material and methods: For this purpose 24 five-week-old male Wistar rats (weight about 200 g) received 8 different tetracyclines (chlortetracycline, demeclocycline, doxycycline, methacycline, minocycline, oxycycline, rolitetracycline, and tetracycline) subcutaneously in a three day interval sequentially in different combinations. Bone specimen were embedded in methylmetacrylate, cut and investigated by a spectral camera (SpectralCube SD-300, ASI, Israel).

Results: Each tetracycline derivate revealed a characteristic fluorescence spectrum (Fig. 1). Three different groups out of the eight tetracyclines could be distinguished using spectral image analysis: Group 1 (506 nm): chlorotetracycline. Group 2 (529–535 nm): demeclocycline, doxycycline, rolitetracycline, tetracycline. Group 3 (541–547 nm): oxytetracycline, methacycline. Linear unmixing and subsequent single depiction, however, was only possible with two different tetracyclines derivatives in vivo.

Discussion: The technique of polychrome sequential labelling is feasible using two different tetracycline derivatives and spectral image analysis. Having established this technique, the transfer of the dual labelling of bone for a human application is now possible for the first time.



doi:10.1016/j.bone.2007.12.046

36

Polychrome tetracycline bone labelling—New possibilities using spectral image analysis

Thomas Tischer^a, Stephan Vogt^a, Cornelia Haczek^b, Horst Zitzelsberger^c, Stefan Milz^d, Christoph Pautke^b

^a Department of Orthopaedic Surgery, Technical University of Munich, Munich, Germany

^b Department of Oral and Maxillofacial Surgery, Technical University of Munich, Munich, Germany

^c Institute of Molecular Radiobiology, GSF-National Research Center for Environment and Health, Neuherberg, Germany

^d AO Research Institute, AO Institute, Davos, Switzerland

Introduction: Polychrome sequential labelling of bone is a standard technique to analyse bone growth or regeneration processes in vivo. Due to the fact, however, that most fluorochromes are not approved for a human application, this tech-