

Cell biological studies of the combined use of time-varying light radiation (near-infrared and red) and electromagnetic fields with the same stimulation frequencies

Stutz R. ¹, Krauß M. ¹, Uhlig M. ¹, Kenner J. ², Schönfelder J. ², Wetzel Chr. ²

¹ EAAT – European Association of Andullation Therapy, Brussels, Belgium ; ² FEP Fraunhofer-Institut für Elektronenstrahl- und Plasmatechnik, Dresden, Germany

Introduction

Basically respond individual cells or cells of a tissue on the information obtained with a cell physiological response that often exist in the release of neurotransmitters or a metabolic reaction. This information can be of chemical or physical nature. In the latter pulses of light and electromagnetic information sources play a central role.

From previous studies basic essential knowledge for the nonlinearity of dynamical systems and stochastic resonance phenomena are known which can be used as prerequisites for the application of certain frequencies to cellular material.

Objective

The cell- biological studies of the present study were performed on in vitro model systems. This human cell cultures (monocytes, fibroblasts) were in focus. Object of the study was to investigate the therapeutic influence of in vitro cell cultures in the area of the primary action site of pulsed electromagnetic fields and pulsed light.

Materials and Methods

All studies were performed on in vitro cultures of specifically selected human cells performed (fibroblast cells and primary monocyte cell line). Normal and predamaged cell cultures were used to investigate the influence of the treatment on inflammation & healing processes.

The tests were performed according to the scheme in Figure 1

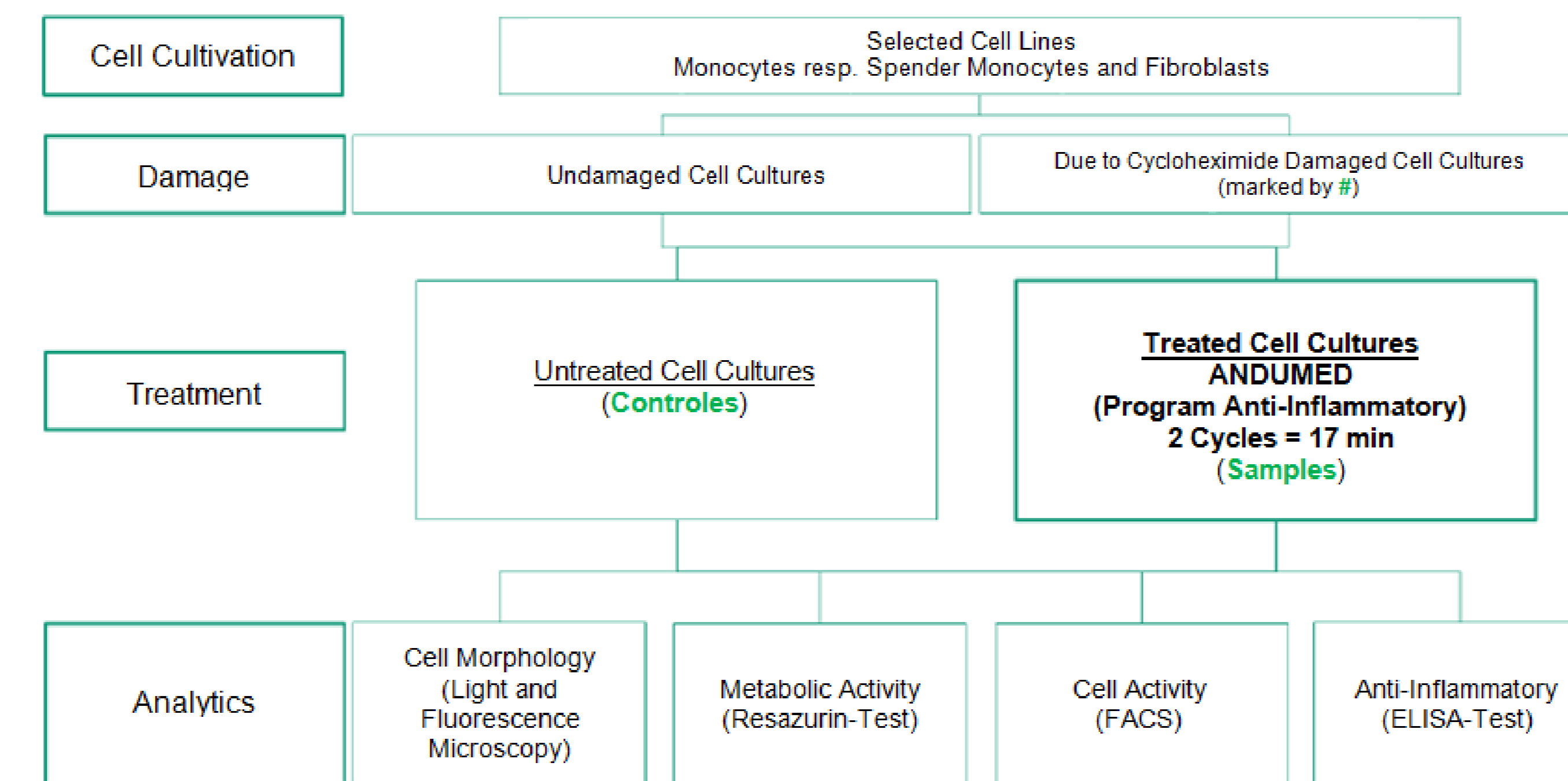


Fig. 1: Scheme for the Method and Definition for the Experimental Groups

Results and Discussion

In the studies with the undamaged fibroblasts was demonstrated by the treatment a significant increase in metabolic activity by 7.5%. In monocytes, a significant increase in metabolic activity in the undamaged (+ 5.4%) and especially in the damaged (+ 9.4%) was observed after the cells treatment. Inhibition of inflammation by the application could, based on the proinflammatory cytokines IL-6 and IL-8, which are responsible for the initiation of an inflammatory response, are not detected in the fibroblasts.

Fibroblasts

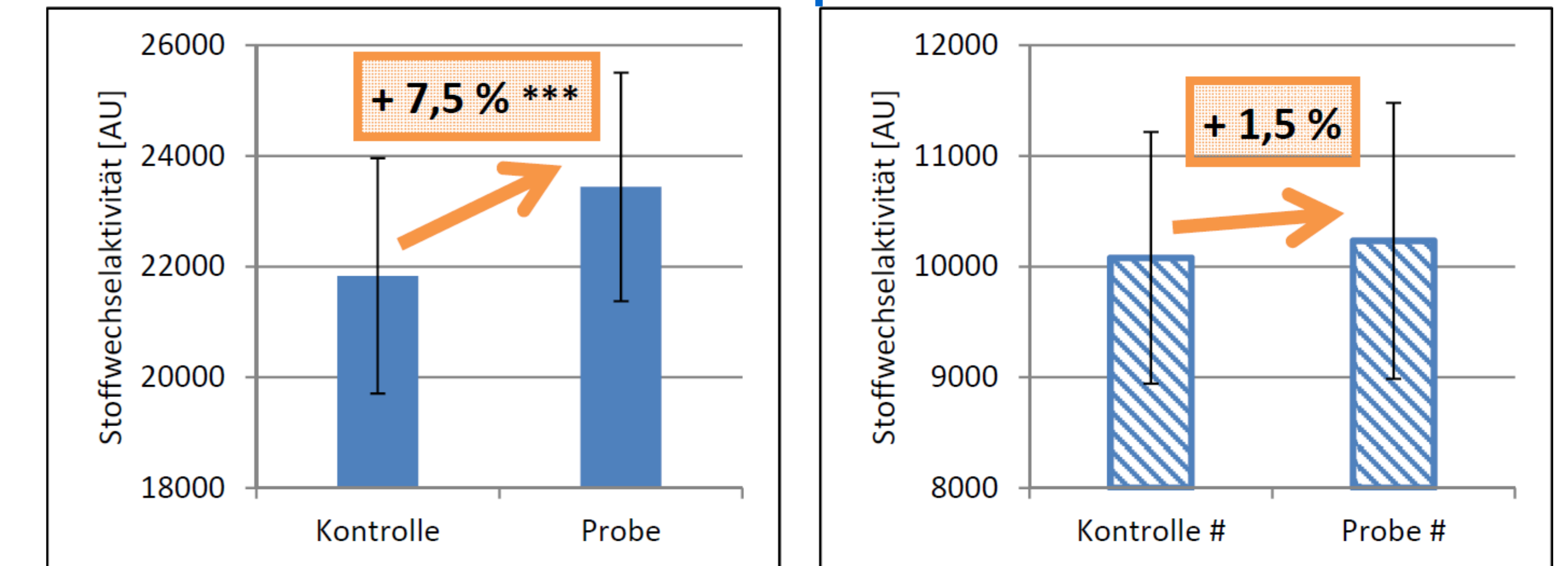


Fig.2 Undamaged and damaged (right side) fibroblasts. Changes in metabolic activity after treatment relative to the control group (Resazurin test), *** p < 0.001 (statistically highly significant) .

Monocytes

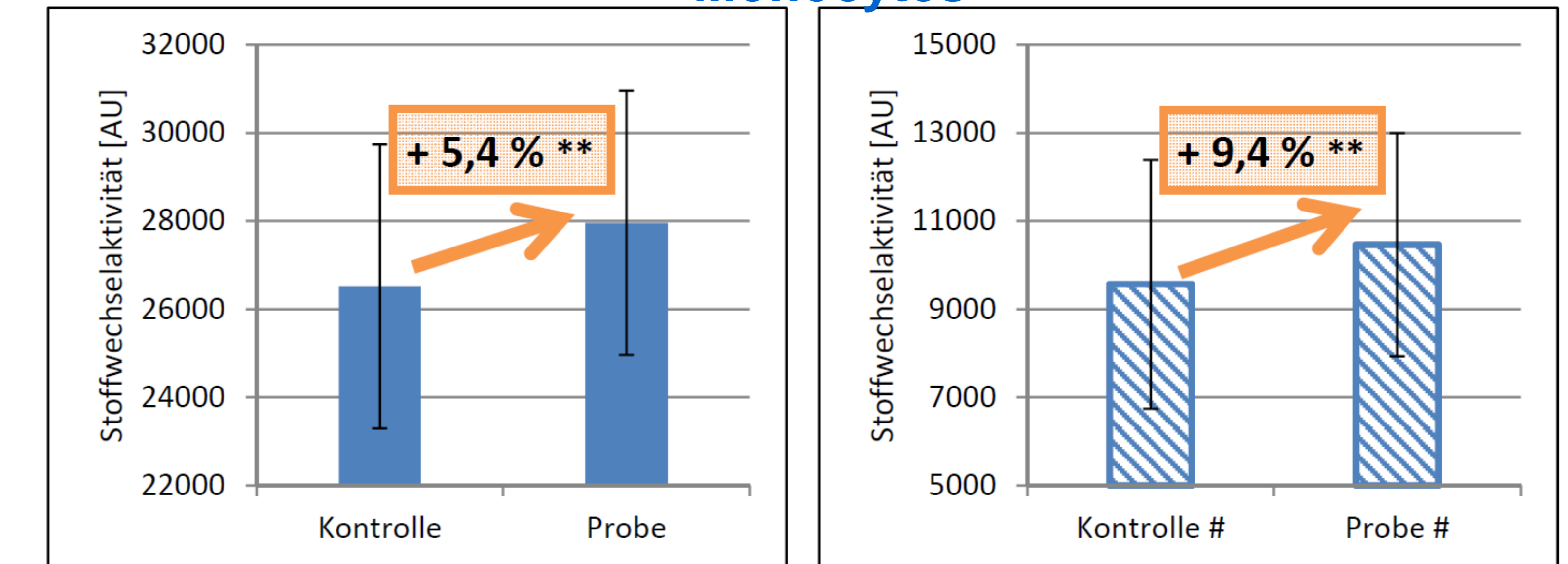


Fig. 3 Undamaged (left) and damaged (right) monocytes. Changes in metabolic activity after treatment relative to the control group (Resazurin test), ** p < 0.01 (statistically significant) .

Conclusions

In addition to the significant metabolism-boosting effects of this combined frequency therapy is necessary, the use of additional, application-specific cell lines. In the area of inflammation to increase the number of tests must be sought in order to demonstrate the tendencies found a possible impact on inflammation. In addition, a variation of the treatment times, treatment intervals and frequencies, and separate recommended investigation of the effect of light radiation and electric fields.