The influence of hydroplasma on the proliferative and secretory activity of human mesenchymal stromal cells

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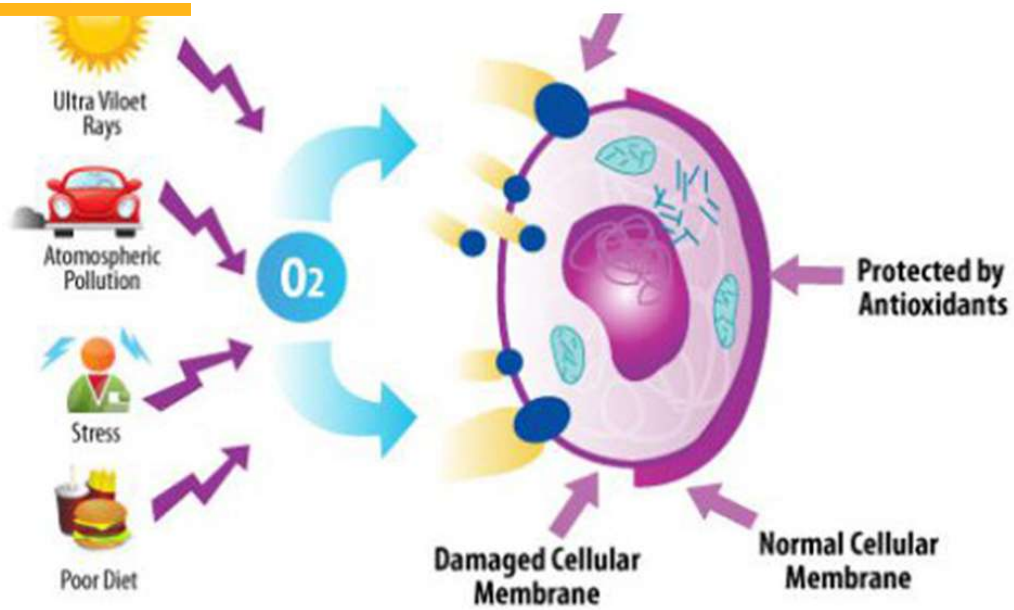
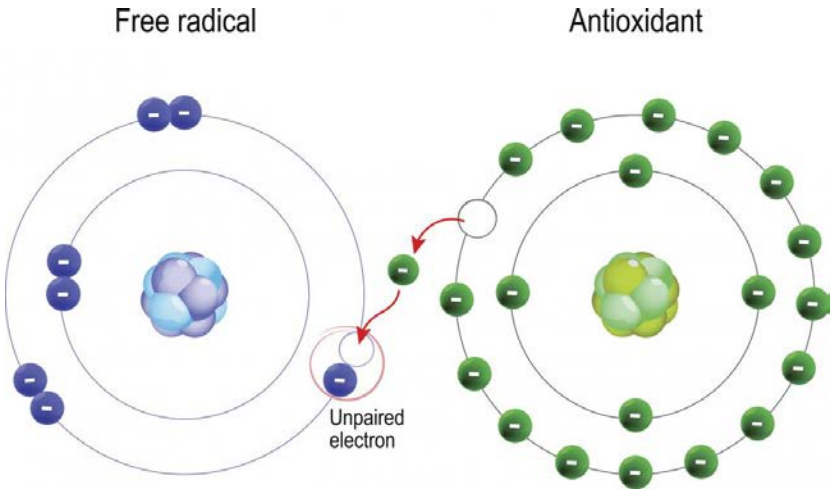
Background

Damage to the cell membranes and other cell structures by free oxygen radicals is one of the principal reasons for pathological processes that lead to various somatic diseases. The most common risk factors for oxidative stress are chronic stress and fatigue, alcohol and tobacco use and exposure to UV radiation and environmental air pollutants.





Lately, there has been a significant increase in interest in herbal, natural drugs (nutraceuticals, parapharmaceuticals) as they are safer and more adjusted to human physiology. One of the most common natural compounds is bioflavonoids, the largest class of plant polyphenols.

Materials and methods

Cell culture

Commercial hMSC cell line (Sigma-Aldrich, Lot.: 492-05A, 2nd passage)

Object of research

Absolute Energy (AE) Hydroplasma and Water for Life (WoL) Hydroplasma, were diluted in a growth medium according to the instructions to the concentration of ×1, ×0.5 and ×2. For AE Hydroplasma, a maximum dilution of ×10-5 was included in the study.

Assessment of proliferative activity of hMSCs

The time of cell population doubling (DT)

The wound healing assay

Evaluation of secretory activity of hMSCs

Results and discussion. Proliferative activity of hMSCs

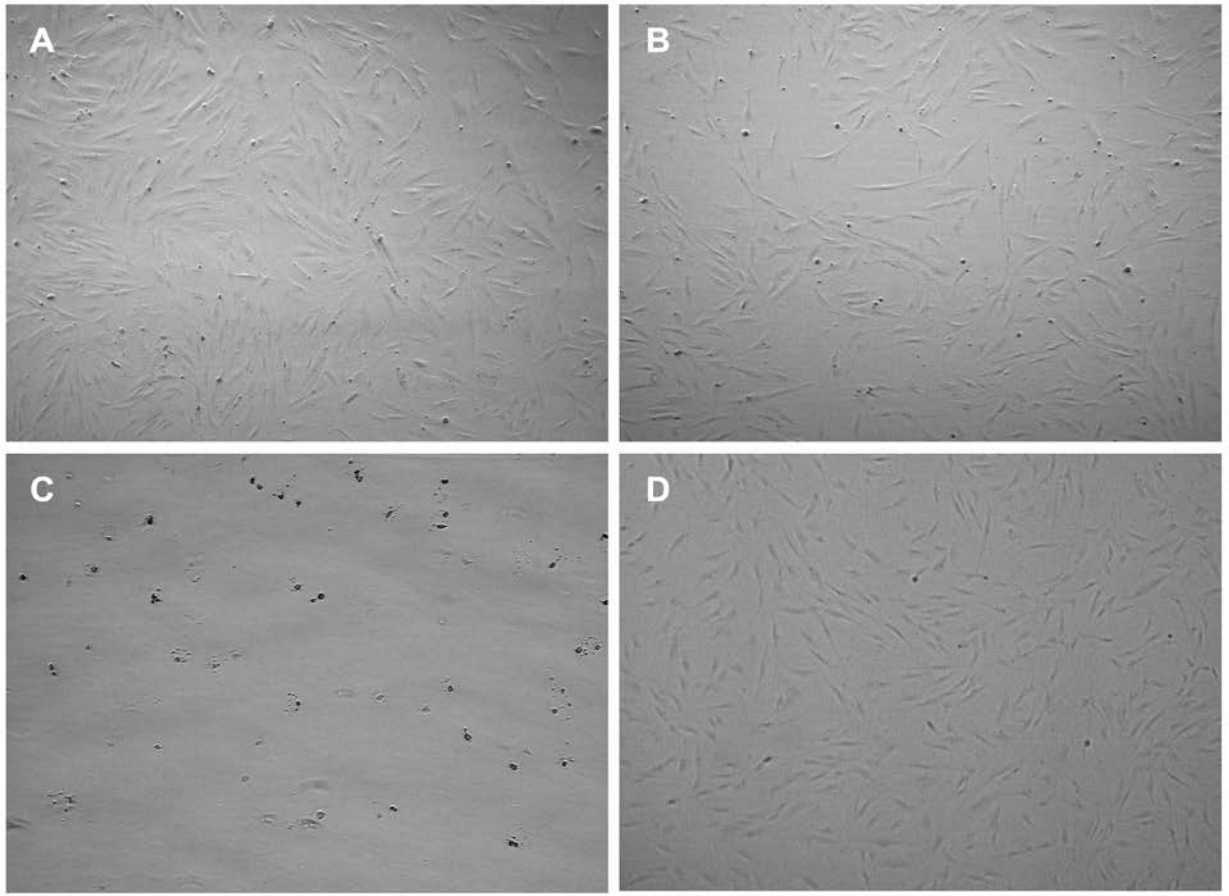


Figure 1. hMSC cells cultured in the medium (5th day of cultivation). A) Native culture of hMSCs cells. B) hMSCs cell culture in a medium containing the studied WoL drug at a concentration of ×1. C) hMSCs cell culture in a medium containing the studied drug AE at a concentration of ×1. D) hMSCs cell culture in a medium containing the studied AE drug at a concentration of $\times 10^{-5}$. Magnification: ×50.

Results and discussion. The Wound healing assay

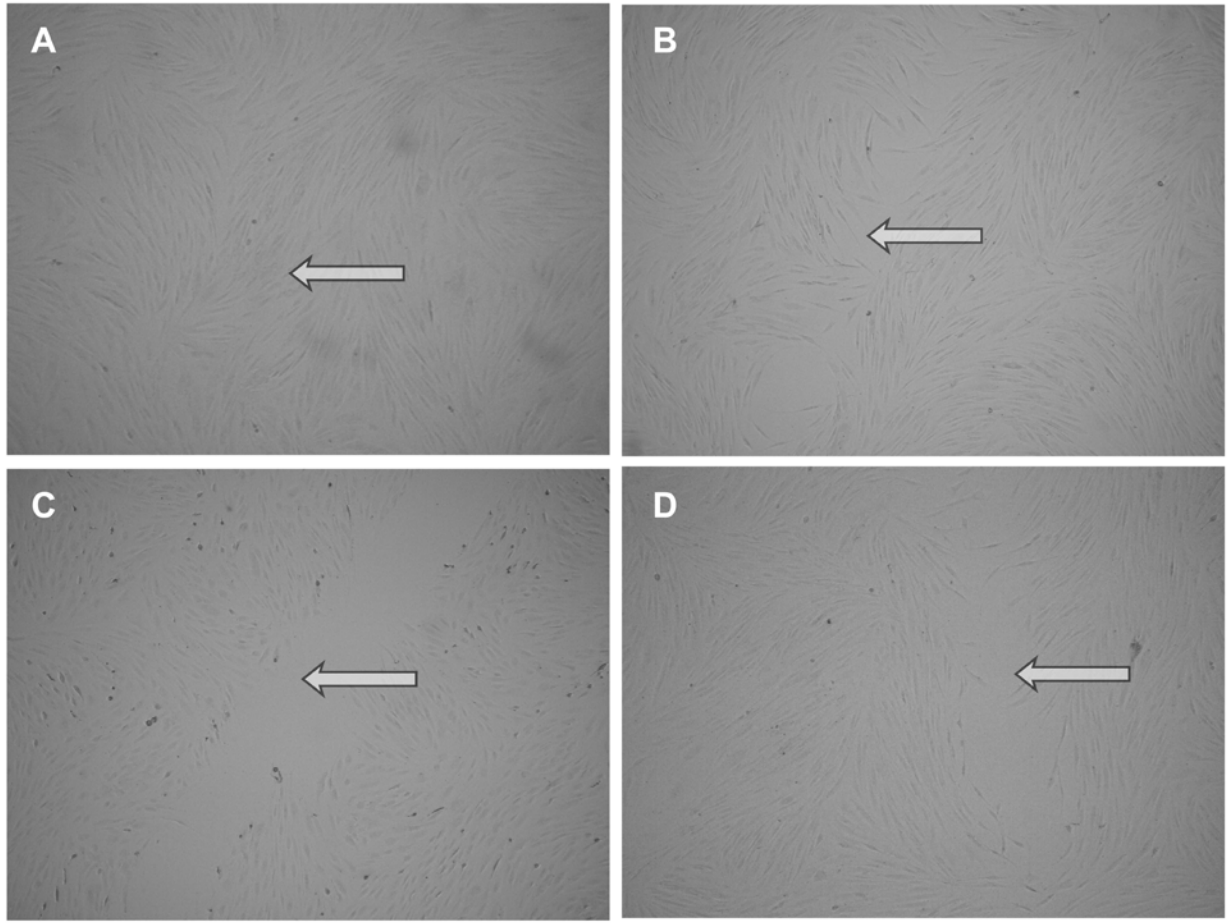
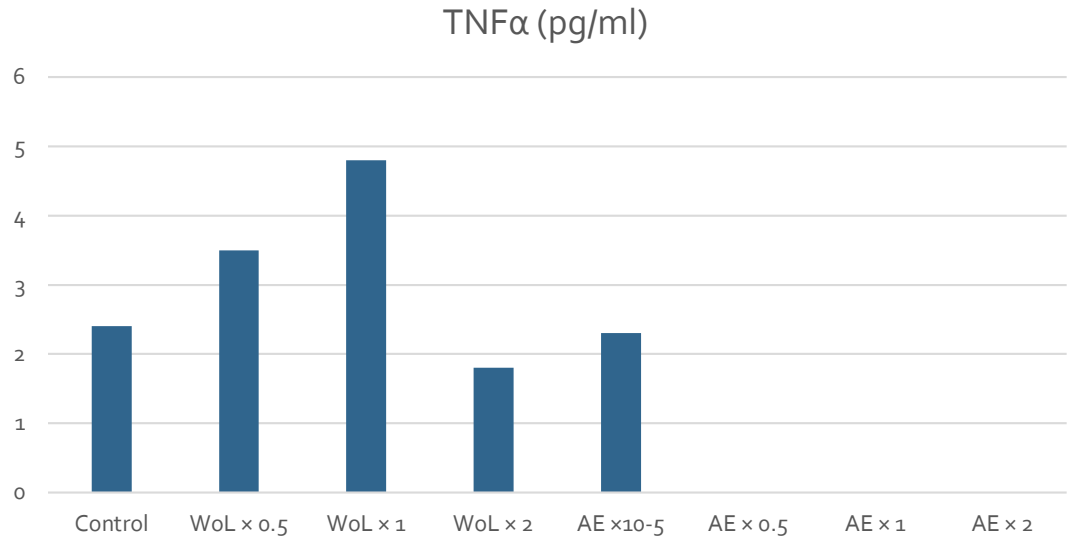
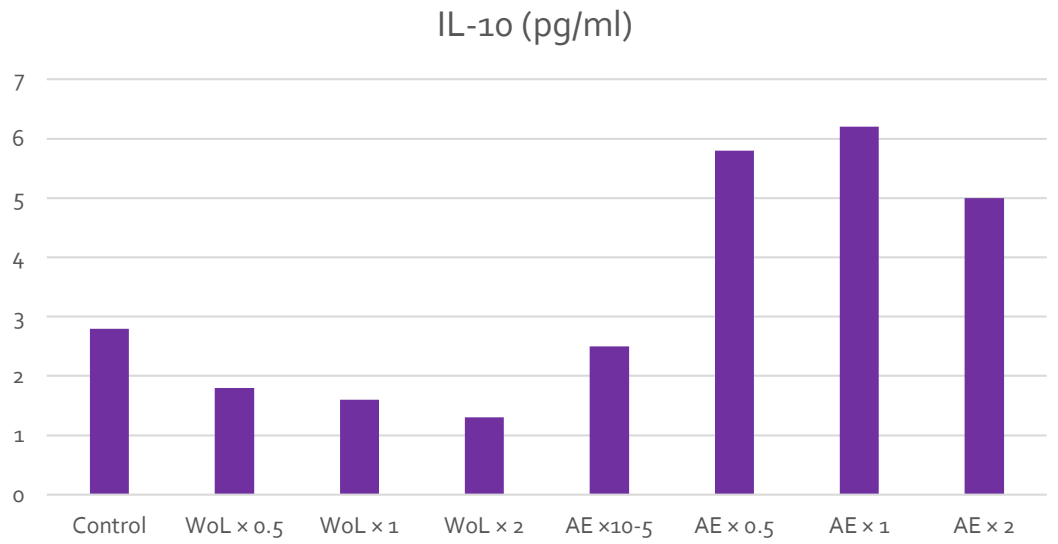
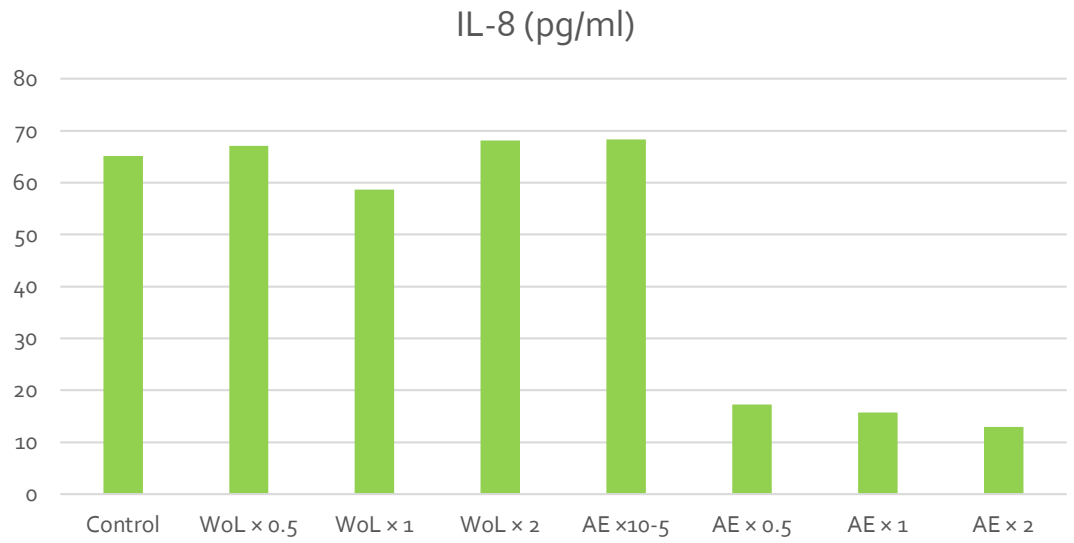


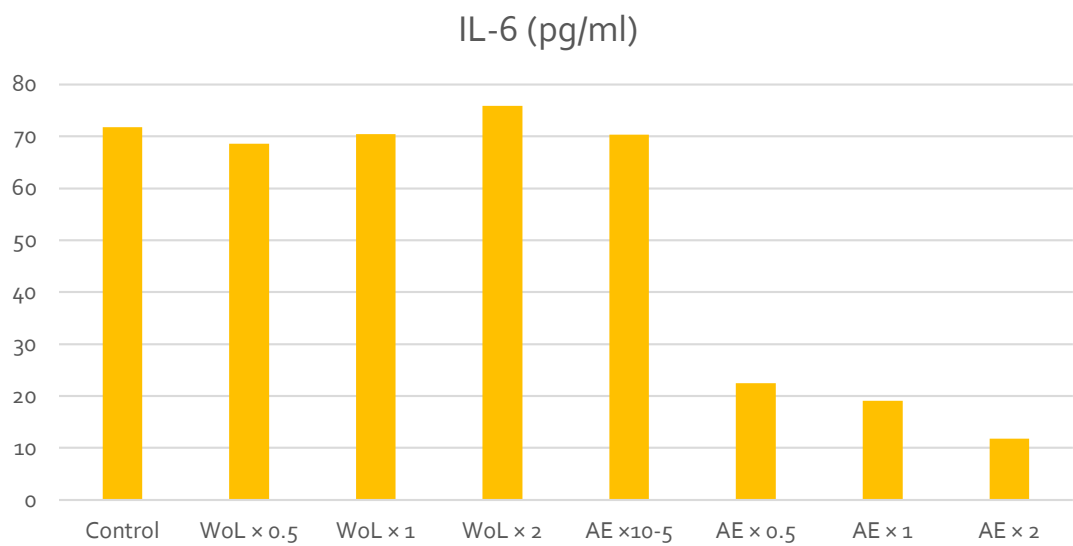
Figure 2. Wound healing assay. Cultivation (18 h) after forming a mark on the single-layer formation. A) hMSCs cultivated in the standard growth medium, B) hMSCs cultivated in medium containing WoL diluted at a concentration of ×1. C) hMSCs cultivated in a medium containing AE drug at a concentration of ×1. D) hMSCs cultivated in a medium containing AE drug at a concentration of $\times 10^{-5}$. Magnification: ×50. The grey arrows indicates the scratch location.

Results and discussion. Secretory activity of hMSCs









Conclusions

In this study, two samples of hydroplasma were analysed, WoL and AE. Each sample was analysed under three different concentrations, and each analysis was repeated three times. The average value and standard deviation were calculated from the data obtained.

- When assessing the overall effect of WoL and AE Hydroplasma at extremely low concentrations on the proliferative and secretory activity of hMSCs, no statistically significant differences were found compared to the hMSCs control culture.
- When estimating the total impact of AE Hydroplasma, the death of individual hMSCs was observed from the first day of cultivation. By the fifth day after the beginning of the experiment, all of the cells were dead. It was associated with a low content of TNFα and IL-6/-8 in the conditioned medium, as well as a minor increase in the amount of IL-10.

Thank you!