

# Hormetic intervention of glyoxal-induced premature senescence in human cells

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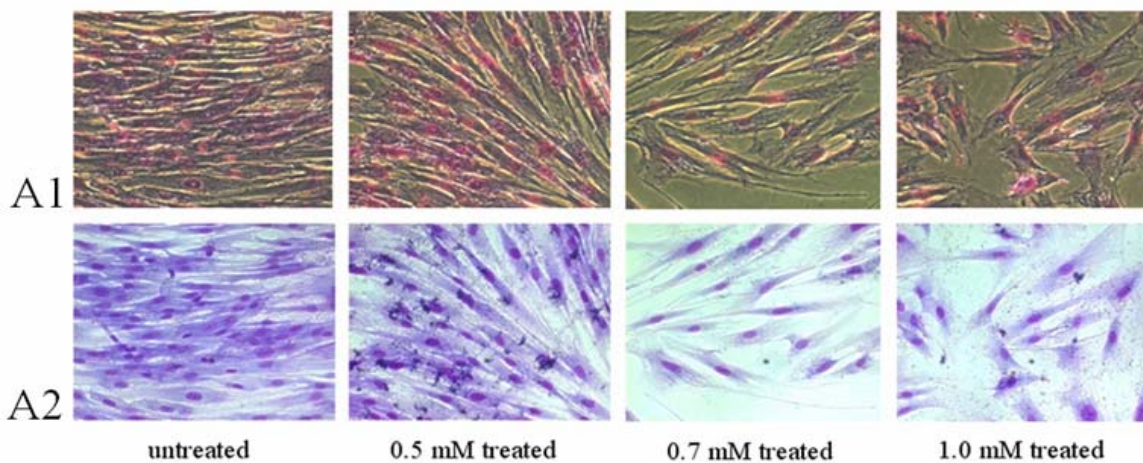
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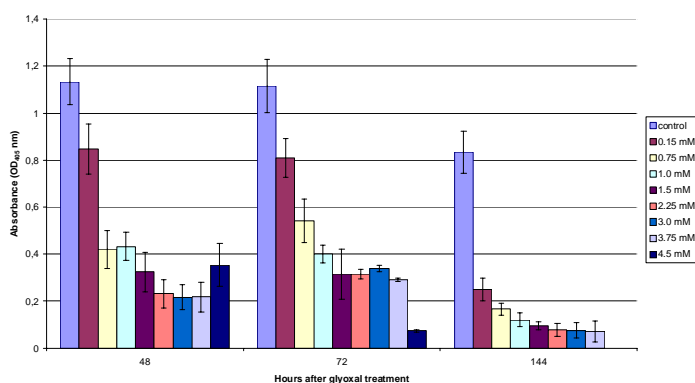
## Introduction and aim

Mild stress-induced hormesis is an approach to intervene in the aging process. Repeated exposure of normal human cells to 41°C heat shock for 1 hour twice a week is an example of a mild stress that has many hormetic effects, including improved resistance to other stressors. We are investigating new applications of heat shock-induced hormesis against sugar-induced premature senescence. Early passage human skin fibroblasts treated with 1 mM glyoxal for 72 hours undergo premature senescence in terms of enlarged cell size, inhibition of cell division and increased levels of oxidatively damaged proteins. The aim is to determine if single or multiple pre-exposures to mild heat stress can prevent or decrease glyoxal-induced premature senescence in human cells, including fibroblasts, keratinocytes, and mesenchymal stem cells.

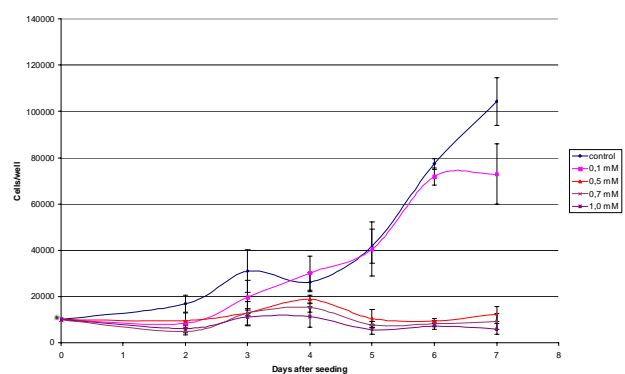
## Setting up the system



**Figure 1.** Glyoxal treatment induces senescent phenotype in early-passage human fibroblasts within 72 hours of treatment (A1 and A2 - phase contrast, plain light; microscopic magn. X20)



**Figure 2.** Glyoxal inhibits cell cycle progression, as measured by BrdU-incorporation.



**Figure 3.** Effect of glyoxal on one-step growth curve of human fibroblasts (The \* on the y-axis indicates the starting cell input number).

## Investigations in progress

- Identification and quantification of specific advanced glycation end-products (AGEs) in glyoxal-treated fibroblasts.
- Determination of ATP/ADP levels and other stress markers.
- Testing the preventive effects of repeated mild heat shock (RMHS) on glyoxal-induced premature senescence.