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## Abstract

# Changes in the kinase expression panel of K562 human leukemia after Avemar treatment

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**Background:** The positive effect of the wheat germ extract Avemar has already been proved in cancer. Compared to the control group significantly longer survival times were achieved in both *in vivo* experiments and clinical studies. Inhibition of cell growth was also detected in K562 human leukaemia cell line *in vitro*. Avemar given p.o. (3 g/kg) resulted in significant increase of the survival time compared to the control group ( $p < 0.005$  Mann-Whitney) in i.v. implanted K562 xenograft model, which was practically the same as the effect of Gleevec treatment. Since, the mechanism(s) of action of Avemar is still not properly characterized a kinase expression panel in K562 *in vitro* model was examined. **Methods:** K562 cells ( $8 \times 10^5$  cell/ml), were treated with Avemar (500 µg/ml) and mRNS from 3–3 parallel samples and their appropriate controls were isolated 24, 48 hours after the treatment and 24 hours after washing the cells previously treated with Avemar for 48 hours. To determine the kinase expression pattern Kinase OpenArray™ plates were used, having over 500 kinase genes with controls in quadruplicates in each plate. Changes in expression was declared if the average value was over 1 (2-fold change in mRNA copy number) and the standard deviation was relatively small ( $2 \times \text{STDEV} = \text{AVERAGE}$ ). **Results:** We have found 16 kinases which expression has temporary or durative (maintained for 24 hour after washing) decreased (e.g.: CCL2, ABR, FLT1, EphB6, TGF $\alpha$ ) and 30 which expression has increased (e.g.: CPT1B, IRE1, ITK, RON, LTK, EphB2, FASTK). **Conclusions:** Our result demonstrated that many of the kinases which expression was altered by Avemar treatment is known to participate in cell cycle, cell migration, apoptosis and signal transduction. Thus, our results might shed light on the main mechanism(s) of action of Avemar and raise the possibility to identify the active substance(es) of this natural extract.

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