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Plant biochemistry and molecular biology

P-02.08.5-001 Whirly1 is involved in establishing an euchromatic status at HvS40 locus during drough stress induced leaf senescence in barley (*Hordeum vulgare* L.)

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The plastid-nucleus located protein Whiry1 acts as an upstream regulator of leaf senescence binding to the promoter of senescence associated genes (SAGs) like senescence marker gene *HvS40*.

In order to investigate the impact of Whirly1 on drought stress-induced senescence, transgenic barley plants with a knockdown of Whirly1 (*Hvwhy1kd*) were grown under untreated and drought stress conditions. The leaf senescence evolution was monitored by physiological parameters and gene expression studies of senescence and drought stress related genes. To reveal the epigenetic indexing at *HvS40* at onset of drought-induced senescence in wild type (WT) and *Hvwhy1kd* lines, stress-responsive loading with histone modifications at 6 gene regions of *HvS40* (2 regions in the promoter, one region around translation start site and 3 regions located in the gene body) was analysed by ChIP and quantified by RTq-PCR.

In barley, drought treatment caused acceleration of leaf senescence in wildtype (WT) plants, whereas *why1kd* lines showed a staygreen phenotype. Expression of senescence-associated and drought stress responsive genes expression was delayed in *Hvwhy1kd* indicating that Whirly1 protein acts as an upstream regulator of drought stress-induced senescence. The ChIP results showed that drought treatment is causing in WT a significant increase in the levels of H3K9ac all over the analyzed gene regions, correlating with a massive induction of *HvS40* expression, while drought stress caused no substantial increase of H3K9ac in *why1*kd plants.

The results suggest that drought induced expression of *HvS40* is under epigenetic control, and furthermore that WHY1 is involved in this epigenetic control level.

P-02.08.5-002 Anticancer activity of buckwheat burn virus

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Oncolytic viral therapy is based on the capabilities of selective lysis of tumor cells and is a prospective trend in cancer disease treatment. In vitro experiments showed that plant Rhabdoviruses does not have any direct cytotoxic effect upon Sarcoma 37 cells, causes induction of apoptosis in these cells and does not pose any threat to somatic cells of warm-blooded animals, which makes it possible to use this virus for therapy of malignant neoplasms. Buckwheat burn virus (BBV), the prototypic member of the family Rhabdoviridae, contains surface glycoprotein and which is lectin-active. Its carbohydrate branch can aid adhesion of lymphocytes to tumor cells. The present study has addressed the effect of BBV on cancer cell viability. All studies were carried out after 1 week of inoculated with Erlich Cancernome (2×10^6 cells/animal, i. p.) in 2 months male Balb/C mice treated at once with or without plant extract with BBV (15 mg/kg, i. p.). By fluorescent microscopy and using two due staining by acredine orange and propidium iodide it was found that in the 3rd day of administration of BBV lead to increasing of necrotic and apoptotic cells on 45% and 4% respectively versus to untreated group. At the same time the viability of investigated cells was impaired too and according to flow cytometry analysis using propidium iodide the amount of dead cells was elevated by fivefold (17.7% versus 3.5% in untreated group). Also as was shown in previously reports BBV decreased activity of macrophages in the early stages after injection and it may have a positive effect when using this drug in tumor therapy. When using this drug appears to slow down the possibility of a sharp activation of macrophages, and as a consequence of the development of cytotoxic effect will be prolonged.

Key words: Rhabdoviruses, buckwheat burn virus, cancer, cell viability.

P-02.08.5-003 Antimicrobial activity of some plant materials used in Armenian folk medicine

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Plants are considered as one of most promising sources for new antimicrobials, based on the evidence of their use in folk medicine to treat various infectious diseases since ancient times. Despite relatively small area size, Armenia has large diversity of flora with many endemic species. The main goal of this study was the screening of various parts of 28 herbs (widely being used in Armenian folk medicine) for their antimicrobial activities in order to select most prospective plants for further comprehensive studies.

Plant crude extracts were obtained with maceration technique using five solvents: water, methanol, chloroform, acetone and hexane. Agar well diffusion assay was used to evaluate antimicrobial properties of plant crude extracts at 500 μg/ml concentration against *Escherichia coli* VKPM-M17, *Pseudomonas aeruginosa* GRP3, *Bacillus subtilis* WT-A1, *Salmonella typhimurium* MDC 1754 and *Staphylococcus aureus* MDC 5233, *Candida albicans* WT-174 and *Candida guilliermondii* HP-17. Statistical analysis was done using GraphPad Prism 5.03.

Crude extracts of all tested plant materials expressed antimicrobial activity against at least one test strain. Most of the tested extracts inhibited growth of both Gram-negative and Gram-positive bacteria. In contrast, only some plant materials exhibited inhibitory activity against yeast strains. According to obtained data *Sanguisorba officinalis*, *Rumex confertus*, *Hypericum alpestre*, *Lilium armenum* and *Agrimonia eupatoria* possessed the highest and broadest antimicrobial activity. Moreover, the results showed that acetone was the most effective solvent for solubilizing antimicrobial compounds from plant materials followed by methanol, chloroform, hexane and water.

The results demonstrated high antimicrobial activity of medicinal plants used in Armenian traditional medicine. Five plant species were selected for further comprehensive studies. Besides, acetone was proposed as efficient solvent in antimicrobial screening protocols.

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