
Abstract

Metabolomic analysis of *Viscum album* L homeopathic tinctures and antitumor studies in 3D spheroid models

Michelle Nonato de Oliveira Melo¹, Adriana Passos Oliveira¹, Marcia Alves Marques Capella¹, Rafael Garrett², Mirio Grazi³, Hartmut Ramm³, Tim Jaeger⁴, Stephan Baumgartner^{3,4}, Carla Holandino^{1*}

1 - Multidisciplinary Laboratory of Pharmaceutical Sciences, Pharmacy College, Federal University of Rio de Janeiro, Rio de Janeiro - RJ, Brazil.

2- Metabolomic Laboratory (LabMeta/LADETEC), Chemistry College, Federal University of Rio de Janeiro, Rio de Janeiro - RJ, Brazil.

3 - Society for Cancer Research, Hiscia Institute, Arlesheim, Switzerland.

4 - Institute of Integrative Medicine, University of Witten/Herdecke, Herdecke, Germany.

Correspondence author: cholandino@gmail.com

Background The antitumoral efficacy of aqueous *Viscum album* extracts is attributed to the presence of lectins and viscotoxins. However, previous studies demonstrated an antitumoral activity of European *V. album* ethanolic homeopathic tinctures (VAHT) prepared according to homeopathic methodology. **Aims** To investigate the seasonal influences (summer and winter) in the metabolomic profile of *V. album* ssp. homeopathic mother tinctures (VAHT) and to evaluate the antitumoral activity of some VAHT in 3D tumor spheroid models. **Methodology** The following VAHT were prepared by ethanolic maceration: *V. album* ssp. *album* growing on *Malus domestica*, *Quercus* sp. and *Ulmus* sp.; *V. album* ssp. *austriacum* from *Pinus sylvestris*; *V. album* ssp. *abietis* from *Abies alba*. Chemical analyses were performed using liquid chromatography coupled to high-resolution mass spectrometry. Data was submitted to multivariate statistical analysis using principal component analysis (PCA) and Partial Least Squares Discriminant Analysis (PLSDA) in Metaboanalyst platform. The antitumor potential of VAHT (0.5% v/v) was conducted in 3D tumor spheroid models (MDA-MB-231 cell line) by MTT for 72 hours. **Results and discussion** The PCA analysis explained 40% of data variation and clustered VAHT samples into 3 groups, emphasizing the chemical similarity between the botanical subspecies of *V. album*. Some key compounds were mainly responsible for this separation: pinobankasin hexose-pentose (*V. album* ssp. *abietis*); citric acid (*V. album* ssp. *austriacum*); malic acid (*V. album* ssp. *album*). The chemical differences among summer and winter samples, detected by PLSDA, were related to the *Viscum album* host trees. A significant reduction of 50% and 41% ($p < 0.05$) was detected in tumor cell viability when VAHT from *Abies alba* and *Quercus* sp. were compared to ethanol control, respectively. **Conclusion** The present study shows, for the first time, an overview of metabolomic profile from different homeopathic mother tinctures of European *Viscum album* and their promising antitumor activity in 3 D spheroid model.

Keywords: *Viscum album*, homeopathic tinctures, antitumoral, metabolomic, spheroid



© International Journal of High Dilution Research.
Not for commercial purposes.

