



## **Arkansas scientists developed a natural source of the anti-aging compound resveratrol and its analogues**

Three years ago a group of scientists led by Dr. David Sinclair at Harvard published a study showing the beneficial effects of resveratrol, a natural compound found in red wine, on expanding the life span of rodents. Soon after this press release, the news traveled around the world hitting all media of communication.

Resveratrol is probably one of the most studied plant-derived compounds over the last years. Its beneficial effects in human health are continuously increasing and include antioxidant and several anticancer properties among others. Indeed, its presence in red wine has been suggested to be the cause of the phenomenon known as the “French Paradox” where a population in France with a high fat diet and moderate consumption of wine shows low incidence of cardiovascular diseases.

Resveratrol is produced by certain plants in response to environmental challenges and pathogen attack. This is the why is predominantly found in the skin of grapes and therefore in red wine because the skins are maintained for a longer period during the manufacturing of red versus white wine. But resveratrol is not unique to grapes. Other important plants such as peanuts and blueberries also contain resveratrol. Because the production of resveratrol cannot be controlled when grapes, peanuts or grapes are grown in the field, the amounts of resveratrol often vary significantly.

Research led by Dr. Fabricio Medina-Bolivar and Dr. Maureen Dolan at Arkansas State University (ASU) has shown that peanut roots (“hairy roots”) grown in the laboratory can be a source for a high quality resveratrol product ([Medina-Bolivar et al., 2007](#)). At his laboratory at the [Arkansas Biosciences Institute](#) (ABI), Dr. Medina-Bolivar applies several years of research experience on how to manipulate the plant roots to produce biologically active compounds. By applying these “tricks”, he was able to induce the peanut roots to produce a defined and controlled amount of resveratrol. Moreover, these roots can be induced to produce other important natural resveratrol analogues, such as the lowering cholesterol compound pterostilbene. Because of the many applications of these compounds on the food and pharmaceutical sectors, a patent was filed by ASU to protect this invention.

Ongoing collaborative projects have emerged based on this discovery. A collaborative project among Drs. Medina-Bolivar and Dolan at ASU and Dr. Carrier (University of Arkansas-Fayetteville, UAF) is studying the regulation of the biosynthesis of resveratrol and its analogues and their purification from the root cultures. Preliminary outcomes from this project funded by the NSF-EPSCoR Plant-Powered Production (P3) center were presented by Dr. Medina-Bolivar at the World Congress on In Vitro Biology (Tucson, AZ) in 2008. Mr. Jose Condori, Ph.D. student of Dr. Medina-Bolivar, is studying the regulation of the biosynthesis of these important phytochemicals. Initial results from this work were published earlier this year ([Condori et al., 2009](#)) and will be presented by Mr. Condori at Gordon Research Conference on Plant Metabolic Engineering this July. Ms. Julie Abbott, student advised by Dr. Carrier, is working on the purification of resveratrol and selected analogues from the root cultures. Part of this research was presented by Ms. Abbott at the International Food Technology meeting earlier this year. In order to scale-up production of resveratrol and its analogues, this research is also studying the application of novel air-lift bioreactors for the growth of the roots and production of these compounds. This work, done in collaboration with Dr. Sivakumar (ASU), was also presented at the Congress on In Vitro Biology (Tucson, AZ) last year.

One of the main advantages of the root cultures is that they provide a reliable and sustainable source of resveratrol and its natural analogues that can be studied to identify novel bioactive compounds. To these end, Dr. Medina-Bolivar and Srivatsan (ASU) are teamed to study the

neuroprotective properties of these phytochemicals produced in the root culture with long term goal to develop drugs for the prevention and treatment of neurodegenerative disorders such as Parkinson's disease. Aspect of this work were presented by Dr. Medina-Bolivar at the International Drug Discovery Science and Technology Conference in Beijing, China late last year and new outcomes from this work will be presented in an invited talk by Dr. Medina-Bolivar at the American Chemical Society meeting in Washington DC on the month of August of this year.

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