

# Behind The Scenes: Student Research Award Winner, Strathmann

by Ms. Amy Keller

At the recent ASP Annual Meeting in Tampa, Florida, Ms. Julia Strathmann gave her Student Research Award presentation, entitled "Xanthohumol-induced transient superoxide anion radical formation triggers cancer cells into apoptosis via a mitochondria-mediated mechanism." The Newsletter interviewed Ms. Strathmann and her advisor, ASP member Dr. Clarissa Gerhäuser, who both told us more about this exciting research. The Newsletter wishes to congratulate Ms. Strathmann on her award, and on the accompanying publication, published this March online in *FASEB Journal*, 2010, 24, 2938-2950.

## How did you become interested in xanthohumol?

**Dr. Gerhäuser and Ms. Strathmann:** Beer is a rich source of polyphenols with potential cancer chemopreventive activities. The story of xanthohumol actually began with the fractionation of 300 liters of a lager-type beer. We followed inhibition of cyclooxygenase 1 (Cox-1) during activity guided-fractionation and discovered xanthohumol as the active Cox-1 inhibiting principle, although it is found in beer only at very low concentrations of about 0.1 mg/L. Further characterization of xanthohumol in a series of in vitro bioassays revealed that this prenylated chalcone has a broad spectrum of chemopreventive activities at all stages of carcinogenesis. Recently we could confirm cancer preventive potential of xanthohumol in the rat model of 7,12-dimethylbenz[a]anthracene (DMBA)-induced breast cancer, which is likely due to its anti-hormonal and anti-proliferative activities.

## How do you feel being a student research award winner?

**Ms. Strathmann:** Winning the ASP student research award is a great honor for me. I am very happy that the work was considered to be prize worthy, and that actually our manuscript "Xanthohumol-induced transient superoxide anion radical formation triggers cancer cells into apoptosis via a mitochondria-mediated mechanism" was chosen for the ASP student research award. I had never expected that! Moreover, being given the opportunity to present at the ASP Annual Meeting in Tampa, Florida, was a unique experience which I enjoyed very much. I am very grateful to



YAN DE ANDRES

Back: from left to right: Mr. Antonio Garreta, Dr. Clarissa Gerhäuser, Ms. Marion Baehr, Dr. Norbert Frank, and Ms. Julia Strathmann. Front: from left to right: Ms. Silke Tudor, Ms. Renate Steinle, Ms. Jung Kim, and Ms. Karin Klimo.

the ASP scientific committee for giving me the opportunity to experience how it feels to be a student research award winner, which I definitely did not want to miss!

## How does it feel to mentor an award winner?

**Dr. Gerhäuser:** I am very proud of Julia. She was an excellent graduate student, and was very persistent in pursuing this project. It took us some time to clarify what was actually going on, and Julia had to establish many new methods in the lab. She never gave up, although most assays did not run at the first try and had to be optimized and adapted. I am very happy that all her efforts finally were rewarded by the student research award.

## Could you provide a brief explanation of the work and results in your own words? In what way are the data in your paper new?

**Dr. Gerhäuser and Ms. Strathmann:** Prooxidant effects of xanthohumol described in our publication in *FASEB Journal* were discovered 'by chance,' when Julia was reinvestigating production of reactive oxygen species (ROS) induced by other chemopreventive agents. We and others had described xanthohumol previously as an antioxidant, so we were quite surprised when we realized that treatment of cultured cells with xanthohumol led to ROS production within seconds. We had used antimycin A, an inhibitor of the mitochondrial respiratory chain as a positive control. Since the kinetics of ROS production by

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both compounds were very similar, we were able to identify mitochondria as a source of ROS. By using ROS scavengers, we could clearly demonstrate that immediate ROS production via the mitochondria was important for apoptosis induction by xanthohumol. It was not known before that xanthohumol targets mitochondria to release ROS, and that ROS production is the trigger for apoptosis induction.

### What impact does this research have?

**Dr. Gerhäuser and Ms. Strathmann:** So far, we have only investigated apoptosis induction as a downstream effect of xanthohumol-mediated ROS release. However, it is very likely that the consequent change in the intracellular redox milieu might affect other chemopreventive mechanisms, such as Nrf-2-mediated induction of Phase 2 enzymes, anti-inflammatory mechanisms via transcription factor NF- $\kappa$ B, anti-angiogenic activity, and autophagy. All of these mechanisms are affected by xanthohumol, but only now do we realize that they might all be triggered by the same initial event, transient ROS production. What will be challenging in the future is to demonstrate that ROS production and all subsequent events are also relevant *in vivo*.

### What was the most challenging part of the project detailed in this paper?

**Dr. Gerhäuser and Ms. Strathmann:** There are many potential sources of ROS in a cell. Initially we focused on enzymes located in the cell membrane, and Julia spent weeks in isolating membrane preparations to measure enzyme activities and ROS. It took some time to convince ourselves that xanthohumol can enter a cell and target the mitochondria so rapidly. Probably, the most difficult part of the project was to accurately and precisely elucidate the kinetics of events that followed xanthohumol treatment. Since ROS are very short-lived molecules and cells are stressed very easily during experimental handling, it was very challenging to generate reproducible and reliable data.

### What is a favorite nonscientific activity of your lab?

**Dr. Gerhäuser:** We like to party. We celebrate anything (and sometimes even without a reason), from birthdays to guests and trainees coming and leaving, moving to a new lab, and successful Ph.D. exams. Since our group is quite international, we

always have a wonderful choice of food from around the world. Recently, we even introduced a 'Happy Hour' with margaritas as a reward for accepted manuscripts...

### What is your lab's motto?



### What is your greatest extravagance in the lab?

**Dr. Gerhäuser:** We like to travel. Some time ago, eight of us flew to Milan, Italy, as a lab excursion, just on one day, thanks to the cheap European airlines. Some had never entered a plane before, so this was quite an experience. Our lab neighbors did not even believe that we were really there. Since a one-day trip was definitely too short, we recently went to Montpellier in the south of France and stayed for two nights. As we could not just leave for two days, we took a day off! This was a wonderful experience, the food was just great, and we had a lot of fun. ■

## ASP Web Page News

by Dr. John Porter

It has been an eventful year for the web presence of ASP. After a number of changes to the site last year, a proposal was received to do a major overhaul of the site design and migrate the site to a new server. The Executive Committee contracted with Inverted Web Development (ASP member Mr. Jeremy Beau and his business partner Mr. Steven Mautone), to set up the site with a new domain name, [www.pharmacognosy.us](http://www.pharmacognosy.us), hosted on WordPress, with a variety of changes giving a new look and feel.

In addition, we now have capabilities on Facebook, Twitter, and LinkedIn. These social networking sites should be useful, especially for the younger members, and there are a number of members joined on each of these branch outlets for the society's electronic presence.

Information available on the website includes recent Annual

Meeting details, maintained by the meeting organizers, and the ASP award winners, election results and the *Newsletter*. Another feature of the site is the opportunity to post pictures of events, collection sites, organisms, members, and any other appropriate content.

The semi-annual report shows that we have between 5,000 and 6,000 visitors per month. These visitors find the site through direct knowledge of the URL, referral from other sites, and referral from search engines.

We welcome all comments and suggestions from members and hope to continue to make the website useful to as many members as possible. Suggestions for additional pages of interest, additional functions, photographs, and improvements to the site and welcome and should be directed to the Webmaster, Dr. John Porter, at [j.porter@usp.edu](mailto:j.porter@usp.edu). ■