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FIRST PERSON

# First person – Dongqing Zheng

First Person is a series of interviews with the first authors of a selection of papers published in Journal of Cell Science, helping early-career researchers promote themselves alongside their papers. Dongqing Zheng is first author on 'AKT but not MYC promotes reactive oxygen species-mediated cell death in oxidative culture', published in JCS. Dongqing is a PhD candidate in the lab of Nicholas A. Graham at University of Southern California, Los Angeles, where he uses a systems biology approach to investigate diseases.

Dongqing Zheng

**How would you explain the main findings of your paper in lay terms?**

Cancer cells, while growing uncontrolled, exhibit increased glucose consumption and lactate production, even in the presence of oxygen, relative to normal cells (i.e. aerobic glycolysis). The emergence of the liquid-chromatography mass spectrometry-based (LC-MS) proteomics and metabolomics provide a systematic approach to uncover the complex and dynamic protein and biochemical molecular (metabolite) networks regulating cancer survival and growth. In this project, we use such techniques to investigate the biological outcomes of phosphorylation events mediated by cancer-causing genes (AKT and MYC) and growth conditions (glucose and galactose).

Our results demonstrate the cancer-causing gene (AKT)-dependent nature of the cancer cell's survival and proliferation, which suggests the optimal drug to stop cancer cell growth must be tailored to the individual genetic profile of tumors. Our findings are novel because they (a) demonstrate that AKT but not MYC restricts the ability of mammalian cells to shift between glycolysis and respiration; and (b) illustrate the power of '-omics' technologies to explain cancer biology; and (c) are, to our knowledge, the first report using the galactose culture system to examine the differential effects of cancer-causing genes.

**Were there any specific challenges associated with this project? If so, how did you overcome them?**

We use high-content, quantitative LC-MS methods and systems biology data integration to identify the mechanism of biological enzymes downstream of cancer-associated signaling pathways. One of the biggest challenge in this project was to obtain useful biological insights from the proteomics and metabolomics data, and put them into application. The data all come in huge amounts and the data types are very different. The tasks to accomplish this goal generally do not follow common patterns, and can quickly become as varied as the data sources themselves. One can easily lose track and be overwhelmed by the amount of non-related biological information (noisy data). My solution was to quickly identify the commonality that was mostly correlated with the experimental observation, which requires a very solid understanding the relationships of one data set to another. Exploring cellular functions with the combination of proteomics and metabolomics will generate valuable insight into the complex and dynamic nature of the cancer cell.

**When doing the research, did you have a particular result or 'eureka' moment that has stuck with you?**

Yes! In order to address the JCS reviewer's question of what type of cell death occurs in short-term galactose-cultured MCF10A-AKT cells, I performed a Annexin V-propidium iodide flow cytometry experiment, and found out the dying cells undergo necrosis. I would have never thought of this result.

**Why did you choose Journal of Cell Science for your paper?**

Because our manuscript lies at the interface of cancer '-omics', oncogene-dependent tumor metabolic reprogramming and therapies targeting tumor metabolism, we believe it fits with the scope of Journal of Cell Science. Additionally, JCS is led by scientists that share the same interests and background as me. Indeed, our reviewers raised intriguing questions and gave very constructive feedback on the manuscript.

**Who are your role models in science? Why?**

I am very lucky to have a PI who is very helpful and supportive, and gives me enough responsibilities to challenge myself.

**What's next for you?**

I am looking forward to finish my PhD degree later this year, and hopefully finding an R&D position in the private sector.

Dongqing Zheng's contact details: University of Southern California, PCE 108, 925 Bloom Walk, Los Angeles, CA 90089.
E-mail: zhengd@usc.edu

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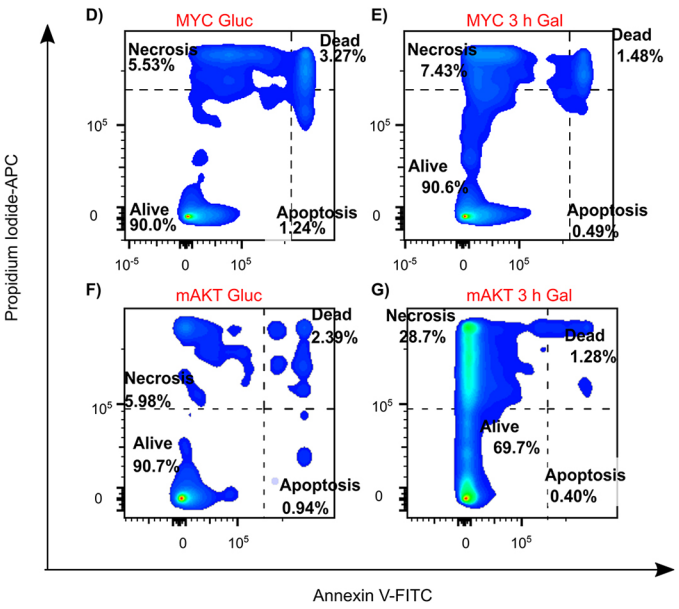


**Annexin V and propidium iodide staining of MCF-10A cells expressing either AKT or MYC cultured in glucose or galactose.** Galactose cells were switched from glucose culture and exposed to galactose for 3 h before staining. The percentage of cells determined as alive (lower left), necrotic (upper left), apoptotic (lower right), or dead (upper right) is indicated.

## Reference

**Zheng, D., Sussman, J. H., Jeon, M. P., Parrish, S. T., MacMullan, M. A., Delfarah, A. and Graham, N. A**. (2020). AKT but not MYC promotes reactive oxygen species-mediated cell death in oxidative culture. *J. Cell Sci.* **133**, 239277. doi:10.1242/jcs.239277