

Cutting Edge Cell Research by Pitt Scientists

The Situation: I went to the University of Pittsburgh for my undergraduate career. As an alumna, I like to keep up with the research that Pitt conducts. Pitt is known as a powerhouse research school, so they publish frequent press releases about cutting edge research. I found this particular press release as I was looking through Pitt's News Archive one weekend. This press release on cell research has two main purposes: 1) to inform the Pitt community that Pitt scientists lead the way in cell research that could lead to cures for serious disorders, and 2) to show further Pitt pride because Pitt scientists are active in ongoing cutting edge research. Here's the press release:

When Cells 'Eat' Their Own Power Plants; Pitt Scientists Solve Mystery of Basic Cellular Process

PITTSBURGH, Sept. 30, 2013 – A mix of serendipity and dogged laboratory work allowed a diverse team of [University of Pittsburgh](#) scientists to report in the Oct. 1 issue of *Nature Cell Biology* that they had solved the mystery of a basic biological function essential to cellular health.

By discovering a mechanism by which mitochondria – tiny structures inside cells often described as "power plants" – signal that they are damaged and need to be eliminated, the Pitt team has opened the door to potential research into cures for disorders such as [Parkinson's disease](#) that are believed to be caused by dysfunctional mitochondria in neurons.

"It's a survival process. Cells activate to get rid of bad mitochondria and consolidate good mitochondria. If this process succeeds, then the good ones can proliferate and the cells thrive," said Valerian Kagan, Ph.D., D.Sc., a senior author on the paper and professor and vice chair of the [Pitt Graduate School of Public Health's Department of Environmental and Occupational Health](#). "It's a beautiful, efficient mechanism that we will seek to target and model in developing new drugs and treatments."

Dr. Kagan, who, as a recipient of a Fulbright Scholar grant, currently is serving as visiting research chair in science and the environment at [McMaster University](#) in Ontario, Canada, likened the process to cooking a Thanksgiving turkey.

"You put the turkey in the oven and the outside becomes golden, but you can't just look at it to know it's ready. So you put a thermometer in, and when it pops up, you know you can eat it," he said. "Mitochondria give out a similar 'eat me' signal to cells when they are done functioning properly."

Cardiolipins, named because they were first found in heart tissue, are a component on the inner membrane of mitochondria. When a mitochondrion is damaged, the cardiolipins move from its inner membrane to its outer membrane, where they encourage the cell to destroy the entire mitochondrion.

However, that is only part of the process, says Charleen T. Chu, M.D., Ph.D., professor and the A. Julio Martinez Chair in Neuropathology in the Pitt School of Medicine's Department of Pathology, another senior author of the study. "It's not just the turkey timer going off; it's a question of who's holding the hot mitt to bring it to the dining room?" That turns out to be a protein called LC3. One part of LC3 binds to cardiolipin, and LC3 causes a specialized structure to form around the mitochondrion to carry it to the digestive centers of the cell.

The research arose nearly a decade ago when Dr. Kagan had a conversation with Dr. Chu at a research conference. Dr. Chu, who studies autophagy, or "self-eating," in Parkinson's disease, was seeking a change on the mitochondrial surface that could signal to LC3 to bring in the damaged organelle for recycling. It turned out they were working on different sides of the same puzzle.

Together with Hülya Bayır, M.D., research director of pediatric critical care medicine, Children's Hospital of Pittsburgh of UPMC and professor, Pitt's Department of Critical Care Medicine, and a team of nearly two dozen scientists, the three senior authors worked out how the pieces of the mitochondria signaling problem fit together.

Now that they've worked out the basic mechanism, Dr. Chu indicates that many more research directions will likely follow.

"There are so many follow-up questions," she said. "What is the process that triggers the cardiolipin to move outside the mitochondria? How does this pathway fit in with other pathways that affect onset of diseases like Parkinson's? Interestingly, two familial Parkinson's disease genes also are linked to mitochondrial removal."

Dr. Bayır explained that while this process may happen in all cells with mitochondria, it is particularly important that it functions correctly in neuronal cells because these cells do not divide and regenerate as readily as cells in other parts of the body.

"I think these findings have huge implications for brain injury patients," she said. "The mitochondrial 'eat me' signaling process could be a therapeutic target in the sense that you need a certain level of clearance of damaged mitochondria. But, on the other hand, you don't want the clearing process to go on unchecked. You must have a level of balance, which is something we could seek to achieve with medications or therapy if the body is not able to find that balance itself."

Comments on the original message: Pitt's press release needs some work. I'll use the Heath brothers' "Six Principles of Sticky Ideas," discussed in *Made to Stick*, to improve the stickiness of this message. Specifically, I'll discuss the parts that need improvement, and then I'll rewrite those problem areas based on each of the six principles: Simple, Unexpected, Concrete, Credible, Emotional, and Story. The result will be a more effective, memorable message.

Simple

I think this press release fails to highlight the bottom line up front. The title doesn't convey the most important information to the reader. Most readers wouldn't know what the press release was about if they didn't read every line. The details about the cells in the title and the leading paragraphs are extra, compared to the bottom line: understanding the basic cellular process of "self-eating" could open the door to a cure for diseases like Parkinson's.

Unexpected

The press release does contain a surprise factor for the reader, but sadly it's buried in the fourth paragraph. The unexpected Thanksgiving turkey analogy interests the reader, but it could be placed more strategically at the beginning of the press release. Moving this analogy to the beginning would hook the reader right away.

Concrete

The message becomes concrete once the Thanksgiving turkey analogy is used to describe the cell eating its own mitochondrion. The writers do a good job of using the reader's existing schema of cooking a Thanksgiving turkey to make the message understandable.

Credible

As authorities on cell "self-eating" research, Dr. Kagan, Dr. Chu, and Dr. Bayir add credibility to the message. This authority approach works in this article since it's about specialized scientific research. The reader will believe a message from leading scientists who have done the work.

Emotional

Although this message is scientific, I think it should invoke more of an emotional response from readers. Readers would appreciate a more emotional focus on how this research could lead to curing Parkinson's.

Story

The press release starts by saying that the "story" has been solved: "they...solved the mystery of a basic biological function essential to cellular health." This strategy goes against the Heath brothers' advice to tell a story from beginning to end. The audience wants to "simulate" the events in their minds. This press release has no "built-in drama" to let the reader "play along." So, here's my revision:

Pitt Scientists Discover Cells' "Self-eating" Process & Open Doors to Finding a Cure for Disorders like Parkinson's

PITTSBURGH, Sept. 30, 2013 – It turns out that cellular processes and cooking Thanksgiving turkeys are quite similar, as Pitt scientists discovered on their quest to understand basic cellular process.

A diverse team of University of Pittsburgh scientists discovered a mechanism by which mitochondria – tiny structures inside cells – signal that they are damaged and need to be eliminated or “eaten.” With this discovery, the Pitt team opened the door to potential research into cures for disorders such as [Parkinson's disease](#) that are believed to be caused by dysfunctional mitochondria in neurons.

Two of the senior authors leading the study are Valerian Kagan, Ph.D., D.Sc. and Charleen T. Chu, M.D., Ph.D. Dr. Kagan is a professor and vice chair of the [Pitt Graduate School of Public Health's Department of Environmental and Occupational Health](#). Dr. Chu is a professor and the A. Julio Martinez Chair in Neuropathology in the Pitt School of Medicine's [Department of Pathology](#).

Dr. Kagan and Dr. Chu's research arose nearly a decade ago when they had a serendipitous conversation at a research conference. Dr. Kagan's research focused on understanding the cardiolipins found in the mitochondria. Cardiolipins are a component on the inner membrane of mitochondria. When a mitochondrion is damaged, the cardiolipins move from its inner membrane to its outer membrane, where they encourage the cell to destroy the entire mitochondrion.

Dr. Kagan likened the process to cooking a Thanksgiving turkey. "You put the turkey in the oven and the outside becomes golden, but you can't just look at it to know it's ready. So you put a thermometer in, and when it pops up, you know you can eat it," he said. "Mitochondria give out a similar 'eat me' signal to cells when they are done functioning properly."

However, that is only part of the process, says Dr. Chu. "It's not just the turkey timer going off; it's a question of who's holding the hot mitt to bring it to the dining room?" That's where Dr. Chu's interests came in; she determined that the key transporter is the protein LC3. One part of LC3 binds to cardiolipin, and LC3 causes a specialized structure to form around the mitochondrion to carry it to the digestive centers of the cell.

Dr. Chu, who studies autophagy, or "self-eating," in Parkinson's disease, was seeking a change on the mitochondrial surface that could signal to LC3 to bring in the damaged organelle for recycling. Her interests in LC3 coupled with Dr. Kagan's research on the cardiolipins led the two researchers to collaborate. Later, Dr. Kagan, and Dr. Chu joined

forces with the third senior author Hülya Bayır, M.D., research director of pediatric critical care medicine, [Children's Hospital of Pittsburgh of UPMC](#) and professor in [Pitt's Department of Critical Care Medicine](#).

Dr. Bayır's research focused on neuronal cells in the brain. She found that it is particularly important that this "self-eating" process functions correctly in neuronal cells because these cells do not divide and regenerate as readily as cells in other parts of the body. "I think these findings have huge implications for brain injury patients," she said. "The mitochondrial 'eat me' signaling process could be a therapeutic target in the sense that you need a certain level of clearance of damaged mitochondria."

So after dogged laboratory work, the three senior authors and a team of nearly two dozen scientists solved the mystery of how the pieces of the mitochondria-signaling problem fit together. "It's a survival process. Cells activate to get rid of bad mitochondria and consolidate good mitochondria. If this process succeeds, then the good ones can proliferate and the cells thrive," said Dr. Kagan. "It's a beautiful, efficient mechanism that we will seek to target and model in developing new drugs and treatments." You can read the scientists' full report in the Oct. 1 issue of [Nature Cell Biology](#).

Now that they've worked out the basic mechanism, Dr. Chu indicates that many more research directions will likely follow. "There are so many follow-up questions," she said. "What is the process that triggers the cardiolipin to move outside the mitochondria? How does this pathway fit in with other pathways that affect onset of diseases like Parkinson's?"

We need answers to these questions. If you have a family member with Parkinson's or know of someone who has this serious disorder, you know how crippling it can be. Now that researchers understand the basic cellular process, they can start to understand the dysfunctional cellular processes that cause Parkinson's disease and other disorders.

We must continue to support these scientists and all of our Pitt research teams in their quests to solve the mysterious puzzles of science.

Comments on the revised message: Following the "Six Principles of Sticky Ideas," I'll explain my revisions for the new Pitt press release.

Simple

My revision uses the core idea as the title, so the reader knows exactly what they will read about. The reader gets the bottom line immediately, so they don't have to figure it out as they read the article. I kept most of the details about how the "self-eating" process

works because the article needs to highlight the scientists' work and *show* how they came to their bottom-line conclusion. The scientists want to educate the audience; I didn't want to shorten the article and get rid of the essential scientific knowledge the reader gains.

Unexpected

Now, the turkey-cooking theme starts at the beginning and leads into the explanation that appears later on. The leading line of the press release is truly unexpected. No reader will expect to see a link between cellular processes and cooking Thanksgiving turkeys. This shocking hook grabs the reader's attention, so they want to know how the scientists came to this conclusion. The unexpectedness of the turkey cooking analogy keeps the reader entertained while they are being educated.

Concrete

I kept the turkey cooking analogy because readers can use their existing schema to picture the comparison. The analogy plays on readers' experience of Thanksgiving; they can picture cooking a turkey and the big moment of bringing it out to the dinner table.

Credible

I stuck with the original approach for credibility. The three leading authors, with long academic and research titles, lend enough credibility for the reader. I chose to get the two leading authors' main credentials out of the way upfront, so the reader can focus on the cellular process explanation. The original message establishes a clear hierarchy for the three senior authors because they are mentioned in a particular order. I kept the same structure in my revision.

Emotional

The original press release lacked emotional appeal. In the revised message, I used the ending as a time to appeal to readers' emotions. Once they understand the magnitude of the research, I help them think about how it affects their own lives with words like "you" and "we." I also show that more work must be done with unanswered questions at the end. In order for Pitt researchers to continue their work, they need help from the entire Pitt community. Readers experience Pitt pride, a feeling of hope for the future, and a desire to support more research.

Story

I reworked the original organization to create a story. I moved the story about how Dr. Chu and Dr. Kagan met to the beginning. Next, I described the relationship between their research interests. The reader can follow a logical progression from their early research to their collaboration with Dr. Bayir and a larger team. I moved the mystery "solving" closer to the end, which provides their final conclusion. Lastly, I remind the reader how this story is just the beginning to a larger mystery because the researchers still have unanswered questions.

Conclusion

With my revisions, readers will find the research study more “sticky.” They will remember the comparison between cooking a turkey and the basic cellular process because of the shocking comparison. The story of the discovery also helps further their understanding of the process, because they can “play along” in the mystery. Although the writers did a good job adhering to the Concrete and Credible Principles, they needed improvement with the Simple, Unexpected, Emotional, and Story Principles.

References

Heath, C., & Heath, D. (2007). *Made to Stick*. New York: Random House.

UPMC. (2013). “When cells ‘eat’ their own power plants; Pitt scientists solve mystery of basic cellular process.” Retrieved from <http://www.upmc.com/media/NewsReleases/2013/Pages/pitt-scientists-solve-mystery-of-basic-cellular-process.aspx>