

Congratulations to the 2009 Young Investigator Award Winner, Mee Kum Kim, MD, PhD, Seoul National University, Korea.

Read below for an interview with Dr. Kim.

Please describe, in language intended for a general scientific audience rather than for our stem cell researchers, what hypothesis you were testing in the research from your paper.

Mesenchymal stem cells (MSCs) are well known to suppress immune function *in vitro*. However, there have been variable results regarding their immune modulatory function after transplantation *in vivo*. It is not known exactly how MSCs suppress immune function. Presumably, MSCs come into contact with lymphocytes in the lymph nodes and immature dendritic cells in target organs. However, when implanted intravenously, MSCs have shown a variable ability to migrate to these tissues, which could explain the variable results regarding their immune modulatory function *in vivo*. Our hypothesis was that MSCs can modulate ocular inflammation efficiently if they can be delivered in an appropriate way. Therefore, we chose direct application of MSCs onto the corneal surface to investigate the immune suppressive effect in the eye. Our results indicate that MSCs *in situ* can effectively modulate ocular inflammation in a chemical burn model.

Give some background rationale, explaining why this hypothesis was important in stem cell research.

I believe the fundamental goal of stem cell research is to establish clinically applicable therapeutics to treat conditions such as such as immune-associated disease and cancer. Our hypothesis supports the evidence that MSCs can be used to treat inflammatory disease *in vivo*.

Briefly outline your experimental approach to test your hypothesis.

To investigate the anti-inflammatory and anti-angiogenic effects of MSCs, we used a chemical burn model of the cornea. We applied MSCs directly to the burned corneas and evaluated neovascularization, corneal opacity, inflammatory cell infiltrates and cytokine changes.

Was there a specific methodological technique that was very important in these studies?

We developed this animal model to represent acute chemical burns which result in corneal stem cell deficiencies in their later stages. We also developed the method of topical application of the MSCs on to the corneal surface. These two methods were critical in evaluating the *in vivo* effect of MSCs on acute inflammation, and investigating whether MSCs can restore the micro-niche that is necessary to support corneal epithelial stem cells in the inflamed eye.

How do you interpret these results? What does this mean for stem cell biology?

I believe these findings provide evidence that stem cells can be used therapeutically to modulate immune function. It extends the possible therapeutic role of stem cells; they can be used not only as a source for cellular differentiation and replacement, but for modulation of the microenvironment.

What hypotheses should the field test now?

We should continue to examine the mechanisms of the immune modulatory function of MSCs is, by studying factors such as soluble mediators (e.g., IL-10 or indoleamine-2,3 dioxygenase) which may be critical in the development of tolerance. Meanwhile, clinical trials using MSCs in various stem cell deficient or autoimmune diseases should continue to verify the clinical relevance of the application of MSCs.

Why did you select the journal Stem Cells for your paper?

We selected your journal because of its reputation as one of the leading journals in the field of stem cell biology, and because of its high impact factor.

Finally, on a more personal note, tell us a little about you, your education, and training. What is your position right now? What would you like to do in the near future? What impact do you expect this award to have on your career aspirations?

I graduated from the Medical College at Seoul National University in 1994, and then earned my Ph.D. in Ophthalmology at Seoul National University. I joined Dr. Jin Hak Lee in the Seoul Artificial Eye Center at Seoul National University Hospital Clinical Research Institute, and have been there since 1999. I have been working to develop Seoul-type keratoprosthesis for patients with corneal blindness, and to investigate the feasibility of using porcine cornea xenografts as a substitute for human corneas. I am also studying immune-modulatory therapeutics using MSCs and TLR-associated signals for epithelial stem cell deficient patients, immune-related corneal disease patients, and cornea transplant patients. Recently, I joined Charles Surh's laboratory at the Scripps Institute to investigate mucosal tolerance. I believe the Stem Cells Young Investigator Award will greatly help to advance my scientific career. It also encourages my devotion to stem cell research, and I am very grateful to the Editorial Board of Stem Cells for this award.