

# **Effects of Protease Inhibitors and Antioxidants on *In Vitro* Survival of Porcine Primordial Germ Cells**

**<sup>1</sup>Chang-Kyu Lee and <sup>2,3</sup>Jorge A. Piedrahita**

<sup>1</sup>*School of Agricultural Biotechnology, Seoul National University,  
Suwon 441-744, Korea,*

<sup>2</sup>*Department of Veterinary Anatomy and Public Health, and*

<sup>3</sup>*Center for Animal Biotechnology and Genomics, Texas A&M University,  
College Station, Texas 77843-4458 USA*

## **ABSTRACT**

One of the problems associated with *in vitro* culture of primordial germ cells (PGCs) is the large loss of cells during the initial period of culture. This study characterized the initial loss and determined the effectiveness of two classes of apoptosis inhibitors, protease inhibitors and antioxidants, on the ability of porcine PGCs to survive in culture. Results from electron microscopic analysis and *in situ* DNA fragmentation assay indicated that porcine PGCs rapidly undergo apoptosis when placed in culture. Additionally,  $\gamma$ -2-macroglobulin, a protease inhibitor and cytokine carrier, and N-acetylcysteine, an antioxidant, increased the survival of PGCs *in vitro*. While other protease inhibitors tested did not affect survival of PGCs, all antioxidants tested improved survival of PGCs ( $p < 0.05$ ). Further results indicated that the beneficial effect of the antioxidants was critical only during the initial period of culture. Finally, it was determined that in short-term culture, in the absence of feeder layers, antioxidants could partially replace the effect(s) of growth factors and reduce apoptosis. Collectively, these results indicate that the addition of  $\gamma$ -2-macroglobulin and antioxidants can increase the number of PGCs *in vitro* by suppressing apoptosis.