

Lazio Life Sciences

Pharma Finance 2008

Istituto Superiore di Sanità: Dept. of Environment and Primary Prevention

We have recently invented a method to **induce or accelerate the proliferation of cells** that either are unable to proliferate or have limited replicative potential. The method stems directly from our discovery (J. Cell Biol. 176: 807-818, 2007) that all kinds of non-proliferating cells actively maintain their non-proliferation state by expressing cell cycle inhibitors (CKI). Removal of such inhibitors is sufficient to produce proliferation, even in the absence of growth factors.

Thus, we have shown that it is possible to induce proliferation of cells even in suboptimal culture conditions or ignoring their specific growth factor requirements. Temporary, reversible removal of specific cell cycle inhibitors is achieved through RNA interference. Such removal is followed by reentry into the cell cycle and proliferation of previously quiescent cells.

This method is applicable to cells whose culture is currently not possible, such as, by way of example, cardiomyocytes. In general, for **cell replacement therapy approaches**, it would be often desirable to increase the growth rate of the cell type of choice, to obtain the required number of cells and/or to obtain such number in the shortest possible time.

The method is as well applicable to cell types that do not readily grow in culture or tend to differentiate while proliferating, such as **hematopoietic stem cells**. It is worth mentioning that many types of adult-derived stem cells grow very poorly in culture.

Finally, ongoing in vivo experiments indicate that cell cycle reactivation by CKI removal can be readily achieved in vivo as well as in vitro. Thus, it is possible to conceive of in vivo applications to **foster the repair of tissues** whose natural self-healing capabilities are limited. Examples include tendons, cartilages, bones, endocrine cells, etc.

Innovative aspect of the product/project and main advantages:

Current methodologies for growing cells in vitro depend on detailed knowledge of the culturing requirements of the specific cell type being considered. In cases where such requirements are insufficiently understood, culturing is usually impossible. Alternatively, culture requirements include expensive cocktails of growth factors, feeder layers made of living cells, or animal sera.

Our method boosts cell growth even in suboptimal culture conditions. Hence, it allows culturing cells that cannot be otherwise cultivated, reduces growth-factor requirements, and accelerates cell growth. These enhancements should allow, facilitate, and/or accelerate in vitro culture of fastidious cell types, wound healing, and tissue repair.

In summary, our method, being applicable both in vitro and in vivo, should find wide application in biotechnology and tissue repair, whenever cell proliferation is limiting.



Pharma Finance 2008
Rome, May 22-23
Radisson SAS es Hotel
Via Filippo Turati, 171



**Istituto Superiore di
Sanità' – Dept. of
Environment and
Primary Prevention**

Address:
Viale Regina Elena, 299
– 00161 Roma

Ph: 0649903163
Fax: 064990365
marco.crescenzi@iss.it
www.iss.it

Contact :
Dr. Marco Crescenzi
Senior Scientist