FEATURES

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TFII-I Epigenetically Controls Stem Cell Differentiation

Dashzeveg Bayarsaihan, Aleksandr V. Makeyev, and Badam Enkhmandakh

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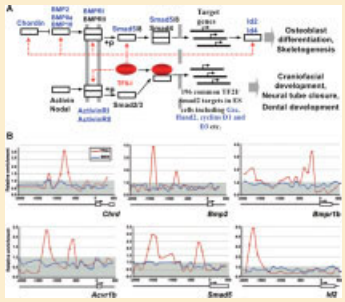

The TFII-I family transcription factors, encoded by *GTF2I* and *GTF2IRD1*, are implicated in various cellular and embryonic processes including cell differentiation and proliferation, angiogenesis, neural tube and skeletal development. These genes are deleted in Williams syndrome (WS), a neurodevelopmental disorder with a complex phenotype including mental deficiency, premature aging of skin, supravalvular aortic stenosis, and dental and craniofacial malformations. Genome-wide binding studies revealed that TFII-I factors prime a large set of genomic loci in mouse embryonic stem cells and embryonic tissues. Moreover, many sites co-localize with H3K4me3/K27me3 bivalent marks across the promoters of developmental genes. This review by Bayarsaihan *et al.* provides a summary of current knowledge regarding the function of TFII-I in epigenetic control of stem cell differentiation.

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iPSC Reprogramming Methods: Translational Considerations

Mahendra S. Rao and Nasir Malik

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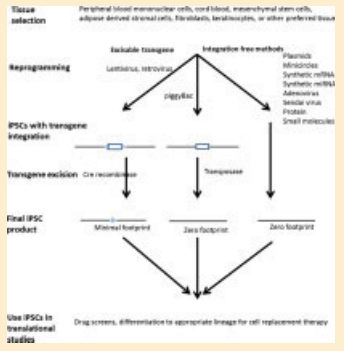

The reprogramming of patient somatic cells into induced pluripotent stem cells (iPSCs) offers new opportunities in translational medicine. iPSCs can be differentiated into a variety of cell types that might have utility in cellular replacement therapies and high throughput drug screens. The review by Rao and Malik critiques the strengths of reprogramming methods when the objective is to obtain an iPSC that is suited for translational studies as opposed to one that will only be used for basic research. The methods are compared in their efficiency of iPSC generation, capacity to reprogram multiple cell types, and ability to generate an iPSC without leaving a reprogramming transcription factor vector "footprint" in the iPSC genome. Several methods were found to be capable of producing "translational-grade" iPSCs but before choosing a method researchers with translational objectives for iPSCs must carefully weigh the importance of each of three factors listed above in the context of their ultimate goals.

Journal of Cellular Biochemistry

A Cytoprotective Role for Nestin in HG-Induced Podocyte Apoptosis

Wei Liu, Yue Zhang, Jun Hao, Shuxia Liu, Qingjuan Liu, Song Zhao, Yonghong Shi, and Huijun Duan

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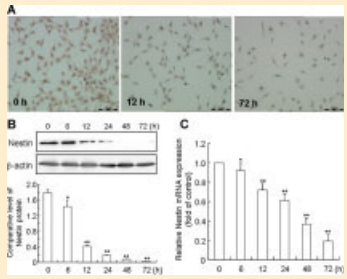
Podocyte apoptosis contributes to the pathogenesis of diabetic nephropathy (DN). Recent findings indicate that the disruption of the cytoskeleton is related to podocyte apoptosis. Liu *et al.* investigated the involvement of nestin, an important cytoskeleton-associated class VI intermediate filament (IF) protein, in high glucose (HG)-induced podocyte apoptosis. The data showed that HG decreased the expression level of nestin in a time-dependent manner in cultured podocytes. Through knockdown of nestin expression by miRNA interference, the HG-induced podocyte apoptotic rate was significantly increased. Considering that nestin is a substrate of cyclin-dependent kinase 5 (Cdk5), Liu *et al.* further assessed the expression of Cdk5 in HG-treated podocytes. The results showed that HG stimulation increased the expression level of Cdk5 in a time-dependent manner in cultured mouse podocytes. The protein activator of Cdk5, p35, was also increased in a time-dependent manner by HG stimulation. Downregulation of Cdk5 by miRNA interference attenuated the nestin reduction in HG-treated podocytes. HG-induced podocyte apoptosis was effectively attenuated in Cdk5-depleted podocytes. These data suggested that nestin, which is dependent on Cdk5 regulation, plays a cytoprotective role in HG-induced podocyte apoptosis.



Silicate Modulates Osteoblast-Osteoclast Cross-Talk

H.C. Schröder, X.H. Wang, M. Wiens, B. Diehl-Seifert, K. Kropf, U. Schloßmacher, and W.E.G. Müller

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The bone mineral of vertebrates consists of hydroxyapatite, an inorganic deposit that is formed by osteoblasts. The anabolic process of hydroxyapatite formation is paralleled by a catabolic reaction, driven by osteoclasts that mediate the dissolution of this inorganic scaffold. Hence the equilibrium between new bone formation and bone resorption is regulated by a finely tuned interplay between osteoblasts and osteoclasts. The well established cytokine pair, osteoclastogenic ligand of receptor activator of NF-κB (RANKL) and osteoprotegerin (OPG), both released from osteoblasts, controls the growth and the differentiation of osteoclasts. Previously Müller and colleagues showed that the inorganic bio-polymer biosilica increases the expression of OPG without affecting the release of RANKL. In addition, biosilica enhances the growth potential of osteoblast-related SaOS-2 cells *in vitro*, while it causes no effect on osteoclastic RAW 264.7 cells. In the study published here (Schröder *et al.*) we demonstrate that, in the presence of silicate, SaOS-2 cells release a factor(s) that causes a decrease in the number of TRAP-positive RAW 264.7 cells. Simultaneously the SaOS-2 cells retain their capacity of differential gene expression of OPG and RANKL in favor of OPG. Based on this new observation the authors conclude that in the presence of silicate a factor(s) is released from SaOS-2 cells that cause a significant inhibition of osteoclastogenesis of RAW 264.7 cells.