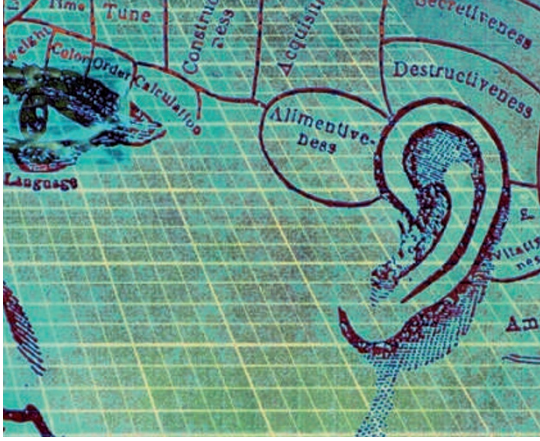
BIOBUSINESS BRIEFS

DEAL WATCH

Novartis licenses GenVec's hearing loss programme



Novartis has acquired exclusive global rights to GenVec's preclinical hearing loss and balance disorders programme. The programme has been investigating gene therapy to express atonal homologue 1 (*ATOH1*) in the inner ear to regenerate the sensory hair cells involved in detecting sound and changes in head position. GenVec will receive US$5 million upfront and is eligible for more than $200 million in milestones.

To date, there are no effective pharmacotherapies available for hearing loss or balance disorders, which are estimated to affect ~28 million people in the United States alone. "Although many individuals with hearing loss achieve excellent auditory and oral communication results with conventional hearing aids and cochlear implants, a subset of patients do not," says Andrew Griffith, Scientific Director, National Institute on Deafness and Other Communication Disorders at the National Institutes of Health, USA. Furthermore, "not all patients qualify for cochlear implant surgery, so regeneration of hair cells, either through drug treatment, stem cells or gene therapy, is considered to be the ultimate treatment for hearing loss," explains Stefan Heller, Associate Professor, Department of Otolaryngology — Head and Neck Surgery, Stanford University School of Medicine, USA.

Previous research has shown that during development ATOH1 triggers the generation of sensory hair cells in the inner ear and that, in the ears of adult mice and guinea pigs, ATOH1 can induce the formation of new sensory hair cells and restore hearing and balance after acute damage (*Nature Neurosci.* 12, 679–695; 2009). Such findings led GenVec to develop adenovectors that deliver ATOH1 to the inner ear as a potential therapeutic strategy for disorders linked to loss of sensory hair cells.

Such an approach faces similar safety considerations as gene therapy for other diseases and other organs. Furthermore, as Griffith points out: "Gene delivery to the inner ear may present additional challenges due to the extreme and usually irreversible damage to inner ear fluids and tissues caused by even mild physical, chemical or biological perturbations". In addition, there is "a complete lack of studies regarding long-term survival of ATOH1-induced new hair cells, the generation of ectopic hair cells and whether these cells contribute to the hearing process or whether they are detrimental. Mouse models with overproduction of hair cells have hearing loss, suggesting that the location, hair cell number and general morphology and architecture of the organ of Corti are important," cautions Heller.

Nevertheless, "the potential benefit of gene therapy may outweigh potential risks in a subset of patients with significantly debilitating hearing or balance disorders that are refractory to current treatments," says Griffith. "It is also a very positive sign that pharmaceutical companies recognize the potential for the development of novel therapies for hearing loss," says Heller. "At the moment, it is impossible to tell which of the three major directions — gene therapy, stem cells and drug treatment — is going to be the most effective one. I would not be surprised to see combinations of these approaches, perhaps in conjunction with cochlear implants in the future."