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Latest News in Genetics Research

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Recent months have witnessed many new developments in the field of Genetics and the subfields of Medical Genetics and therapeutics in particular. The foremost of these new developments is a unanimous ruling issued by the Supreme Court of the United States of America on June 13, 2013 that the naturally occurring genes cannot be patented. The ruling also invalidates all existing patents on such genes, but still allows the synthetic genes like copy DNA (cDNA) to be patented. The American College of Medical Genetics and the American Society of Human Genetics have hailed this decision as a victory for medical geneticists whose ultimate goal is to promote the medical diagnoses. Although this ruling was in response to a specific court challenge to the patents for Breast Cancer Genes 1 and 2 (called BRCA1 and BRCA2) held by Salt Lake City based Myriad Genetics, Inc., all existing patents on genes like FLT3 [an integral part of the standard of care for acute myelogenous leukemia (AML) now], RB1 gene for diagnosis of melanoma, gene for prostate cancer, etc. In 2005, an article in the journal Science estimated that 20% of the human genes had been patented, of which 63% patents were held by private companies. With this ruling, as long as the researchers or diagnostic laboratories do not copy the exact procedures of the gene-patent holding laboratories/firms and instead, use alternate methods to diagnose gene mutations like next generation sequencing, whole genome analysis or significantly modified cDNA strings, etc., they can now work on any naturally occurring gene. This will foster new methods for detecting gene mutations and help the medical community for better diagnoses of human disorders. Some doctors, hospitals are already planning to bring in-house many of these diagnostic tests instead of sending the patient specimens to specific laboratories holding the gene patents. Saving money on the exuberant prices charged by the gene patent holding laboratories, the doctors would be able to offer the same tests at much cheaper prices to the patients. Currently, the Fluorescence in situ hybridization (FISH) probes have also to be bought from the specific labs holding gene patents for the detection of specific

mutations. Now, other laboratories will also be able to develop new FISH probes which may not be the exact copies of the existing probes (if they are also patented), and work on the same genes. The monopoly is over and this competition will also bring down the prices of the currently very expensive FISH probes.

Based on the cell-free fetal DNA circulating in maternal blood, a team of workers have developed a noninvasive paternity testing using informatics supported analysis of single-nucleotide polymorphism (SNP) array measurements to accurately determine paternity in early pregnancy (Ryan et al, 2013: Genetics in Medicine, 15: 473-81). They achieved 100% accuracy in paternity testing using this new technology, as early as 6 weeks into pregnancy.

A research team from University of California, Los Angeles (UCLA) has successfully used a microscopic self-degradable water-soluble capsule (pill) to deliver apoptin protein, which effectively targets cancer cells to die without harming the non-cancerous healthy tissues. The capsule used is less than half the size of the smallest bacteria and the researchers are predicting that it will open a door to an entirely new weapon against disease, as per the lead author Yi Tang, a UCLA professor of Chemical and Biomolecular Engineering.

University of the South Wales reported in the journal Nature Structural and Molecular Biology (February 2013) that the so called junk DNA can reactivate tumor suppressor genes that can result in cancer if inactivated. Their research shows that the inactivation of these tumor suppressor genes is not permanent. The most noble tumor suppressor gene is TP53 gene on the short arm of chromosome 17, whose inactivation or a deletion (loss of heterozygosity, LOH) is associated with adverse prognosis for many types of leukemia and lymphoma, as well as solid tumors. Less than 2% of the whole genome is made up of actually functional genes and the remaining DNA was so far called Junk DNA, but now it is shown that it may not be junk after all, and may have regulatory functions for the transcribed genes.

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