

filter hybridization and subsequent analysis. ["Work for Others" projects supported by an agency or organization other than DOE (e.g., NIH, National Cancer Institute, or a private company) can be conducted at a DOE installation because this work is complementary to DOE research missions and usually requires multidisciplinary DOE facilities and technologies.]

The Resource for Molecular Cytogenetics was established at LBNL and the University of California (UC), San Francisco, with the support of the Office of Biological and Environmental Research and Vysis, Inc. (formerly Imagenetics). The Resource aims to apply fluorescent in situ hybridization (FISH) techniques to genetic analysis of human tissue samples; produce probe reagents; design and develop digital-imaging microscopy; distribute probes, analysis technology, and educational materials in the molecular cytogenetic community; and transfer useful reagents, processes, and instruments to the private sector for commercialization.

NIST Advanced Technology Program

Several commercial applications of research sponsored by the U.S. Human Genome Project have been furthered by the Advanced Technology Program (ATP) of the U.S. National Institute of Standards and Technology. ATP's mission is to stimulate economic growth and industrial competitiveness by encouraging high-risk but powerful new technologies. Its Tools for DNA Diagnostics program uses collaborations among researchers and industry to develop (1) cost-effective methods for determining, analyzing, and storing DNA sequences for a wide variety of diagnostic applications ranging from healthcare to agriculture to the environment and (2) a new and potentially very large market for DNA diagnostic systems.

Awardees have included companies developing DNA diagnostic chips, more powerful cytogenetic diagnostic techniques based on comparative genomic hybridization, DNA sequencing instrumentation, and DNA analysis technology. Eventually, commercialization of these underlying technologies is expected to generate hundreds of thousands of jobs. [800/287-3863, Fax: 301/926-9524, atp@micf.nist.gov, <http://www.atp.nist.gov>]

Patenting and Licensing Highlights, FY 1994-96

- A development license for single-molecule DNA sequencing replaced the 1991-94 CRADA (the first CRADA to be established in the U.S. Human Genome Project) between LANL and Life Technologies, Inc. (LTI).
- In 1995, a broad patent was awarded to UC for chromosome painting. This technology uses FISH to stain specific locations in cells and chromosomes for diagnosing, imaging, and studying chromosomal abnormalities and cancer. Resulting from a 1989 CRADA between LLNL and UC, FISH was licensed exclusively to Vysis.
- Hyseq, Inc., was founded in 1993 by former Argonne National Laboratory researchers Radoje Drmanac and Radomir Crkvenjakov to commercialize the sequencing by hybridization (SBH) technology. Hyseq has exclusive patent rights to a variation known as format 3 of SBH or the "super chip." Hyseq later won an Advanced Technology Program award from the U.S. National Institute of Standards and Technology to develop the technology further.
- Oligomers—short, single-stranded DNAs—are crucial reagents for genome research and biomedical diagnostics. ProtoGene Laboratories, Inc., was founded to commercialize new DNA synthesis technology (developed initially at LBNL with completed prototypes at Stanford University) and to offer the first lower-cost custom oligomer synthesis. The Parallel Array Synthesis system, which independently synthesizes 96 oligomers per run in a standard 96-well microtiter plate format, shows great promise for significant cost reductions. ProtoGene first

