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"Applied and Translational Genomics" — What is new?

Among the many high expectations and promises witnessed at the dawn of the new millennium were the completion of the human genome project (HGP) and the commencement of the genomics era. However, the genomic era had begun well before the landmark and highly ambitious project to sequence the entire human genome was even conceived. There are several examples of major pre-genome era achievements. These include the successful employment of new DNA analytical methods in the mapping of some of the critical genes and the deciphering of adjoining genomic regions related to non-curable human diseases. DNA recombinant technology led to the discovery and development of several protein products revolutionizing the treatment and prevention of some incurable human diseases. And the application of genetic analysis methods helped in sequencing microbial genomes. All of these achievements were possible from systematic and targeted collective research efforts in applied and translational genetics and biotechnology.

In the genomic context, the foundation for applied and translational genomics was thus laid well before the seminal completion of the HGP. Since the completion of HGP, the rapid accumulation of enormous data and information has crossed all boundaries beyond any imagination. Today a young graduate of cell and molecular biology and genetics enjoys describing some of the most complicated laboratory methods that were virtually impossible to comprehend even by some senior geneticists and molecular biologists who later accepted the challenge to sequence human and other genomes. A number of laboratory methods supported by sophisticated information technology hardware and advanced bioinformatics tools are now in routine use across many nations on all continents. While some leading centers continue to invest time and resources in basic genomic and molecular biology research, a large number of research establishments are engaged in developing new techniques applicable in wide ranging areas including biotechnology, pharmaceutical manufacturing, medicine and health, agriculture and horticulture, marine and fishery, animal welfare and veterinary science, and climate friendly efficient bio-energy production. Each specific field and specialist area would further require painstaking and intensive research efforts and investment to translate the selected application into practical, safe and efficient use. It is often not possible to delimit boundaries between applied and translational research, as both are intricately linked and move forward together to achieve the desired goal.

This introductory editorial note outlines the available evidence and identifies potential areas in which applied and translational genomics research might produce effective and efficient measurable outcomes. Like any other scientific and technological field, an important outcomes measure should be the meeting of societal expectations in wide ranging domains including economic gains, improving living standards, compatibility with socio-cultural and religious practices, and alignment with the contemporary ethical, moral and legal requirements. There are several potential areas where rapid advances in scientific understanding and avenues for translational research would need to be seriously considered. Naturally any such listing would not be sufficient and might not be truly representative of all aspects of applied and translational genomics research. Nevertheless, it might be beneficial to leading research establishment and young investigators to be aware of some of the leading areas (Table 1).

For most researchers and established professionals, reporting and publishing peer review reports and sharing data might not be too onerous. There are several journals and on-line publishing channels with a genomic prefix or suffix. The proposed new genomics journal by Elsevier is expected to complement the genomics portfolio and aims to

Table 1
A template for applied and translational genomics research.

Genomics and biotechnology applications
Genomic laboratory applications
Bioinformatics tools for genomic research
Managing genome sequencing data
New drug discovery and development
Cell based therapy including stem cell technology
Improved and enhanced food production including crops
Innovations in genomic technologies
Nanogenomics
Genome vaccines
Bioenergy production
Genetics and genomics in clinical medicine
Diagnostic
Prognostication
Personalized therapeutics
Pharmacotherapy
Non-pharmacotherapy
Public and population health genomics
Genome database of high risk population groups for common medical diseases, for example diabetes mellitus
Strategic planning for preventing major Mendelian diseases, for example sickle cell disease, beta thalassemia, cystic fibrosis, familial hypercholesterolemia, etc.
Microbial/pathogen genome databases, for example HIV, SARS, H1N1, etc.
Genomic surveillance for Regional and International infection control, for example pandemic influenza
Bio-economic applications and developments
Biotechnology infrastructure for national and regional developments
Creation of jobs and revenue from teaching and training opportunities
Biofuel industrial applications from plants, algae and grasses
Fortified and bulk crop production, for example maize and rice
Selective and improved plant food production
Improved livestock for human consumption
Marine genomics and fishery industry
Development of supporting financial institutions and networks
Banking, venture capital, investments, share capital, etc.

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Table 1 (*continued*)

Genomics and society
Safe and acceptable use of the population genomic databases
Monitoring population movements
Emigration and immigration management
Disaster management—earthquakes, tsunamis, terrorist attacks, etc.
Ethical issues
Concerns of bioethics community
Consent and confidentiality
Ownership
Prevention of harm to peoples from biomaterial procurement
Inappropriate use of the manpower resources
Diversion to questionable technology development
Inequitable distribution of financial gains from genomic applications
Regulation and legal issues
Appropriate use of current statutory powers
Need for new statutes
Mechanisms for research governance
Patenting — new ideas, new methods, etc.
Biomaterial procurement — monitoring and reimbursement
Marketing of technology and products back to people and the state
Role of international agencies (WHO, FAO, World Bank, OECD, etc.).

focus on publishing leading and cutting edge applied and translational genomics research. The journal shall endeavor to publish material related to industrial, agricultural, environmental, medicine and health, and social and ethical applications of genome science and technologies (Table 2).

A list of potential areas (Table 2) is appended to assist established and new genomic investigators and professionals to consider publishing their research, reviews and opinions in '*Applied and Translational Genomics*'. The editorial policy shall be ethical and transparent by any international standard. All material will be subjected to rigorous internal peer review followed by external review wherever needed. The journal is open access providing rights to authors who will contribute an agreed sum for immediate on-line access. The executive staff for the journal shall offer assistance to authors from less developed countries and those with financial constraints. The open access charge could be waived completely in certain circumstances, for example invited review articles. Members of the editorial board are fully aware that the scope of the journal would need to be regularly revised as genome sciences and technologies take humankind ahead in 21st century. It is anticipated that this new biomedical knowledge sharing and information resource will meet its objectives and establish itself as a credible journal in a rapidly advancing and highly competitive field.

Table 2
Scope and remit of 'Applied and Translational Genomics'.

- Genome sequencing methods
- Genomic variation (copy number/SNPs)
- Comparative genomics
- Functional genomics/proteomics
- Applied bio-systems/systems biology
- Bioinformatics (new purpose built/designed soft ware/program)
- Bio banking (cell repository; DNA banking)
- Data banking/databases
- Applied biotechnology (laboratory development and support)
- Clinical cytogenomics/clinical genomics (molecular diagnostics)
- Genomic and personalized medicine (evidence-based medicine)
- Public/population health (screening and targeting selected population; large scale infection control and preventive measures)
- Pharmaceutical industry (new drugs and vaccines)
- Nutrigenomics (specifically targeted design foods)
- Plant and agricultural genomics (enhanced/fortified crops and animal food production)
- Ecogenomics (improved sanitation and environmental pollution control)
- Bioeconomy (biotechnology, bio energy, biomaterials, etc.)
- Education and media (professional and public education; bio-information through on-line/medial resources)
- Ethical, legal and social issues in translational genomics
- Legal and regulatory including Intellectual property rights (patenting etc.)

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