Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Preface

In the early stage of conceptualizing and actioning the current volume (*Advances in Genetics 108*; ISBN 978-0-12-823785-4), no one had even dreamt of the SARS-2/Covid-19 pandemic. By the time we were able to put together contents and identify the most appropriate faculty, early warning signs and unclear news had started buzzing around of a new Corona family virus that had affected hundreds in the Wuhan city in Southwest China. Toward the late 2019, we were able to put together most articles included in the current volume of *Advances in Genetics*. We chose to focus on genome-based precision and personalized diagnosis and prevention at population level. At that time, most clinicians, healthcare professionals, and the public at large had not consumed the idea of individualized genomic precision diagnosis and prevention at population level. During the first quarter of the Corona/SARS-2 pandemic, the RT-PCR diagnostic test got established as the most sensitive and reliable diagnostic tool (Tahamtan & Ardebili, 2020). However, for considerable period, we could not work out a precise treatment strategy. Within the next few months, research laboratories around the globe emerged with claims of vaccine development. Among these, the mRNA-derived vaccine became the front runner (Abbasi, 2020). Both RT-PCR precision diagnosis and mRNA SARS-2/Corona/Covid-19 vaccine are examples of genome-led personalized precision diagnosis and prevention. It might look serendipitous, this volume appearing at the height of Covid-19 infection control with similar message, however in different diseases and applications.

This volume includes carefully selected articles authored by a team of highly skilled scientists and clinicians. Preventive population genomics offers the prospect of population stratification for targeting screening and prevention and tailoring care to those at greatest risk. The *BRCA* model provides 30 years of insight and experience of how to conceive of and construct precision breast cancer care and serves as an initial model for preventive population genomics. Population-based *BRCA* testing in the Jewish population is feasible, acceptable, reduces anxiety, does not detrimentally affect psychological well-being or quality of life, is cost-effective, and is now beginning to be implemented in most breast cancer clinics. Population-based *BRCA* testing and multigene panel testing in the wider general population are cost-effective for numerous health systems and can save thousands or more

lives than the current clinical strategy (Reisel, Baran, & Manchanda, 2021). In the clinical diagnostic setting, there is always the need for novel technologies with high-order sensitivity and specificity. The translational research in diagnostic genomics has led to the development of three potential technologies: liquid biopsy, single-cell RNA sequencing, and spatial transcriptomics (Budhiraja, Basu, Abhilash, Juwayria, & Gupta, 2021). These three novel genomic technologies offer robust detection and accurate diagnosis in cancer as cornerstone for precision oncology. These technologies are now increasingly applied for better molecular understanding of cancer as well as many other heterogeneous genetic diseases.

Targeted precision molecular therapeutics is an established component of precision medicine. There are now new drugs available targeting the epithelial growth factor receptor (EGFR), vascular endothelial growth factor receptor (VEGF), mTOR, KRAS, and BRAF, among others. One such new class of targeted drugs in the armamentarium is poly(ADP-ribose) polymerase (PARP) inhibitors (PARPi), which inhibit the enzyme PARP, thus interfering with DNA repair. This strategy utilizes a preexisting genomic lesion in tumors with homologous recombination repair defects, including BRCA mutations (Mehta & Bothra, 2021). In this context, discussion on the prostate cancer, one of the significant causes of male mortality, is important and justified. Prostate cancer heritability is attributed to a combination of rare, moderate to highly penetrant genetic variants as well as commonly occurring variants conferring modest risks [single-nucleotide polymorphisms (SNPs)]. Some of the former type of variants (e.g., *BRCA2* mutations) predispose particularly to aggressive prostate cancer and confer poorer prognoses compared to men who do not carry mutations. Molecularly targeted treatments such as PARP inhibitors have improved outcomes in men carrying somatic and/or germline DNA repair gene mutations. Both germline and somatic prostate cancer research have significantly evolved in the past decade and will lead to further development of precision medicine approaches to prostate cancer treatment as well as potentially developing precision population screening models. Ongoing clinical trials are exploring other molecular-targeted approaches based on prostate cancer somatic alterations (Benafif, Ni Raghallaigh, McHugh, & Eeles, 2021).

Genomic characterization of lung cancer has not only improved our understanding of disease biology and carcinogenesis but also revealed several therapeutic opportunities. Targeting tumor dependencies on specific genomic alterations (oncogene addiction) has accelerated the therapeutic developments and significantly improved the outcomes even in advanced stage of disease. Multiplex gene testing has become mandatory in view of constantly

increasing number of therapeutic targets and effective treatment options. Influence of genomic characteristics on response to immunotherapy further makes comprehensive genomic profiling necessary before therapeutic decision-making. This approach is pivotal for managing the non-small-cell lung cancer (NSCLC). Current lung cancer management is the perfect example of "precision medicine" in clinical oncology (Pathak, Chitikela, & Malik, 2021).

The prevalence of noncommunicable diseases has been on an upward trajectory for some time, and this puts an enormous burden on healthcare expenditures. Lifestyle modifications including dietary interventions hold an immense promise to manage and prevent these diseases. Recent advances in genomic research provide evidence that focusing these efforts on individual variations in abilities to metabolize nutrients (nutrigenetics) and exploring the role of dietary compounds on gene expression (nutrigenomics and nutriepigenomics) can lead to more meaningful, personalized dietary strategies to promote optimal health (Ahluwalia, 2021). Finally, the focus shifted on the microbiome with abundant new products targeted at specific molecular loci. Several novel natural products endow the capacity to suppress the hike of superbugs and help us avoid the burgeoning condition of antibiotic resistance. There is a wide gamut on different sources of microbes that endure the tendency to synthesize novel compounds and curtail the spread of rising superbugs. In addition, there are classes of secondary metabolites with their route of biosynthesis by different microbiota residing in different animals, insects, reptiles, and humans (Bhattarai, Bhattarai, & Baral, 2021).

Authors and editor of this volume believe to have made a small contribution to the enormous and rapidly advancing knowledge base in the burgeoning field of precision, personalized, and preventive genomic medicine. All those who contributed, in whatever manner, are gratefully acknowledged. Any resemblance or replication of factual information is coincidental and unintentional simply to convey and elaborate the concept of genomics-led precision and personalized evidence-based medicine.

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References

Abbasi, J. (2020). Covid-19 and mRNA vaccines-first large test fort a new approach. *JAMA*, *324*(12), 1125–1127.

Ahluwalia, M. K. (2021). Nutrigenetics and nutrigenomics—A personalized approach to nutrition. *Advances in Genetics*, *108*, 277–340.

Basu, A., Budhraja, A., Juwayria, Abhilash, D., & Gupta, I. (2021). Novel omics technology driving translational research in precision oncology. *Advances in Genetics*, *108*, 81–145.

Benafif, S., Ni Raghallaigh, H., McHugh, J., & Eeles, R. (2021). Genetics of prostate cancer and its utility in treatment and screening. *Advances in Genetics*, *108*, 147–199.
Bhattarai, K., Bhattarai, K., & Baral, B. (2021). Next-generation microbial drugs developed from microbiome's natural products. *Advances in Genetics*, *108*, 341–382.
Mehta, P., & Bothra, S. J. (2021). PARP inhibitors in hereditary breast and ovarian cancer and other cancers: A review. *Advances in Genetics*, *108*, 35–80.
Pathak, N., Chitikela, S., & Malik, P. S. (2021). Recent advances in lung cancer genomics: Application in targeted therapy. *Advances in Genetics*, *108*, 201–275.
Reisel, D., Baran, C., & Manchanda, R. (2021). Preventive population genomics: The model of *BRCA* related cancers. *Advances in Genetics*, *108*, 1–33.
Tahamtan, A., & Ardebili, A. (2020). Real-time RT-PCR in COVID-19 detection: Issues affecting the results (Editorial). *Expert Review of Molecular Diagnostics*, *20*(5), 453–454.