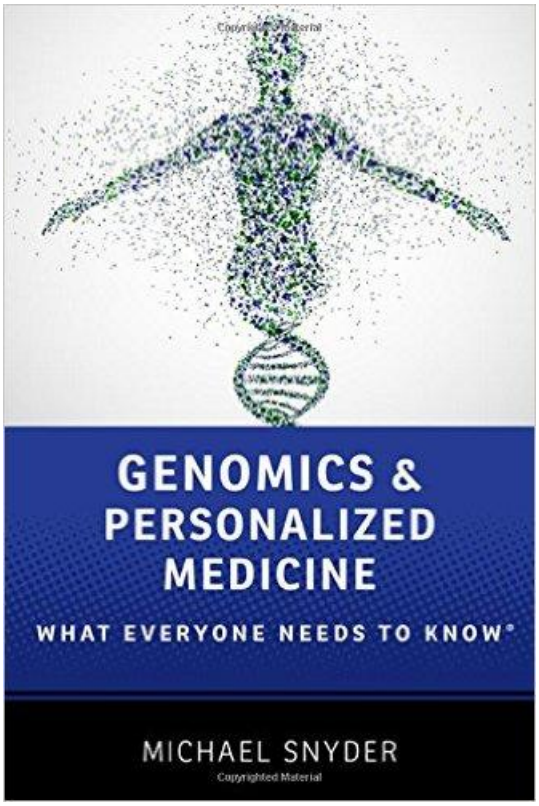
Book Review

Genomics and Personalized Medicine – What Everyone Needs to Know, Michael Snyder, Oxford University Press, New York, 2016.

This is a marvellous book. It is concise and written in a direct and straightforward manner. This makes it a readily accessible read for Higher Human Biology and Higher Biology students. Students could read this book either during the course or as a pre-course reader. The layout of the book also lends itself to being used a reference book. In many ways it is like a hybrid between a popular science book and a text book. For teachers this book is a good introduction to genomics and personalised medicine, provides useful anecdotes for teaching and gives a thought provoking insight into the kind of medicine that young people may well encounter in the future.



A particular strength of the book is its layout and organisation. At 160 pages and 22 chapters the topics are clearly defined and presented succinctly. In addition each chapter has sub headings presented in the form of questions. This gives a clear indication of what will be covered and makes the book useful for reference as a scan of the questions in each chapter leads the reader to any areas of particular interest.

The fundamentals of DNA biology are well dealt with at a level appropriate for Higher. Cancer genomics and treatment covers both germline and somatic cell mutations and cell cycle regulation mutations. These are clearly illustrated with useful examples .Although cancers are traditionally classified by their organ of origin, emphasis is put on the genomic profile of tumours and their capacity for further new mutations to arise. Basing the classification of cancers on genomic information leads to understanding the underlying molecular defects and opens the door for personalised medical management. In addition examining genomic information can lead to early diagnosis and more effective treatment.

The DNA sequencing of genetic diseases caused by single gene mutations and multiple genetic changes are covered. Such information can lead to prompt and proper diagnosis and an understanding of the impact on biological pathways. In turn this can guide the development of medical treatments including pharmacogenomics. The study of genomic information in the healthy including pre-natal testing and the effects of the environment and epigenetics on the genome can all contribute to the assessment of disease risk and preventative measures.

The book also considers other ‘omes’ that might be medically useful – the transcriptome, proteome, metabolome and microbiome have all proven useful for understanding and sometimes preventing disease. RNA, proteins and cell metabolites can act as biomarkers for heath and disease as they are the results of gene expression. The value of genomics in health also extends to sequencing of genes involved in the immune system, bacteria and viruses and the changes in the genome with age with a view to extending health span as well as life span.

The collection of health information is considered from wearable health devices (it is a pity that Intermediate 1 Biology with its Unit on Health and Technology has disappeared from the curriculum!) to the processing and analysis of ‘big data’. The ethics of ownership of genomic information, privacy and who is entitled to someone’s genomic information is considered. The question of educating people to be able to understand their own genomic information and the education required for their doctors, healthcare providers, insurers and policy makers are all considered. The author makes the case for the cost of personalised medicine being a saving in the long term as preventative measures should be cheaper than the expense of treating disease. Aimed at an American readership, the cost implications are considered more from an insurance based health system rather than our NHS although the underlying principles are the same.

The author envisages a future where many people will have their genome sequenced, perhaps before birth, and along with a wealth of other collected information used to predict, diagnose and treat disease as well as to manage good health. In that future people will have more control of their medical destiny with an increasing shift of responsibility from the medical profession to the individual.

The author Michael Snyder, Professor of Genetics and Director of the Center of Genomics and Personlized Medicine at Stanford University states “*We believe that the average person is capable of understanding basic concepts of genomic information, and given its foundational nature in relation to our health, it should be taught to every student in high school*”. The new courses in Higher Biology and Higher Human Biology seek to contribute to that aspiration.