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Perspective

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Problems and Perspectives of Personalized Medicine

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Introduction

Personalized neurology is the application of principles of personalized medicine, i.e., the prescription of specific therapeutics best suited for an individual taking into consideration both the genetic, epigenetic and environmental factors that influence response to therapy. The aim is to improve efficacy and reduce adverse effects of therapy. Personalization of therapies for neurological disorders is based on a better understanding of the disease at the molecular level. Molecular diagnostics, molecular neuroimaging, sequencing and monitoring of gene expression by microarrays are important technologies for this purpose. Besides neuro genomics and neuro proteomics, nongenomic technologies such as nano biotechnology are also used. Biological therapies for neurological disorders, such as cell therapy, gene therapy, gene editing, RNAi, vaccines and monoclonal antibodies can also be personalized. Biomarkers and integration of diagnostics with therapeutics are important for the selection and monitoring of treatments. Biomarkers enable pre symptomatic diagnosis, selection of appropriate treatment, assessment of disease progression, and evaluation of patient response to therapy. Nano biotechnology has refined molecular diagnosis, improved drug formulation and targeted delivery through the blood-brain barrier to the lesion in the brain and spare the normal tissues to reduce systemic toxicity. Integration of multiple factors into personalized approach requires use of bioinformatics. A personalized approach can be incorporated in algorithms for the management of various neurologic disorders. Examples of neurological disorders will include Alzheimer disease, Parkinson disease, epilepsy, and stroke.

Advantages and future of personalized neurology are the availability of low-cost genomic sequencing will expand the use of genomic information in the practice of neurology. Sequencing of the genome is enabling genetic redefinition of several neurologic disorders as well as better insight into their patho mechanisms to improve our understanding and facilitate early detection by molecular methods. An increase in the ability to anticipate diseases rather than just reacting to them after onset may enable the institution of preventive measures. The precision and effectiveness of drugs is increased. Drugs can be better targeted to diseases in some patients based on genotype information. Development of more effective personalized medicines may obviate the need for surgery in some chronic neurological disorders.

The trend toward personalized approaches to health and medicine has resulted in a need to collect high-dimensional datasets on individuals from a wide variety of populations, in order to generate customized intervention strategies. However, it is not always clear whether insights derived from studies in patient populations or in controlled trial settings are transferable to individuals in the general population. To address this issue, an observational analysis was conducted on blood biomarker data from 1033 generally healthy individuals who used an automated, web-based personalized nutrition and lifestyle platform. Using the resulting dataset, a correlation network was constructed to generate biological hypotheses that are relevant to researchers and, potentially, to users of personalized wellness tools. The correlation network revealed expected patterns, such as the established relationships between blood lipid levels, and novel insights, such as a connection between neutrophil and triglyceride concentrations that has been suggested as a relevant indicator of cardiovascular risk. Biomarker changes were assessed from baseline to follow-up, relative to platform use. Preliminary associations were found between the selection of specific nutrition and lifestyle interventions and biomarker outcomes. Across many biomarkers measured, there was a significant trend toward normalcy in participants whose biomarker values were out-of-range at baseline.

Various Drugs Administrations

Knowing the genetic polymorphisms of a patient shows whether a drug will make the intended effect according to the dosage from clinical trials, will require more or less dose, or it should be avoided and seek a therapeutic alternative. In general, patients are poly medicated, however the effect of various drugs administered together may be different (produce ineffectiveness or toxicity), different to what would happen when administered alone. Sometimes, even if a person could take the drugs individually according to the genetics, the drugs themselves could inhibit or induce the other. To successfully apply pharmaco genetics and make a prescription safely and accurately, many parameters should be taken into account, such as drug-drug interactions, drug-lifestyle, inhibitions and inductions and dose variation according to patient studied genes. All this information can only be interpreted together, using pharmacogenetics interpretation software like g-Nomic, g-Nomic crosses information concerning prescribed drugs, patient's genetic variations to give a personalized report with all necessary information: Drug interactions, drug with lifestyle, inhibitions, inductions and dose variation according to the patient's genes. Applied pharmaco genetics can indeed avoid many emergency cases, safe lives and money. But to correctly apply pharmaco genetics, an interpretation software is needed since there are too many variables to consider. Hypertension, hyperlipidemia, Hyperglycemia and Cigarette smoking are major risk factors for the development of Coronary Heart Diseases (Newcomer et al.). Hypertension is the leading curable risk factor for cardiovascular disease, affecting more than 1 billion people worldwide (Patel et al.). Treatment of hypertension is to reduce future cardiovascular morbidity and early death. Antihypertensive therapy has shown improvement in the incidences of stroke, heart failure & renal failure however, the incidence of CHD has not been reduced to that degree (The Sprint Research Group). Normal human BP (Systolic/Diastolic) ranges from

120/80mmHg to 140/90mmHg. Hypertension is the continuous elevation of resting systolic ≥ 140mmHg and diastolic ≥ 90mmHg BP (Carretero et al.). Effects of Nifedipine an antihypertensive drug were seen on Glucose, Insulin and Epinephrine, in the light of Helsinki Criteria, a study designed on nondiabetic and diabetic hypertensive patients. Two sets, minimum of 12 patients (6-non-diabetics and 6-diabetics) were recruited for treatment. In Set-A non-diabetic hypertensive patients were kept on placebo first for two weeks and GTT was performed, then patients switched on Nifedipine at an average dose 23.8 ± 7.4 mg/day.

When the diastolic BP normalized ≤ 90mmHg at-least for 6-weeks period, then second GTT was performed. In Set-B, diabetic hypertensive patients treated with Nifedipine first at an average dose 21.3 ± 3.5 mg/day for 6-weeks period, GTT was conducted, followed by a placebo period for 2-weeks then the patients went through second GTT for quantifying glucose, insulin and catecholamine blood levels and results were compared. Based on results it is concluded that, Nifedipine worsens Glucose Tolerance and it is a diabetogenic drug.