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INTEGRATIVE ALGORITHMS IN PATIENT FOCUSED LABORATORY MEDICINE

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There is a mounting evidence that the overall efficiency of procedures in Laboratory Medicine would be significantly improved with algorithms integrating clinical indications with standardized laboratory protocols, combining biochemical and genetic tests (1–3). This issue of Journal of Medical Biochemistry offers comprehensive overview of fundamental principles regarding this issue together with a compilation of current achievements in certain areas (4, 5).

The first section provides state-of-art presentation of molecular diagnostics, which, through constant and rapid methodological improvements, becomes inevitable in a wide variety of diseases and conditions. Genetic variants are used as markers for diagnosis, prognosis, prevention and targets for treatment, thus providing a base for personalized medicine (2–5). Consequently, their practical adoption has significant influence on clinical laboratories' technology and requirements for quality assurance (1).

The topic of the second section is integrative evaluation of thrombophilia, a multifactorial disorder, involving genetic and acquired factors causing procoagulant disbalance. Laboratory investigation represents a step-wise, functional and molecular detection of the most common and well-established causes, with caution about assays' performances and influencing conditions. Testing is recommended in young patients, patients with recurrent or thromboses at unusual sites and in persons with positive family history, while the impact on patient management and rethrombosis prediction remains controversial (6, 7).

Molecular defects and integrative protocols in evaluation of certain tumors (i.e. multiple endocrine neoplasia, pituitary tumors) and congenital heart anomalities are addressed in the third section. Emphasis will be made on wide spectrum of interactions, contributing to clinical phenotype, available techniques and need for joint continuous multidisciplinary education (8).

The fourth section focuses on role of pharmacogenomics in personalized medicine (3). Near future is expected to make additional insights into polymorphisms involved in drug responses. for individualized therapy should include bio-markers in conjunction with genetic data, as evidenced by recent improvements in therapy with thiopurines. Evidence of association between response to oral glucose-lowering drugs and variants in genes encoding for transporters, receptors and metabolizing enzymes provides directions for personalized treatment in diabetics (9). Also, drugs for cardiovascular system have been subject of pharmacogenomic studies. Results provide confidence that genome-tailored prescription and use of defined algorithms will contribute to successful and safe therapy, accompanied by increased clinical relevance (10).

The final section is aiming to present importance of integrative algorithms in genetic diseases, which remain highly challenging for modern medicine. Timely diagnosis, preferably before the onset of irreversible pathology, is of supreme importance, because the therapeutic efficiency significantly depends on it (2–4). For establishment of successful diagnostic strategy data about molecular defects, prevalence and natural course of disease are mandatory. In general, diagnostic strategy still mostly relies on initial clinical suspicion of individual symptoms that may occur from early infancy period to adulthood. Examination is usually followed by adequate specialist and laboratory management. Nevertheless, some questions are still open, primarily regarding justifiability of screening and testing of non-symptomatic carriers. Specificities of integrative approach in this field are illustrated on examples of lysososmal storage disorders (11) alpha-1-antitrypsin deficiency (12) and phenylketonuria (13).

Both patients' benefit and overall efficiency of procedures in Laboratory Medicine can be significantly improved by applying algorithms which integrate clinical indications for certain laboratory investigation and standardized laboratory protocols, based on combination of different biochemical and genetic tests. First goal of the *integrative algorithms in patient focused laboratory medicine* is to provide contemporary insight into concepts of molecular- genetic testing and personalised medicine markers, as well as challenges during incorporation of molecular diagnostics in clinical laboratories and quality control management. Second goal is to present to laboratory medicine professionals examples of integrative approach addressing various conditions, diseases and therapeutic regimens: thrombophilia, multiple endocrine neoplasia, pituitary tumours, congenital heart defects, lysosomal storage diseases, alpha-1-antitrypsin deficiency, phenylketonuria, general and specific pharmacogenetics (CV drugs and immunosuppressants).

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