

## Plenary lectures

### PL1 - Preventive, predictive and personalized medicine - where are we?

#### PL1 - 1

#### European strategies, new guidelines & standardisation in predictive, preventive & personalised medicine

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Predictive, preventive & personalised medicine is a new strategy in healthcare aiming at application of innovative biotechnologies in the prediction of human pathologies, the development of timely prevention and individualised therapy-planning. Predictive diagnostics is considered as a reliable navigation system for targeted preventive measures and consequent development of treatment approaches tailored to the patient. Of paramount importance is communication among professionals – medical doctors, biotechnologists, computer-scientists, healthcare providers, policy-makers, educators, who are obligatorily involved in the paradigm change from delayed interventional to predictive medicine. This concept is considered as medicine of future. New strategies which EPMA represents for further consideration at the EU-Commission, the European Parliament, WHO and UNO are elaborated by the consortium of the world-leading professionals (Europe-unrestricted). The EPMA Mission and Objectives in the field of Predictive, Preventive & Personalized Medicine (PPPM) have been introduced to the Organisation of United Nations. The participants of the meeting agreed that the paradigm change can be achieved only by coordinated measures well-focused on solving the accumulating problems in healthcare and the concomitant economical burden that societies across the globe are facing more and more.

#### PL1 - 2

#### Recent technology towards predictive, preventive and personalized medicine

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Personalized medicine, which simply means selection of treatment best suited for an individual, involves integration and translation of several new technologies in clinical care of patients.

Researchers have discovered hundreds of genes that harbour variations contributing to human illness, identified genetic variability in patients' responses to dozens of treatments, and begun to target the molecular causes of some diseases. In addition, scientists are developing and using diagnostic tests based on genetics or other molecular mechanisms to better predict patients' responses to targeted therapy.

Advances in DNA analysis to develop methods, which are increasingly specific, sensitive, fast, simple, automatable, and cost-effective, are considered paramount. These demands are currently driving the rapid evolution of a diverse range of newer technologies.

For the future of genomics is demanding the rapid evolution of miniaturization (nanotechnology) and high-throughput genotyping technologies (next generation sequencing) toward increased speed and reduced cost.

The success of personalized medicine depends on having accurate diagnostic tests that identify patients who can benefit from targeted therapies. Within the past few years, a growing number of businesses have begun to offer direct to consumer genetic tests. These tests are designed to help individuals better understand their genetic predisposition for a given health condition.

Another important step will be expanding efforts to develop tissue banks containing specimens along with information linking them to clinical outcomes.

In this arena Laboratory Medicine should play a major role.

## **PL2 - Laboratory medicine online**

### **PL1 – 1**

#### **Health literacy on laboratory tests**

Abstract not provided.

### **PL2 - 2**

#### **Mobile technology and laboratory information services**

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Throughout the history there have been several successful technology breakthroughs that have had a global impact. The latest addition to these revolutionary technologies is the mobile communication. The wireless mobile technology sets us free from the limitations of time and space.

In principle mobile technology means methods and equipment that use electromagnetic signals for the wireless communication. The mobile technology is mainly based on radio waves invented by Guglielmo Marconi at the end of the 19th century. Because electromagnetic spectrum is a scarce resource there is a need for very strict communication standards. We have the Global Positioning System (GPS) and its European versions for worldwide accurate navigation. General wireless point-to-point communication utilizes various digital cellular standards like GSM, GPRS, WCDMA, and LTE. The best method for mobile Internet usage is

so called Wireless Local Area Network (WLAN). Finally we have different technologies for very short distance communication like Bluetooth, RFID, and Near Field Communication (NFC).

Internet and the above mentioned mobile technologies form a solid infrastructure that can be used via personal digital devices. Examples of these are laptop computers, tablet computers, and smart phones. Many mobile devices are capable to utilize almost all of the previously mentioned communication standards. Large companies are creating mobile ecosystems around these technologies.

Clinical laboratories can now provide comprehensive information services based on mobile technology. Almost every phase of the laboratory process from specimen collection to results reporting will be in the future based on mobile technology.

## **PL3 - How to approach malnutrition from laboratory point of view?**

### **PL3 – 1**

#### **Failure to thrive in childhood and the laboratory**

Abstract not provided.

### **PL3 – 2**

#### **Clinical biochemistry in nutrition practice**

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Nutrition screening is of considerable value in identifying patients with malnutrition or at high risk of malnutrition, and the most successful screening tools rely on simple clinical tools without the need for venesection or urine collection

(and therefore avoid any delay beyond the time of interview).

Nutritional assessment is a more detailed process that will normally include a set of anthropometric measurements, and may include study of body composition (such as with bioelectrical impedance or DEXA scanning), and indirect calorimetry to complement standard predictive equations (such as Harris-Benedict) for the determination of energy requirements, as well as a professional opinion of nutritional status. It is unusual for these assessments to include biochemical parameters of necessity, or for the conclusion to incorporate biochemical data, although most patients will have had simple routine laboratory assays performed.

Those outside the clinical nutrition field often consider that the serum albumin is a marker of malnutrition, but there is very little evidence in favour of this assumption. There is no doubt that a low albumin is strongly predictive of a poor outcome, and there is therefore a positive correlation between low albumin and malnutrition, but it is not now considered to be of a causal nature. A similar conclusion can be attached to many other biochemical analyses, and none of the major clinical nutrition guidelines recommends their use in initial assessment. In summary we might usefully conclude that biochemical analysis plays little role in macronutrient assessment.

Nonetheless patients with malnutrition frequently have many biochemical deficiencies and in principle it would be good practice for clinicians to en-

sure that micronutrient status is comprehensively assessed. The difficulties here are that the assays for many micronutrients are not readily available, and because the interpretation of assay results is often neither simple nor transparent. This assessment will therefore often be limited to the measurement of a few key vitamins (e.g. folate, vitamins B12 and D) and elements (e.g. Mg, Se, Zn) and to a few surrogates (such as coagulation status for vitamin K).

Accordingly most of the interface between the clinical biochemist and the clinical nutritionist will be in management and monitoring of patients on artificial nutrition support and particularly those on parenteral nutrition (PN). Conventional hepatic and renal biochemistry will generally be monitored closely in the early days of PN, permitting adjustment and optimisation of volume and electrolyte load. Deteriorating liver function is rare in good hands and abnormalities much more often reflect underlying disease such as sepsis. Correction of micronutrient deficiency will also be monitored but this is not straightforward given the uncertainties of correct intravenous replacement and the availability of some micronutrients only in composite fixed dose formats.

Special and challenging situations such as the management of systemic acidosis or apparently intractable excess or deficiency of certain electrolytes provide the territory for productive liaison between the biochemical and nutritional disciplines.