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Maternal thyroid dysfunction and neonatal cardiac disorders

The normal levels of thyroid hormones (THs; thyroxine, T4 & 3,5,3?-triiodo-L-thyronine, T3) are necessary for the normal development [1-48], particularly the fetal and neonatal cardiac growth and development [49]. The actions of THs are facilitated genomically by thyroid receptors (TRs, ? and ?) and non-genomically at the plasma membrane, in the cytoplasm and in cellular organelles [4,49-55], by stimulation of Na+, K+, Ca2+ and glucose transport, activation of protein kinase C (PKC), protein kinase A (PKA) and mitogen activated and protein kinase (ERK/MAPK) [4]. In addition, the transport of T4 and T3 in and out of cells is controlled by several classes of transmembrane TH-transporters (THTs) [56], including members of the organic anion transporter family (OATP), L-type amino acid transporters (LATs), Na+/Taurocholate cotransporting polypeptide (NTCP), and monocarboxylate transporters (MCTs) [4,49,57,58]. Adding additional complexity, the metabolism of T4 and T3 is regulated by 3 selenoenzyme iodothyronine deiodinases (Ds: D1, D2 and D3) [59-61]. On the other hand, the congenital hypothyroidism can cause the following [49,62-64], (1) congenital heart diseases; (2) diastolic hypertension; (3) reduced cardiac output, stroke volume and a narrow pulse pressure; (4) dilatation and overt heart failure; (5) elevation in the systemic vascular resistance [65-68]. Similarly, the chronic hyperthyroidism can cause the following [49,64]: (1) cardiac hypertrophy; (2) increase in the cardiomyocyte (CM) length rather than width; (3) noticeable diminution in systemic vascular resistance; (4) elevation in the cardiac contractility; (5) systolic hypertension; (6) increase in the cardiac output, venous volume return, blood volume and pulse pressure; and (7) reduction in the systemic vascular resistance [49,69]. T3-therapy can induce DNA synthesis and cardiomyocyte proliferation, and improve the cardiac contractility; though, this action is as still unidentified [49,70-74].

Research Article **Published Date:-2017-09-25 00:00:00**

The master regulator gene PRDM2 controls C2C12 myoblasts proliferation and Differentiation switch and PRDM4 and PRDM10 expression

The Positive Regulatory Domain (PRDM) protein family gene is involved in a spectrum variety of biological processes, including proliferation, differentiation and apoptosis: its member seem to be transcriptional regulators highly cell type and tissue peculiar, towards histones modifications or recruitment of specific interaction patters to modify the expression of target genes. In this study we analyzed the expression profile of different member of PRDM gene family focusing our attention on the role of PRDM2, PRDM4 and PRDM10 genes in mouse C2C12 cell line, during the differentiation of myoblasts into myotubes and speculate about the role of the protein Retinoblastoma protein-interacting zinc finger protein 1-RIZ1, coded by PRDM2 gene, as a regulator of the proliferation/differentiation switch.

Results showed a reduction of PRDM2, PRDM4 and PRDM10 expression level during the commitment of the differentiation of myoblasts into myotubes. The RIZ1 silencing stimulated myoblasts differentiation, similar to the effect of serum deprivation on these cells, associated with an increase of Myogenin expression level, which is considered to be involved in the differentiation of myoblasts into multinucleated myotubes. As demonstrated by chromatin immunoprecipitation experiments, RIZ1 is associated with Myogenin promoter in proliferation condition and after 24h from differentiation induction, negatively controlling therefore Myogenin expression. Moreover RIZ1 silencing induced a reduction in PRDM4 and PRDM10 expression levels leaving us to speculate that the PRDM genes have a redundant role and they are hierarchically organized.

Review Article **Published Date:-2017-08-31 00:00:00**

Use of MicroRNAs to Screen for Colon Cancer

Colon cancer (CC) screening is important for diagnosing early stage for malignancy and therefore potentially reduces mortality from this disease because the cancer could be cured at the early disease stage. Early detection is needed if accurate and cost effective diagnostic methods are available. Mortality from colon cancer is theoretically preventable through screening. The Current screening method, the immunological fecal occult blood test, FOBTi, lacks sensitivity and requires dietary restriction, which impedes compliance. Moreover colonoscopy is invasive and costly, which decreases compliance, and in certain cases could lead to mortality. Compared to the FOBT test, a noninvasive sensitive screen that does not require dietary restriction would be more convenient. Colonoscopy screening is recommended for colorectal cancer (CRC). Although it is a reliable screening method, colonoscopy is an invasive test, often accompanied by abdominal pain, has potential complications and has high cost, which have hampered its application worldwide.

A screening approach that uses the relatively stable and nondegradable microRNA molecules when extracted from either the noninvasive human stool, or the semi-invasive blood samples by available commercial kits and manipulated thereafter, would be more preferable than a transcriptomic messenger (m)RNA-, a mutation DNA-, an epigenetic-or a proteomic-based test. That approach utilizes reverse transcriptase (RT), followed by a modified quantitative real-time polymerase chain reaction (qPCR). To compensate for exosomal miRNAs that would not be measured, a parallel test could be performed on stool or plasma's total RNAs, and corrections for exosomal loss are made to obtain accurate results. Ultimately, a chip would be developed to facilitate diagnosis, as has been carried out for the quantification of genetically modified organisms (GMOs) in foods. The gold standard to which the miRNA test is compared to is colonoscopy. If laboratory performance criteria are met, a miRNA test in human stool or blood samples based on high throughput automated technologies and quantitative expression measurements currently employed in the diagnostic clinical laboratory, would eventually be advanced to the clinical setting, making a noticeable impact on the prevention of colon cancer.

Review Article **Published Date:-2017-08-25 00:00:00**

Surface Plasmon Resonance technology to assess biological interactions

Molecular interactions between proteins or between proteins and small molecules are pivotal events for selective binding of biological structures and, consequentially, for their correct function. In this scenario, the evaluation of kinetic parameters, characterizing a molecular interactions, is considered a crucial event to reveal the nature of binding processes.

The focus on peculiar forces involved in the molecular recognition represents an opportunity to explore biological interactions in real time, and to develop a number of innovative biotechnological methods for diagnosis and/or therapy.

Currently, optical biosensors, offering an increasingly effective technology to detect in real time molecular binding, are usually composed by a detector, a sensor surface and a sample delivery system: only definite substances, which are able to interact specifically with the biological part, lead to an optical or electrical signal of the physical transducer.

In this review we want to highlight the exponentially-growing interest of Surface Plasmon Resonance (SPR) based optical biosensors for molecular binding analysis in different research fields.

Review Article **Published Date:-2017-07-25 00:00:00**

Transglutaminase inhibition: possible therapeutic mechanisms to protect cells from death in neurological disorders

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Transglutaminases are a family of Ca2+-dependent enzymes which catalyze post-translational modifications of proteins. The main activity of these enzymes is the cross-linking of glutaminyl residues of a protein/peptide substrate to lysyl residues of a protein/peptide co-substrate. In addition to lysyl residues, other second nucleophilic co-substrates may include monoamines or polyamines (to form mono-or bi-substituted/crosslinked adducts) or -OH groups (to form ester linkages). In absence of co-substrates, the nucleophile may be water, resulting in the net deamidation of the glutaminyl residue. Transglutaminase activity has been suggested to be involved in molecular mechanisms responsible for both physiological and pathological processes. In particular, transglutaminase activity has been shown to be responsible for human autoimmune diseases, and Celiac Disease is just one of them. Interestingly, neurodegenerative diseases, such as Alzheimer's disease, Parkinson's disease, supranuclear palsy, Huntington's disease and other polyglutamine diseases, are characterized in part by aberrant cerebral transglutaminase activity and by increased cross-linked proteins in affected brains. Here we describe the possible molecular mechanisms by which these enzymes could be responsible for such diseases and the possible use of transglutaminase inhibitors for patients with diseases characterized by aberrant transglutaminase activity.

Mini Review **Published Date:-2017-06-06 00:00:00**

Fungi present in home and their impact on human health-A short review

It is estimated that even up to 30% of buildings worldwide may be the subject of complaints connected with the quality of indoor air. Potential sources of air pollution can be both organic and inorganic particles. This article focuses on biological air pollutants from living and dead biological sources, especially those connected with fungi. Fungi found in the indoor air of domestic dwellings in a large extent are similar in their species composition to those found on the outside of the building. Microorganisms enters into the buildings during the airing of rooms or through the different slots and can develop on the surfaces of various materials. Intensively develops in a poorly ventilated, damp and dusty environments. For this reason the exposure to the indoor air pollution might be stranger for inhabitants than the expose to the impurities of the outdoor air. Presence of fungi in domestic dwellings can be very danger because of most often is associated with allergic reactions, mycotoxins, volatile organic compounds or even with fungal infections.

Research Article **Published Date:-2017-01-20 00:00:00**

Ethical Dimensions of Population Genetic Research in the Caucasus

The emergence and establishment of anthropological genetics as an interdisciplinary science is primarily, associated with the development of new genomic technologies. Precision genetic testing on the one hand, and the rapidly increasing number of genetic investigations on the other, have created a set of bioethical dilemmas for genetic and epidemiology research. Such research deals with persons who have the right to the protection of their personal information and confidentiality, and also concerns collective (village, region, ethnic group, state) consciousness, ethnic identity, and traditional culture, i.e., so called "ethnic pride". In this regard, taking into consideration the results of ongoing field research, we make some recommendations for better management of relationships with individuals and communities and the preparation of questionnaires and informed consent forms that will facilitate similar research projects, especially in such an ethnically, linguistically and culturally diverse region such as the Caucasus.

Short Review **Published Date:-2017-01-09 00:00:00**

Endothelial Repair and Endothelial Cell-Derived Secretome

Growing evidence supports the hypothesis that endothelial cell-derived microparticles (MPs) might contribute to the pathogenesis of cardiovascular (CV) disease. Endothelial cell-derived MPs play a pivotal role in the regulation of the endogenous repair system, thrombosis, coagulation, inflammation, immunity and metabolic memory phenomenon. There is evidence that the MPs are secreted actively accompanied to other regulatory molecules. All these actively synthetizing and secreting factors include proteins, adhesion and intercellular signal molecules, peptides, lipids, free DNAs, microRNAs, and even microparticles (MPs) are defined as cellular secretome. The proteomic profile of secretome is under tightly control of genetic and epigenetic mechanisms, which may altered a secretion of the proteins involved into MPs' organization. Finally, this may contribute the modification of MP's after their secretion and throughout transfer to the target cells. As a result, communicative ability of endothelial cell-derived MPs may sufficiently worse. Subsequently, cross talk between some components of secretome might modulate delivering cargos of MPs and their regenerative and proliferative capabilities via intercellular signaling networks. The aim of the review is to discuss the effect of various components of secretome on MP-dependent effects on endothelium.