Antioxidants Attenuate Diabetes-Induced Activation of Peroxisomal Enzymes

Whereas diabetes involves overproduction of reactive oxygen species and pro-inflammatory cytokines [31], the role of oxidative stress in hyperglycemia-induced nephropathy is unknown. At the same time, the role of peroxisomes in the regulation of cellular oxidative stress is now well established [34]. Dhaunsi and Bitar [10] showed that streptozotocin-induced experimental diabetes induces redox-sensitive enhancement of peroxisomal enzyme activities in the rat kidney. These findings suggest that the use of antioxidants might prove useful to control peroxisome-mediated oxidative stress and to alleviate nephropathy in diabetes.

Calpain Inhibitor Protects against Acute Liver Failure

Recent studies [22] demonstrated a pivotal role for calpain, a cytosolic Ca$^{2+}$-dependent protease, in various types of hepatocyte injury [22]. Control of calpain activation may therefore be a suitable therapeutic intervention for fulminant hepatic failure. Wang et al. [42] evaluated the effects of a potent cell-permeable calpain inhibitor, MDL28170, and its mechanisms of action on thioacetamide (TAA)-induced hepatotoxicity in mice. They found that MDL28170 attenuates TAA-induced acute liver failure via inhibiting hepatocyte apoptosis, abrogating iNOS and TNF-α mRNA up-regulation, and blocking hepatic stellate cell activation.

Electroacupuncture Enhances Sleep

Whereas electroacupuncture (EAc) possesses broad therapeutic effects including improvement in sleep disturbance, the underlying mechanisms are not well defined. Yi et al. [44] found in rats that rapid eye movement and slow wave sleep are increased during the dark period after administration of EAc stimulation of ‘Anmian (extra)’ acupoints. These EAc-induced sleep enhancements are blunted by lesions of the caudal nucleus tractus solitarius, which produces electroencephalographic synchronization on activation [26]. They conclude that this medullary nucleus may be involved in the regulation of EAc-induced sleep alterations.

Thalidomide Attenuates Lipopolysaccharide-Induced Lung Injury

Severe sepsis is the most common risk factor that is associated with the development of acute lung injury. Chen et al. [6] evaluated the protective effect of thalidomide, a synthetic sedative derived from glumatic acid with reported anti-inflammatoyr, immunomodulatory, and anti-angiogenic properties [21] on acute lung injury induced by lipopolysaccharides. They found that thalidomide significantly reduces pulmonary nitric oxide production, pulmonary microvascular permeability and LDH activity in bronchoalveolar lavage fluid. These observations indicate that thalidomide is able to ameliorate lung inflammation and reduce acute lung injury induced during sepsis.

Mercury in Thimerosal-Containing Vaccines Is Not Related to Autoimmunity in Autism

Autism spectrum disorder is being diagnosed at an unprecedented rate, with 1 in 250 children in the United States reported to be afflicted. Singh et al. [35] previously studied the role of abnormal measles-mumps-rubella antibodies and CNS autoimmunity in autistic children [35]. These authors have now explored in 60 autistic children the role of mercury as a risk factor for autism [36]. They found no evidence for a difference in thimerosal (i.e. mercury)-induced antinuclear antibodies and antilaminin antibodies in autistic and normal children who had been inoculated with thimerosal-containing vaccines.

NADPH Oxidase in Human Lung Fibroblasts

Innate host immune responses, mediated at least in part by virus-induced oxidant stress, appear to play an important role in the pathogenesis of some viral respiratory infections [41]. An NADPH-oxidase-like enzyme has been implicated as the source of the oxidant stress following rhinovirus challenge of human fibroblast cells [20]. Dhaunsi et al. [11] confirmed the presence of components of NADPH oxidase in human embryonic lung fibroblasts and identified the gp91-phox homolog NOX4 as the likely cytochrome in these cells. An understanding of the signal transduction pathways involved in the innate response to rhinovirus may implicate potential targets for intervention in these infections.

Thymosin α1 and Tumor-Associated Macrophages

Tumor-infiltrating dendritic cells (DC) have been shown to play an important role in antitumor response in an immunocompromised state in a tumor-bearing host [2, 8]. Srivastava et al. [33] reported that thymosin-α1 (thymosin α1), an immunomodulatory thymic peptide, shows the unique ability to augment differentiation and activation of DC from tumor-associated macrophages (TAM). They further showed that DC generated from thymosin-α1-administered tumor-bearing mice manifest augmented antitumor activity in vitro. Adoptive immunotherapy using TAM-derived DC showed a significant delay in tumor growth and a prolongation of the survival time in tumor-bearing mice. DC obtained from thymosin-α1-administered mice also increased the production of cytokines like IL-1 and TNF-α. These findings will help to design DC-based immunotherapeutic protocols in the treatment of lymphomas using thymosin.
Retinoic Acid Induces Apoptosis in Human Bladder Carcinoma T24 Cells

Retinoic acid (RA) is known to play an important role in regulating growth, differentiation, and apoptosis of many cell types, including bladder cancer cells [45]. Most of the biological activities of retinoids are thought to be mediated by nuclear retinoid receptors [15]. Whether retinoid-induced apoptosis involves cytoskeletal changes is not clear. Chien et al. [7] provided detailed morphological analysis of bladder carcinoma T24 cells during retinoic-acid-induced apoptosis. They reported that breakdown in the intermediate filament network but not cytoskeletal architecture of microtubules may be the crucial event in the apoptotic process.

Keratinocyte Stem Cell Markers Identified in Rat Cornea

Stem cells have been the focus of contemporary research because of its wide application in medicine. These cells are relatively undifferentiated, and have the ability to self-renew and undergo asymmetric cell division to form other cell types [9]. The search for stem cell markers from different tissues constitutes the first step in understanding stem cells. Hsieh et al. [16] examined the postnatal expression patterns of p63, a p53 homologue implicated in epithelia stem cell regeneration, along with other keratinocyte stem cell markers in rat cornea. The results provide some basic information on the characteristics of rat cornea stem cells.

Development of Neural Stem Cells from Human Umbilical Cord Blood

Stem cells have been the focus of recent studies because they have the potential to proliferate and differentiate into the desired cell type [27]. They thus provide a means to treat diseases such as neural degeneration. Whereas human umbilical cord blood is a good source of stem cells because of easy access [13], very few cells isolated can differentiate into neural cells. Pu et al. [14] described a method in which umbilical mesenchymal cells are cultured in neuronal condition medium to promote the differentiation of these cells into the neuronal type. This method will be useful for future development of therapies for neurological diseases.

Overexpression of Rhotekin Increases Survival in Gastric Adenocarcinoma

In the postgenome era, identifying functions of genes which are overexpressed in prevalent human cancer has become an important direction in biomedical research [39, 40]. Liu et al. [24] reported that rhotekin, the gene coding for Rho effector, is overexpressed in human gastric cancer. They also found that overexpression of rhotekin activates NF-κB and confers resistance to drug-induced apoptosis. These findings not only provide a mechanistic insight into carcinogenesis of human gastric cancer, but may lead to a new direction for diagnosis and therapeutic management of gastric cancer in the future.

Calcium Induces Keratinocyte Differentiation via Mitochondrial Membrane Depolarization

The molecular mechanisms that govern keratinocyte proliferation and differentiation are poorly understood, although a high concentration of extracellular calcium induces keratinocyte differentiation [3, 15, 30]. Savignan et al. [32] observed that HaCaT cells, a keratinocyte cell line, undergoes rapid proliferation when grown in medium containing low calcium, but exhibits differentiation and proliferation arrest under high calcium concentrations. They further showed that an increase in [Ca2+]i leads to mitochondrial membrane depolarization, which in turn induces HaCaT keratinocyte differentiation. These observations provide a molecular mechanism by which calcium levels regulate keratinocyte growth and differentiation.

Rhodostomin Inhibits Adhesion of Neutrophils to Fibrinogen

Disintegrins are a group of RGD-containing snake venom proteins which inhibit platelet aggregation via blockade of αIIbβ3 integrin. Tseng et al. [38] found that rhodostomin, a medium-chain disintegrin isolated from the venom of Calloselasma rhodostoma [19], interacts with platelets and leukocytes of the myeloid and monocytic lineage. Rhodostomin also blocks the Mac-1-dependent adhesion of neutrophils to immobilized fibrinogen, and decreases the production of superoxide from adherent neutrophils. These results indicate that rhodostomin binds to activated neutrophils in a RGD-dependent manner.

L-Arginine as a Prophylactic Blocker of Methylglyoxal in Diabetic Patients Cautioned

Methylglyoxal (MG), a reactive 2-oxoaldehyde, is a widely occurring compound that is produced by most glucose-metabolizing cells. As an increase in MG concentration in blood samples of diabetic patients correlates with the development of diabetic complications [28], high-dose L-arginine has been suggested as an agent to scavenger MG [25]. Tsai et al. [37] found a dose-dependent generation of superoxide anion when L-arginine reacts with MG in a buffered lucigenin solution or in a serum-based system. They therefore caution the appropriateness of utilizing high-dose L-arginine as a prophylactic blocker for early glycation reaction in diabetic patients.

A New Form of Cationic Microspheres for Gene Therapy

The ability to deliver peptide nucleic acid-DNA complexes into cells can be an important therapeutic approach. Mischiati et al. [29] showed that cationic microspheres consisting of neutral polymer Eudragit RS100 plus DDAB, can complex with double-stranded PNA-DNA (PDP) chimeras. Since such complexes prevent molecules from degradation in serum or inside the cells, they may serve as a delivery tool for gene therapy. Using PDP molecules containing an NF-κB sequence, these authors demonstrated that this approach can successfully decay the NF-κB transcription factor from the HIV-1 LTR. This study advances previous work [27] on the use of cationic lipids as a therapeutic delivery tool.

References

Biomedical Vignette