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PRODUCTOS NATURALES PARA CICATRIZACIÓN DE HERIDAS EN MEDICINA VETERINARIA. NATURAL PRODUCTS FOR WOUND HEALING IN VETERINARY MEDICINE.

Wound healing in veterinary medicine is a mixture of processes including inflammation, cell proliferation and, in most cases, microbial infection due to the characteristics of the animals' skin. Natural products from different sources, whether animal or plant, have antioxidant, anti-inflammatory, antibacterial and pro-regenerative activities that aid in wound healing. Honey and herbal extracts are natural products that have many health benefits, both human and animal, including their effect on wound healing. Honey is a highly concentrated viscous solution of floral sugars, proteins and enzymes derived from bee crops. Herbal extracts are liquid solutions made from dried or fresh plants extracted with alcohol and/or water. The active compounds of natural products depend on their biological origin, but both (honey and herbal extracts) contain several compounds that act additively or synergistically. Among these compounds, we can mention polyphenols which are considered the most important antioxidants and can be easily quantified. They also help in the elimination of inflammation products. The antibacterial effect is usually a combination of different mechanisms of action due to the different compounds present. Since these compounds may have redundant activity, the occurrence of resistance is less frequent with these products than with commonly used antibiotics with only one active compound. We should not forget that there is concern about antibiotic resistance after use, so natural products provide an alternative approach to skin infections and wound healing in animals. Finally, they also promote the proliferation of cellular components (fibroblasts and keratinocytes) involved in the regeneration mechanism. Despite the beneficial effects on wound healing, efficacy and safety data supporting the use of natural products in animals is limited and further research is needed.

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SIMPOSIO / SYMPOSIA 7

Coordinador Dr. Mario Herrera (Uch), "Pharmacological opportunities targeting long-term metabolic deficits induced by perinatal asphyxia".
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PARTO, UNA INSTANCIA DE REPROGRAMACION METABOLICA CON UN INCIERTO RESULTADO. DELIVERY, A METABOLIC REPROGRAMMING HUB LEADING TO AN UNCERTAIN OUTCOME: CLINICAL AND EXPERIMENTAL CONSIDERATIONS.

Labour and delivery imply a complex and sequential metabolic and physiologic cascade, culminating in a successful childbirth in most circumstances. Delivery can, however, be risky, whenever oxygen supply is interrupted, producing perinatal asphyxia (PA). PA causes an energy failure, leading to cell dysfunction and death when re-oxygenation is not promptly restored. Re-oxygenation induces a long-term energetic crisis affecting metabolism and the repairing machinery required for proper development, making the neonate vulnerable to recurrent metabolic insults. The consequences of PA depend upon the length of the oxygen-deprivation period, resuscitation/re-oxygenation manoeuvres, and developmental stages of the affected brain regions, mesencephalon and hippocampus being highly vulnerable regions. With a model of PA in rat, we identified relevant targets responsible for the metabolic cascades linked to neurodevelopmental impairments. Severe PA induced a sustained effect on redox homeostasis, increasing oxidative stress, decreasing metabolic and tissue antioxidant capacity in vulnerable brain regions, even weeks after the insult. Catalase activity was decreased in mesencephalon and hippocampus from PA-exposed, compared to control neonates, in parallel with increased cleaved-caspase-3 levels, associated with decreased glutathione reductase and glutathione peroxidase activity, a shift towards the TIGAR-dependent pentose phosphate pathway, and delayed calpain-dependent cell death. The brain damage continued long after the re-oxygenation period, extending for weeks after PA, affecting neurons and glial cells, including myelination in grey and white matter. The resulting vulnerability was investigated with organotypic cultures built from PA and control neonates, finding that substantia nigra TH-dopamine-positive cells from PA neonates were more vulnerable to 1 mM of H2O2 than the controls. Several therapeutic strategies have been investigated, including hypothermia, nicotinamide, and intranasally administered mesenchymal stem cell secretomes, promising clinical translation.

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LA CIRCULACIÓN PULMONAR SOMETIDA A HIPOXIA CRÓNICA PERINATAL. ES MAS QUE UN TEMA DE REACTIVADA VASCULAR. PULMONARY CIRCULATION SUBMITTED TO PERINATAL CHRONIC HYPOXIA. IS MORE THAN VASCULAR REACTIVITY MATTER.

The perinatal cardiovascular transition is one of the most radical physiological processes during the life of the individual. The case of pulmonary circulation involves changes not only from the functional point of view but also, more importantly, changes in cellular structure and phenotypes. Oxygen bioavailability is a great modulator of this transition. Chronic gestational hypoxia condition may produce an inefficient process, keeping pulmonary vascular resistance elevated, and leaving the neonatal pulmonary artery pressure increased. Oxygen-dependent factors such as growth factor, and proliferative factors, but to a minimal extent proinflammatory factors such as cytokines, have always been considered as participating agents in this process of perinatal vascular remodeling. The inflammatory process has always been considered the response of inflammatory cells in its development, however, since a few years ago, inflammation has implied the response to stressful situations in which cytokines participate in the adaptation of cells and tissues to new environmental, metabolic, physiological, or pathophysiological conditions. In this work, we will focus on describing in the postnatal period, how chronic gestational hypoxia induces the expression of cytokines at the pulmonary circulation level, as well as proliferative and fibrotic factors and how these are involved in the pulmonary remodeling that this condition induces in neonates living in the Chilean Andean altiplano. Our results show how inflammation is present in the neonatal lung territory and can be reversed with an anti-remodeling and inflammatory treatment. This may imply opening therapeutic windows or physiological study of vascular remodeling process.

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USO DE ORGANOIDES EN 3-D COMO MODELO DE INJURIAS HIPOXICAS DEL CEREBRO. USING 3-D BRAIN ORGANOIDS AS A MODEL IN HYPOXIC BRAIN INJURY.

Recent advances in cell culture technologies have led to the development of new three-dimensional tissue models, known as organoids, which more accurately reflect key structural and functional properties of their in vivo counterparts. Mini brains (cerebral organoids) are now being used to study brain disorders, such as Alzheimer's disease, schizophrenia, microcephaly, and other brain disorders, as well as in drug discovery and regenerative medicine. The development of organoid cultures has a great expectation within the research community to get valuable information in development and disease. Karolinska Institutet Stem Cell & Organoid unit is constantly working to develop more accurate and scalable organoid culture methods. We have developed a 3D-organiod culture system which utilizes hydrogel encapsulation and use of spinning bioreactors as well as microgravity based rotary wall vessel bioreactor to mimic the natural microenvironment for the brain development. The objective of this lecture is to provide knowledge and information about the developments in the area of organoids / 3D culture and support research groups that look forward to incorporate reliable and advanced in vitro organoid models in their ongoing and future research projects/studies, for example hypoxic brain injury model.

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