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ROLE OF CHINESE MEDICINE IN STEM CELL FOR TISSUE REGENERATION

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ABSTRACT

Adult stem cells play a crucial role in tissue renewal and regeneration. Adult stem cells located in certain organs can differentiate into functional entities such as macrophages and bone cells. Hematopoietic stem cells (HSCs) and mesenchymal stem cells (MSCs) are two of the most important populations of adult stem cells. They are also capable to travel through the circulation, migrate to injury sites and differentiate to enhance regeneration process. Chinese medicine (CM) has shown to be potential candidates to activate adult stem cells for tissue regeneration. The activation of adult stem cells self-regeneration not only provides a novel way to repair tissue damage, but also reduces the use of targeted drug that adversely altering the normal metabolism of human subjects.

Keywords: Stem cells, Chinese medicine, regeneration

INTRODUCTION

Regenerative Chinese Medicine

The regenerative medicine is one very old medicine and also one newly developing cross-over science. Definition of regenerative medicine is : To apply the principles and methods of life science, material science, computer science and mechanical engineering to conduct research and development to replace, repair, improve or regenerate different tissues and organs of human body of regenerative curative

technologies and products to use in damaged tissues and organs or disabled function that is caused by diseases, injuries, aging, or hereditary factors.

Concepts of maintenance of living mechanism:

The "living mechanism" is the regeneration capacity of self-control and self-repairing of human body. "The shen is the primary living mechanism."

Huang-di-nei-jing: Ling-shu: Tian-nan described "Losing the shen will be dead and gaining the shen will be alive."

Jing-qi theory:

Huang-di-nei-jing: Ling-shu: Ben-shen described "The original born essence is called jing."

Huang-di-nei-jing: Shu-wen: Jing-qui-zhen-yan described "The jing is the original source of life." It assumes that the jing is the foundation of the developing growth of human body, regenerative repairing, and maintenance of life.

Huang-di-nei-jing: Ling-shu: Yin-yang-mai-ji described "Two shen integrating together is to become form of body. The body is to grow first, called jing." The jing-qi is original source from parents. It requires food of the secondary source continuing to provide nutrients to grow.

"The qi converts jing. The jing is to transform." The function of tissues and organs is original from the jing to convert and transform. Thus, "without this, the ying-qi of five zang cannot nourish and the yang-qi of five zang cannot grow." The essence jing of kidney can improve growth, development, reproduction, regeneration, repairing, and aging. The growth begins at young age to reach the zenith. After the middle age, the energy becomes slow down. "After forty years of age, the yin-qi will become more than half." The kidney qi will be gradually consumed to exhaust.

WHY CHINESE MEDICINE:

The artificial chemical drugs are very similar to artificial fertilizer. On the other hands, the therapeutic effectiveness is relative stronger with one specific therapeutic effective

ingredient. It cannot meet the multiple requirements for satisfying the regeneration and repairing of tissues and organs. It cannot maintain at the best condition for holistic tissues and organs environment. Therefore, over-usage and irrational usage of chemical drugs not only cannot solve old problems, but also induce many iatrogenic diseases. It can make the tissues and organs environment become worsen.

The control of tissues and organs regeneration of Chinese medicine drugs is relied on natural healing capacity of tissues and organs for the injured tissues and organs to regenerate and repair. It reconstructs function of tissues and organs based on natural law. It follows the natural flowing rule to convert the pathological flowing. It adjusts diseases of whole body. Thus it is relative safe and high effective. Therefore, it has very important scientific meaning and clinical application value to conduct research in Chinese medicine drugs to adjust the function and mechanism of tissues and organs regeneration.

TCM claims that the secret for optimum bone health lies in the functioning of the kidneys. The ancient Chinese texts state: "the kidneys are in charge of the bones." The kidneys store Qi, the vital essence believed to be responsible for health and vitality. When the Qi energy is strong, it can stimulate growth and transformation of the marrow, which nourishes and invigorates the skeleton. The Chinese ancients focused their attention on promoting the generation of Qi, knowing that this vital essence would naturally and powerfully promote blood and bone health. Many bone problems originate from poor circulation, inhibiting the delivery of vital

nutrients to the bone cells. In addition, when dead cells are not washed away and are allowed to build up, stagnation is compounded. To counteract this, TCM ancients knew they needed to develop an herbal bone formula that combined rich kidney tonics, amino acids, and herbs that revitalized the cell systems and enhanced blood circulation and microcirculation. From modern science we know that the revitalization of the cell systems and enhanced blood circulation can produce positive results for bone regeneration.

In a bone cells culture experiment, adding *Cuscuta chinensis* Lam. (TCM-5) to the bone cells culture clearly promoted the proliferation and differentiation of the osteoblasts from their precursor cells; but the reduced amount of TRAP indicated that the medicine significantly inhibited the osteoclasts activities. Opposite bone cell responses were observed when *Loranthus parasiticus* Merr. (TCM-3) and *Achyranthes bidentata* Bl. (TCM-4) were added to the bone cells culture. *Encomia ulmoides* Oliv. (TCM-1) and *Dipsacus asper* Wall. (TCM-2) potentially influence the proliferation and differentiation of the osteoblasts from their precursor cells, but they did not affect the osteoclasts activities. The finding from the organ culture indicated that Chinese medicine effectively increased the rate of tissue regeneration of damaged bones.

SHEN YIN (NEGATIVE NEPHRIDIIUM)

SHEN YANG (POSITIVE NEPHRIDIIUM)

SHEN YIN TONIFIERS:

-nourishes the tissues to enhance msc proliferation

-differentiation of msc

List of shen yin tonifiers:

-Tortoise plastron

-Pulp of cornus

-Wolfberry fruit

-Herba gynostemae

Tortoise plastron:

-abundant in fatty acid esters, sterol esters, ketosteroids.

-fatty acid esters effective in MSCs proliferation in low concentration and overgrowth in high concentration

-premier is high performance of osteogenic inducement

-induce alkaline phosphatase-increase osteocalcin level

-differentiation of myoblasts

Herba gynostemae:

-induce MSCs to form neurocytes

SHEN YANG INVIGORATORS:

-related to cellular metabolism

List of shen yang invigorators:

-drynariae rhizoma

-epidemy

EPIMEDY:

- is a shen yang invigorator

-improved osteogenic differentiation of MSCs for expression of TGF-beta 1 and BMP-2

Drynariae rhizome:

-effective in osteoporosis and bone resorption

-promotes MSCs proliferation and osteogenic differentiation

BLOOD ENRICHERS AND ACTIVATORS (BEA) :

- improves micro circulation
- contributes to ossification

List of BEAs :

- cortex eucommiae
- rehmanniate
- fructus psoralea
- achyranthes
- salvia miltiorrhiza
- angelica sinensis
- dipsacus asperoids

Salvia miltiorrhiza :

- induce blood vessel formation
- brings about superior blood supply
- Extract - salvianolic acid
- have neuron like cells inducing action

Dipsacus asperoids :

- Effective constituent- D.asperoids glucoside
- stimulate MSCs reproduction and osteogenic differentiation

Angelica sinensis :

- induce MSCs to neurocytes

DRUG COMBINATIONS:

Ancient formula- Gui-Lu-Er-Xin-Jiao - for deficiency of shen yin and yang contains- Antler glue and Tortoise plastron

Recent formula- shen yang invigorators and bees Most effective- rhizoma drynariae and radix rehmanniae - high collagen production shengji liquor-contains-tortoise plastron and angelica sinensis favours MSCs proliferation

CONCLUSION:

The theories of Chinese medicine have been lasted for more than two thousand years in clinical practice. Without doubt, it is the

important self-renovation for idea inspiration and matter treasure for Chinese medicine. In order to take this advantage, it requires solving modern understanding of Chinese medical theories and scientific expression of clinical experience. The control of liver regeneration in Chinese medicine has large amount of clinical experiences. "The tonifying kidney to grow bone marrow to develop liver" is to control liver regeneration proving the therapeutic effectiveness, which is one characteristic of Chinese medicine. However, research of the control liver regeneration in Chinese medicine has any break-through development. The basic reason of liver regeneration mechanism is very complicated. It is to adjust holistic systemic dynamical control. The liver regeneration of Chinese medicine has multiple routes, levels, directions, systems, ingredients, targets, and time system effect that make Chinese medical research difficult conquer.

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