MECHANISMS OF AGING AND THE FUTURE ANTI-AGING THERAPIES BASED ON THE MEMBRANE HYPOTHESIS OF AGING (MHA) AND THE USE OF HUMAN GROWTH HORMONE (hGH)

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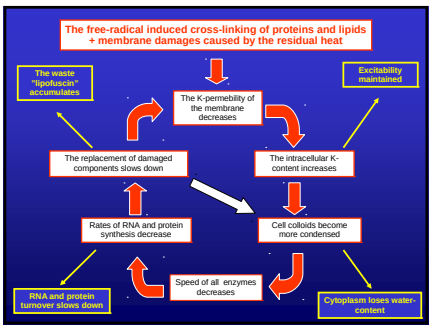
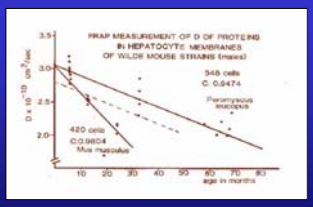
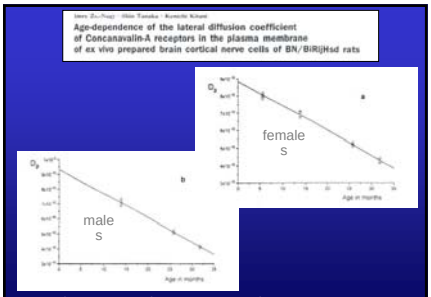
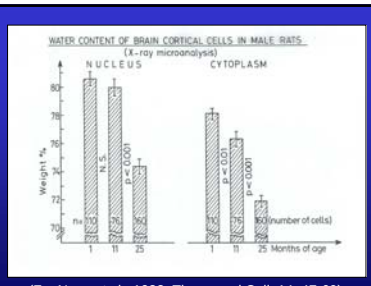




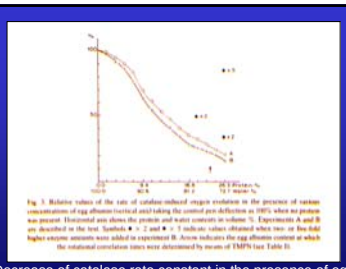
(Zs.-Nagy et al., 1993. J. Gerontol.Biol. Sci. 48, B86-B92)



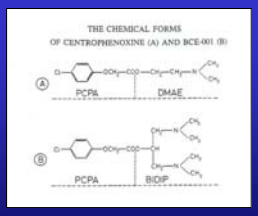
(Zs.-Nagy et al., 1999. Exp. Brain. Res. 124, 233-240)



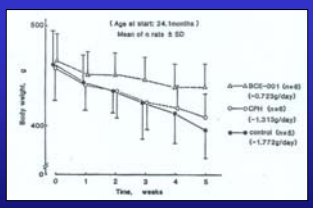
(Zs.-Nagy et al., 1982. Tissue and Cell, 14, 47-60)



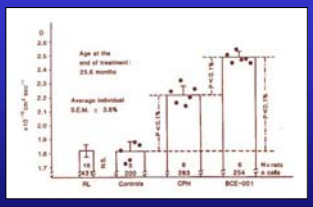
Decrease of catalase rate constant in the presence of egg albumin
(Zs.-Nagy and Floyd, 1991, Arch. Gerontol. Geriatr. 13, 187-200)



(Zs.-Nagy, I., 1994. Ann. N.Y. Acad. Sci. 717, 102-114)



(Zs.-Nagy et al., 1989. Exp. Gerontol. 24, 317-330)



(Zs.-Nagy et al., 1989. Exp. Gerontol. 24, 317-330)

THE MAIN PHASES OF THE DISCOVERY OF GH
(Lindholm, J., Pituitary, 9, 5-10, 2006)

1887: recognition of the relationships between the acromegaly and the pituitary tumors, debated during the next 20 years

1909: Pituitary surgery starts for treating growth-disorders

1922: the existence of GH in anterior pituitary is proven

1957: recognition of the species-specificity of GH;

1971-: sequence of hGH clarified, recognition of GH-releasing hormone and somatostatin

1985-: recombinant human (rh) GH becomes available, somatostatin-analogues, membrane-receptors discovered, IGF recognized, adult GH-deficiency (AGHD) treated successfully

Some important literary sources about hGH from 2000

Anders Juul and Jens O.G. Jorgensen (Eds.) + 46 author:
GROWTH HORMONE IN ADULTS
Physiological and Clinical Aspects
CAMBRIDGE UNIVERSITY PRESS, Cambridge, UK
Second Edition, 2000, p. 498.

Perls, T.T., Reisman, N.R., Olshansky, S.J. (2005):
Provision or distribution of growth hormone for "antiaging":
J. Am. Med. Assoc. 294, 2086-2090.
(shortly cited as: JAMA Commentary)

American Academy of Anti-Aging Medicine (A4M): (2005):
Official A4M response to JAMA Commentary on growth hormone.
Available at: www.worldhealth.net

The main statements of the JAMA Commentary:

The use of hGH for anti-aging treatments is illegal, criminal and requires persecution.

The main points of A4M answer:

The statements of the JAMA Commentary are incorrect, are filled in with misplaced references, and multiple scientific errors, in an apparent attempt to damage the anti-aging medical profession (supported by 52 cited references).

THE ANSWER TO THE MAIN QUESTION:
YES

THE RATIONALE FOR THIS ANSWER:

1. hGH replacement in proper doses is beneficial in all aspects of aging physiology studied so far.

2. The effects of hGH are in perfect agreement with the predictions of the membrane hypothesis of aging (MHA).

3. Earlier in 2006, the price of the rGH-dose needed for a long-term treatment became an order of magnitude lower; its costs now around 200 US-$/month (Saizen, Serono).

DEVELOP-MENTS IN COMBINING THE GROWTH HORMONE REPLACEMENT THERAPY AND THE MHA

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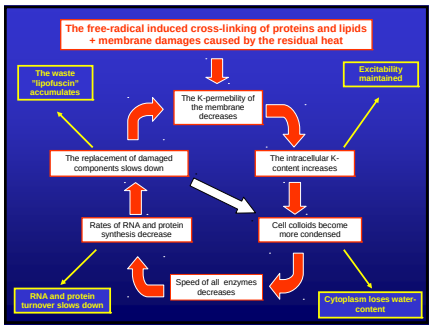
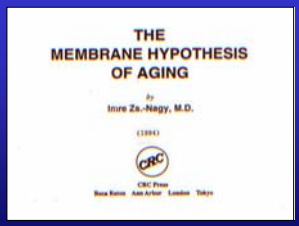
MAY BECOME THE HUMAN GROWTH HORMONE (hGH) REPLACEMENT THERAPY A USEFUL ANTI-AGING INTERVENTION?
AN OPEN-MINDED THEORETICL APPROACH

Presented during recent meetings in:
Budapest, (May, 2006), Vienna (June, 2006), London (September, 2006), Paris (October, 2006), Monte Carlo (March, 2007), Rome (May, 2007), St. Petersburg (July, 2007), Chicago (August, 2007), Paris (October, 2007), Alexandria (May, 2008), Duesseldorf (September, 2008), Taipei (September, 2008) Debrecen (June, 2009), Budapest (October, 2009)





THE KNOWN INTERRELATIONSHIPS MUST BE INTERPRETED IN FRAME OF A PROPER CELL BIOLOGICAL MECHANISM, WHICH IS NOT CONTRADICTING ANY OF THE WELL-ESTABLISHED FACTS.

This job has been performed by „the membrane hypothesis of aging" (MHA)

The main references of MHA:

Zs.-Nagy, I. (1978): J. Theor. Biol. 75, 189.
Zs.-Nagy, I. (1979): Mech. Ageing Dev. 9, 237.
Zs.-Nagy I. (1994): The Membrane Hypothesis of Aging CRC Press (USA), monography, p. 208.
Zs.-Nagy, I. (1997): J. Mol. Med. 75, 703.
Zs.-Nagy, I. (2002): Ann. N.Y. Acad. Sci. 959, 308.

REVIEW

Imre Zs.-Nagy

The membrane hypothesis of aging: its relevance to recent progress in genetic research

Received: 11 October 1996 / Accepted: 16 April 1997

Abstract This review outlines the main concepts of the membrane hypothesis of aging (MHA) developed over the past two decades. MHA offers a general cell biological mechanism to explain the main trends of age-dependent changes in terms of intracellular physicochemistry. An essential point in MHA is that the inevitable plasma membrane alterations result in the accumulation of dry mass in the intracellular space, a process that is essential to cellular development and organismal maturation, but which becomes a rate limiting factor above a certain physical density of the cell colloids. The main statements of the MHA are supported by recent developments in molecular genetics. Specifically, the great majority of the products of oncogenes and antioncogenes are localized to the plasma membrane, indicating a central role of the plasma membrane in mitotic regulation, cell differentiation and senescence.

A LIST OF ONCOGENES AND ANTIONCOGNES REGULATING THE CELL DIVISON AND AGING, THE PRODUCTS OF WHICH ARE LOCALIZED TO THE CELL PLASMA MEMBRANE

gas, ras, kit, fgr, yes, yet, fsv, ros, met, erb, neu, trk, fms, senescence-associated gene, schwannomin gene, prohibitin gene, mortalin gene, p53 and p21 genes, statin gene, gerontogenes, etc.

For details see:
(Zs.-Nagy, I., 1997. J. Mol. Med. 75, 703-714)