FGF-1 as Cosmetic Supplement

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GENTEON USA
Fibroblast Growth Factor 1 (FGF-1)

- Its human gene was first cloned by our lab in 1989;
- Single polypeptide of 17.3 kDa and a pl of 5.0;
- Mitogenic for a variety of mesenchymal and neuroectodermal cells;
- Inducer of neuronal differentiation and embryonic mesoderm formation;
- Angiogenic *in vivo*, may play a role in tissue repair and wound healing.
Mouse FGF1 mRNA is present in neurons but not in glial cells
Our laboratory was the first to solve the FGF1 gene structure and its tissue-specific expression in humans.
We have solved the 3-D structure of FGF-1 using Nuclear Magnetic Resonance
Twelve NMR Structures of FGF-1

C-terminal
Interaction of FGF and FGF Receptor
Our laboratory discovered cysteine-131 is crucial in determining the heparin-binding domain structure of FGF1
Suramin

Polysulfonated Pyrrole Suramin (PPS)
PPS (Lead compound)
Batch: LC 89/43
Molecular Weight = 1209.06 Exact Mass = 1208
Molecular Formula = C_{45}H_{36}N_{10}Na_{4}O_{17}S_{4}
Solubility: DMSO, H_{2}O
Light sensitive. Hygroscopic. Store at 4°C
Model shows PPS will block the binding of FGF-1 to its Receptor
Differentiation of Neural Stem Cells

- **FGF1**
  - Broad potential
  - Self-renewing
  - Multipotent stem cells
  - Embryo or adult brain, blood ("")

- **FGF1**
  - Limited potential
  - Limited self-renewal
  - Neural progenitor
  - Brain or spinal cord

- **FGF1**
  - Limited division
  - Non-functional
  - Neuronal progenitor
  - Brain subregion

- **FGF1**
  - Committed neural progenitor
  - Glial progenitor

- **PDGF**
  - Non-mitotic
  - Functional
  - Neuron

- **CNTF/LIF**
  - Differentiated
  - Glia
  - Specific brain sites
Neural stem cells could be used to treat damaged neurons such as stroke and spinal cord injury and neural degeneration, including Alzheimer’s disease and Parkinson’s disease.
Using green fluorescent protein (GFP), DsRed2-1, and neo as a reporter gene to identify and enrich human neural stem cells

- F1B-Tag
- F1B-GFP
- F1B-DsRed
- F1B-neo
Our proprietary F1B-GFP could be used to study the medical application of neural stem cells.

The marketing value of neural stem cell Therapy is estimated to be USD $30 billion by 2010.
**FGF-1 as a cosmetic product**

FGF-1 rejuvenates both the epidermal cells and the underlying fibroblast cells, which produce collagen, elastin, and hyaluronic acid. These ingredients are now integrated into our cosmetic products.
FGF1 delivers the biological signals of both FGF2 and FGF7 (KGF).

- **FGF1**
  - **FGF2** → **Fibroblast Growth** → Producing collagen, hyaluronic acid, and elastin
  - **FGF7** → **Hair Follicle** → Hair growth
  - **EGF** → **Keratinocyte Growth** → Rejuvenating skin
Gel electrophoresis and Western blotting analysis of newt, bovine and human FGF-1
Human fibroblast growth factor 1 (FGF-1) stimulates Swiss/3T3 fibroblast cells to grow and to undergo mitosis.

6-10 ng/ml is the best %.
FGF-1 Helps Hair Grow
Patent

- U.S. Application No. 09/990,249 filed on Nov. 22, 2001
  (Published on August 1, 2002; Pub. No.: US 2002-0104114 A1)
- EU Application No. 01309893.4 filed on Nov. 22, 2001
- ROC Application No. 90128957 filed on Nov. 22, 2001
- U.S. Application No. 10/829,491 filed on Apr. 22, 2004
  (Published on Sept. 23, 2004; Pub. No.: US 2004-0187172 A1)

Other related patents invented by Dr. Ing-Ming Chiu

1. Patent no. 5,750,365 “Isolated Nucleic Acid Encoding A Newt Acidic Fibroblast Growth Factor (AFGF); Granted May 12, 1998
GENE THERAPY – E’SHEE CLINICAL ESTHETIC
BRING YOU AN NEW ERA OF ANTI-AGING
SKINCARE.

1984 Dr. CHIU First pioneer to clone human PDGF internationally.

1989 Dr. CHIU First pioneer to clone human aFGF internationally.

1998 USA INVENTOR PATENT – ISOLATED NUCLEIC ACID
ENCODING A NEWT ACIDIC FIBROBLAST GROWTH FACTOR
(AGF)

1999 USA INVENTOR PATENT – MURINE CELL LINES WHICH
OVER PRODUCE ACIDIC FIBROBLAST GROWTH FACTOR
(AGF) AND METHOD OF USING SAME

2001 Gorge W. BUSH mails to Dr. CHIU and praises his contribution.


2006 USA INVENTOR PATENT – DNA CONSTRUCT COMPRISING
AN FGF1B PROMOTER REGION OPERABLY LINKED TO AN SV40
LARGE T ANTIGEN ENCODING SEQUENCE

2006 USA INVENTOR PATENT – TRANSGENIC MOUSE FOR
SCREENING THERAPEUTIC AGENTS FOR BRAIN TUMORS