Novel Therapeutic Matrix Metalloprotease And Pro-Inflammatory Cytokine Inhibitors

"We’ve synthesized a novel class of compound that display biological activities equal to or better than natural curcumin, a principal biological compound in the popular Indian curry spice turmeric that has been used throughout history to treat a wide variety ailments. These new compounds could lead to improved treatment of connective tissue- and bone-destructive ailments, and inflammatory related diseases, including ARDS and rheumatoid arthritis."

— Drs. Lorne M. Golub and Francis Johnson, Stony Brook University

Background:

Curcumin, a principal biological compound in the popular Indian curry spice turmeric, has been used throughout history to treat a wide variety of skin, pulmonary, gastrointestinal system and liver diseases and conditions, as well as wounds. Today, numerous studies are starting to reveal why: curcumin acts as an antioxidant, anti-inflammatory, antiviral, antibacterial, antifungal and anticancer agent. Its activities are mediated through the regulation of various transcription factors, matrix metalloproteases (MMPs), growth factors, inflammatory cytokines, protein kinases and other enzymes.

Scientific studies are starting to unlock the interesting biological properties of curcumin, which someday could be used to inhibit the destructive activities of:

- Excessive levels of MMPs that are involved in a number of connective tissue- and bone-destructive ailments — periodontitis, arthritis, osteoporosis, cancer, and cardiovascular pulmonary diseases
- Aberrant pro-inflammatory cytokines produced by human monocytes that are linked to a plethora of human diseases, such as inflammatory bowel disease, acute respiratory distress syndrome (ARDS) and rheumatoid arthritis

Unfortunately, curcumin is notoriously insoluble and tends to have a cytotoxic effect on human cells at low concentrations, disadvantages that greatly limit the clinical use of curcumin and its analogues.

Technology Description:

At Stony Brook University, two eminent researchers are working with new synthetic compounds to overcome curcumin’s disadvantages. The compounds are designed to be more soluble than natural curcumin, which will enhance therapeutic efficacy, may improve pharmacokinetics, increase bio-availability and reduce cytotoxicity.

Francis Johnson, Ph.D., professor in the Department of Chemistry and Pharmacological Sciences, and president of the custom synthesis and process development company, Chem-Masters International Inc., has synthesized a novel class of compound that displays biological activity that may be better than naturally-occurring curcumin. Working with these novel compounds, Dr. Lorne M. Golub, D.M.D., M.Sc., M.D. (Honorary), distinguished professor in the Department of Oral Biology and Pathology, has used them as zinc binding agents to modulate human MMP expression, production and activity, as well as aberrant pro-inflammatory cytokine expression and harmful growth factor activity. Their research shows promise as a new treatment for connective tissue- and bone-destructive ailments, and inflammatory related diseases, including ARDS and rheumatoid arthritis.

Advantages

These novel compounds exhibit:

- Superior biological properties and activity vs. curcumin in experimental models
- Vastly improved solubility and bioavailability
- May improve pharmacokinetics

Applications

- Novel therapeutic compounds
- Zinc binding
- MMP activity
- Cytokine inhibitor

Patents / Publications:

- Patent Pending

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