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The Fourth Scientific Meeting of The TMJ Association.**

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**The TMJ Association is a national, non-profit organization whose mission is to improve the diagnosis,  
care and treatment of everyone affected by TMJ diseases and disorders through fostering research,  
education and other activities with the ultimate goal of preventing TMJ problems.**

THE FOURTH SCIENTIFIC MEETING  
OF THE TMJ ASSOCIATION

*A Systems Approach to the Understanding  
of TMJ as a Complex Disease*

Federation of American Societies for Experimental Biology (FASEB)  
Bethesda, MD  
September 11–12, 2006



... Moving TMJ Research into the 21st Century

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to Dr. Allen W. Cowley, Jr., Ph.D., The TMJ Association

The Fourth Scientific Meeting of The TMJ Association, *A Systems Approach to the Understanding of TMJ as a Complex Disease*, has been driven by concerns long held by temporomandibular joint diseases and disorders (TMJD) patients that there is more to this complex condition than dysfunction and pain of the jaw joint and muscles. The diverse set of co-morbid conditions found in the population of TMJD patients indicates that this is a multifaceted disorder and that diagnostic and therapeutic procedures must involve interdisciplinary approaches.

The overall goal of this meeting is to move research and treatment of TMJDs forward in the next decade by developing recommendations to meet the scientific and clinical challenges in creating an integrated systems approach appropriate to TMJ as a complex disease. To this end, scientists from diverse fields have been invited to:

1. Characterize the multiple symptoms and co-morbid conditions found in TMJD patients.
2. Develop recommendations for strategies and initiatives that could facilitate the development of cross-disciplinary and interdisciplinary research programs within our academic health care centers and across NIH Institutes and Centers.
3. Identify and recommend ways and means by which young clinical investigators from a variety of clinical specialties can become engaged in TMJD-related research.

## Scientific Meeting Planning Committee

Chairman

**Allen W. Cowley, Jr. Ph.D.**

Medical College of Wisconsin, Milwaukee, WI

**Ronald Dubner, D.D.S., Ph.D.**

University of Maryland, Baltimore, MD

**Stephen B. Milam, D.D.S., Ph.D.**

University of Texas Health Science Center,  
San Antonio, TX

**Julie Glowacki, Ph.D.**

Harvard Dental School of Medicine &  
Harvard Medical School, Boston, MA

**Christian S. Stohler, D.M.D., Dr. Med. Dent.**

University of Maryland Dental School,  
Baltimore, MD

**Stephen L. Gordon, Ph.D.**

Cognate Therapeutics, Bethesda, MD

**John T. Watson, Ph.D.**

University of California, San Diego, La Jolla, CA

*The Fourth Scientific Meeting of The TMJ Association:  
A Systems Approach to the Understanding of TMJ as a Complex Disease*  
Federation of American Societies for Experimental Biology, Bethesda, Maryland  
September 11–12, 2006

Monday, September 11, 2006

- 8:00 – 8:10 a.m.     **Welcome**  
Martin Frank, Ph.D., Executive Director, American Physiological Society
- Opening Remarks**  
Allen W. Cowley, Jr., Ph.D., Program Committee Chairman,  
The Medical College of Wisconsin, Milwaukee, WI
- NIH Welcome and Directives**  
Lawrence Tabak, D.D.S., Ph.D., Director, National Institute of Dental and  
Craniofacial Research, Bethesda, MD
- Session 1:            TMJDs as a Model of a Complex Disease Influenced by Environmental and  
                          Iatrogenic Risk Factors*
- Session Chairman: Christian S. Stohler, D.M.D., Dr. Med. Dent., University of Maryland Dental School,  
Baltimore, MD
- 8:10 – 8:20 a.m.     **Introduction to Patient Survey**  
Terrie Cowley, The TMJ Association, Milwaukee, WI
- 8:20 – 8:50 a.m.     **Factors Characterizing TMJ Diseases and Disorders: A Survey of Affected  
                          Individuals**  
Jane M. Kotchen, M.D., M.P.H., Medical College of Wisconsin, Milwaukee, WI
- 8:50 – 9:00 a.m.     **A Patient's Perspective**  
Linda Hoover, Toledo, OH
- 9:00 – 9:30 a.m.     **Interdisciplinary Approaches for the Study of TMJ Patients: Co-morbid Conditions  
                          That Can Arise from Chronic Pain**  
Christian S. Stohler, D.M.D., Dr. Med. Dent., University of Maryland Dental School,  
Baltimore, MD
- 9:30 – 10:00 a.m.   **The C1-C2 Spinal Cord: Nociceptive Processing of Input from the Vagus and the  
                          Neck and Jaw**  
Robert D. Foreman, Ph.D., University of Oklahoma Health Sciences Center,  
Oklahoma City, OK
- 10:00 – 10:15 a.m.   **Break**
- 10:15 – 10:45 a.m.   **Uncovering the Local Biochemical Milieu of Myofascial Trigger Points:  
                          Implications in TMJ-Related Pain**  
Jay P. Shah, M.D., Clinical Research Center, National Institutes of Health, Bethesda,  
MD

10:45 – 11:15 a.m. **Brief Poster Summaries**

**Regulation of CGRP Expression in an in Vivo Model of TMJ Inflammation**

Vinit Patil, M.S.

Vinit Patil and Paul Durham, Missouri State University, Department of Biology, Springfield, MO

**Activation of Trigeminal Nociceptors by Mechanical Stimulation via Integrins**

Samantha A. Moore, Ph.D.

S. A. Moore, Y. Cui, R. Gomex, J. Wirthlin, C. Pokorney, G. Zardeneta, and S. B. Milam, Department of Oral Maxillofacial Surgery, University of Texas Health Science Center-San Antonio, San Antonio, TX

**Effect of Interleukin-1Beta on NRI-Serine 896 Phosphorylation in the Rat Spinal Trigeminal Nucleus**

Wei Guo, M.D., Ph.D.

W. Guo, M. Watanabe, S-P. Zou, R. Dubner, and K. Ren, Department of Biomedical Sciences, Dental School and Program in Neuroscience, University of Maryland, Baltimore, MD

**The Effect of Interleukin-10 and Fluorocitrate on Masseter Inflammatory Hyperalgesia**

Kohei Shimizu, D.D.S.

Kohei Shimizu, Ronald Dubner, and Ke Ren, Department of Biomedical Sciences, Dental School and Program in Neurosciences, University of Maryland Dental School, Baltimore, MD

**Sex Differences in the Nociceptive Processing of Temporomandibular Disorders (TMD) Patients**

Eleni Sarlani, D.D.S., Ph.D.

Eleni Sarlani, Edward Grace, Deborah Rodriguez, Diane Pennington, and Joel Greenspan, University of Maryland Dental School, Research Center for Neuroendocrine Influences on Pain, Baltimore, MD

**Sensory Feedback from Mechanical Nociceptors in the Masseter Muscle Can Be Presynaptically Modulated**

Dean A. Dessem, Ph.D.

D. Dessem and R. Ambalavanar, Department of Biomedical Sciences and Program in Neuroscience, University of Maryland Dental School, Baltimore, MD

11:15 – 12:15 p.m. **Break-out Group Discussions to Discuss Strategies on How to Develop Optimal Cross-Disciplinary Platforms for TMJ Research**

Discussion Leaders:

Group A: Christian S. Stohler, D.M.D., Dr. Med. Dent., University of Maryland Dental School, Baltimore, MD

Group B: Stephen B. Milam, D.D.S., Ph.D., University of Texas Health Science Center-San Antonio, San Antonio, TX

Group C: James P. Lund, B.D.S., Ph.D., McGill University, Montreal, Quebec, Canada

12:15 – 1:45 p.m. **Lunch/Poster Session**

**Session 2:** *Chronic Pain as a Model of Clinical Complexity*

Session Chairman: Ronald Dubner, D.D.S., Ph.D., University of Maryland Dental School, Baltimore, MD

1:45 – 2:15 p.m. **Translating New Insights in Our Understanding of Chronic Pain from the Bench to the Bedside**

Ronald Dubner, D.D.S., Ph.D., University of Maryland Dental School, Baltimore, MD

2:15 – 2:45 p.m. **Pain and the Complex Entity of Reflex Sympathetic Dystrophy**

Wilfrid Jänig, M.D., Christian-Albrechts-Universität, Kiel, Germany

2:45 – 3:00 p.m. **Break**

3:00 – 3:30 p.m. **Evidence of Nociceptive-Neuroendocrine Control of Pain**

Jon D. Levine, M.D., Ph.D., University of California, San Francisco, CA

3:30 – 4:30 p.m. **Break-out Group Discussions to Determine How Lessons Learned from Pain Research Can Guide Efforts to Develop Similar Strategies for TMJ Research**

Discussion Leaders:

Group A: Ronald Dubner, D.D.S., Ph.D., University of Maryland Dental School, Baltimore, MD

Group B: Stephen L. Gordon, Ph.D., Healthonics, Inc., Bethesda, MD

Group C: Jon D. Levine, M.D., Ph.D., University of California at San Francisco, San Francisco, CA

Group D: William Maixner, D.D.S., Ph.D., University of North Carolina at Chapel Hill, Chapel Hill, NC

**Tuesday, September 12, 2006**

**Session 3:** *Diverse Approaches Used to Study Other Complex Diseases*

Session Chairman: Allen W. Cowley, Jr., Ph.D., Medical College of Wisconsin, Milwaukee, WI

8:00 – 8:30 a.m. **Integration and Multiscale Analysis of Biological Pathways Responsible for Complex Diseases such as TMJ**

Allen W. Cowley, Jr., Ph.D., Medical College of Wisconsin, Milwaukee, WI

8:30 – 9:00 a.m. **Is Menopausal Hormone Therapy a Protective Factor or a Risk Factor? Challenges of Managing a Complex Hormonal State**

Judith L. Turgeon, Ph.D., University of California-Davis School of Medicine, Davis, CA

9:00 – 9:30 a.m. **Genetics as the Glue for Translational Research**

Howard J. Jacob, Ph.D., Medical College of Wisconsin, Milwaukee, WI

**Session 4:** *How to Create A Workforce Within Our Academic Healthcare Centers to Match the Science Required*

Session Chairman: Theodore A. Kotchen, M.D., Medical College of Wisconsin, Milwaukee, WI and National Center for Scientific Review, National Institutes of Health, Bethesda, MD

9:30 – 10:00 a.m. **Training Multidisciplinary Translational Clinical Scientists**

Sharon M. Gordon, D.D.S., M.P.H., Ph.D., University of Maryland, Baltimore, MD

10:00 – 10:15 a.m. **Break**

10:15 – 10:45 a.m. **Understanding and Treating TMJ Disorders: A Modest Proposal**

Theodore A. Kotchen, M.D., Medical College of Wisconsin, Milwaukee, WI and  
National Center for Scientific Review, National Institutes of Health, Bethesda, MD

10:45 – 11:15 a.m. **Brief Poster Summaries**

**TMJ Chondrocytes Isolated from Biglycan/Fibromodulin Double-Deficient Mice Have Altered Proliferation and Differentiation in Vitro**

Mildred C. Embree, B.S.

Mildred Embree, B.S.<sup>1,2</sup>, Yanming Bi, Ph.D.<sup>1</sup>, Colette Inkson, Ph.D.<sup>1</sup>, Tina Kilts<sup>1</sup>,  
and Marian Young, Ph.D.<sup>1</sup>

<sup>1</sup>Molecular Biology of Bones and Teeth Unit, Craniofacial and Skeletal Diseases  
Branch, NIDCR, NIH, DHHS, Bethesda, MD

<sup>2</sup>Medical University of South Carolina, College of Dental Medicine, Charleston, SC

**Nociceptive Modulation of Jaw Muscle Spindle Activity Requires Fusimotor Drive**

Radi Masri, B.D.S, Ph.D.

Radi Masri, Jin Y. Ro, and Norman Capra, Department of Biomedical Sciences,  
Baltimore College of Dental Surgery, University of Maryland Dental School,  
Baltimore, MD

**Analgesia Produced by Epoxyeicosatrienoic Acid in the Ventral Periaqueductal Gray of the Rat**

Maia Terashvili, Ph.D.

Maia Terashvili<sup>1</sup>, Phillip F. Pratt<sup>2</sup>, and David Harder<sup>1</sup>

<sup>1</sup>Department of Physiology

<sup>2</sup>Department of Anesthesiology and Pharmacology and Toxicology

Cardiovascular Research Center, Medical College of Wisconsin, Milwaukee, WI

**Mechanical Signals Generated by Appropriate Physical Therapies Can Prevent Fibrocartilage Degradation and Induce Repair in TMJ Disorders (TMJDs)**

Danen Sjostrom, B.S.

D. Sjostrom, T. J. Knobloch, and S. Agarwal, The Ohio State University, College  
of Dentistry, Section of Oral Biology, Columbus, OH

**Gap Junction Proteins in Reactive Astrocytes Contribute to Inflammatory Hyperalgesia**

Hu Wang, M.D., Ph.D.

H. Wang, S-P. Zou, R. Dubner, and K. Ren, Department of Biomedical Sciences,  
Dental School and Program in Neurosciences, University of Maryland, Baltimore,  
MD

**Identification of Proteoglycan 4 in the Temporomandibular Joints of Baboons**

Jennifer L. Schulze, M.S.

J. L. Schulze, S. B. Milam<sup>1</sup>, and R. G. LeBaron

Department of Biology, University of Texas at San Antonio

<sup>1</sup>Department of Oral and Maxillofacial Surgery, University of Texas Health Science  
Center, San Antonio, TX

11:15 – 12:15 p.m. **Break-out Group Discussions to Determine How Diverse Approaches Can Be Formulated into Cross-Disciplinary Research Programs and How to Create a Workforce Required for These Efforts Within Our Medical and Dental Institutions**

Discussion Leaders:

Group A: Howard J. Jacob, Ph.D., Medical College of Wisconsin, Milwaukee, WI

Group B: Allen W. Cowley, Jr., Ph.D., Medical College of Wisconsin, Milwaukee, WI

Group C: Theodore A. Kotchen, M.D., Medical College of Wisconsin, Milwaukee, WI and National Center for Scientific Review, National Institutes of Health, Bethesda, MD

12:15 – 1:45 p.m. **Lunch/Poster Session**

1:45 – 2:45 p.m. **Panel of Discussion Leaders to Summarize and Consolidate a Set of Overall Recommendations**

2:45 – 3:00 p.m. **Closing Remarks**

Lawrence Tabak, D.D.S., Ph.D., Director, National Institute of Dental and Craniofacial Research, Bethesda, MD