



The Third Scientific Meeting of The TMJ Association was stimulated by the critical need to establish improved research and diagnostic criteria for Temporomandibular Diseases and Disorders. Clinicians and scientists interested in studying these conditions have been handicapped by an absence of standardized and accepted diagnostic criteria. To address this need, we have assembled outstanding basic and clinical scientists who are familiar with specific aspects of TMJD as well as on the underlying pathology and co-morbid conditions of the patients. While many conferences are devoted to highly focused topics within already established disciplines and diseases, it is the goal of the organizers of this meeting to bring basic and clinical scientists from a number of disciplines together with experts in physics, bioengineering, bioimaging, computational biology, and modeling with an eye to attracting their talent and expertise to the field in an effort to expand the knowledge base needed to advance the field.

The specific aims of this meeting are:

1. To provide an understanding of the needs and challenges currently faced in the diagnosis of TM diseases and disorders.
2. To assess current methods and explore new ways to define the TMJ vulnerable population through the utilization of new and emerging technologies provided through bioengineering, bioimaging, and computational biology.
3. To promote the participation of young scientists through a travel award program.
4. To stimulate interest among young investigators in a multidisciplinary approach to research on temporomandibular diseases and disorders.

We believe the scientific meeting will make an important contribution to the development and utilization of advanced technologies for application to TMJ diseases and disorders. In so doing we believe that new or improved approaches for diagnosing these complex conditions will emerge that can lead to the prevention or to the delay of the onset or progression of these conditions, thereby, improving the quality of healthcare and life for the millions of sufferers.

### **Scientific Meeting Planning Committee**

*Chairman*

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

**Shu Chien, M.D., Ph.D.**  
University of California, San Diego

**James S. Hyde, Ph.D.**  
Medical College of Wisconsin

**Ronald Dubner, D.D.S., Ph.D.**  
University of Maryland

**Stephen B. Milam, D.D.S., Ph.D.**  
University of Texas Health Science Center

**Julie Glowacki, Ph.D.**  
Harvard Medical School  
Harvard Dental School of Dental Medicine

**Christian S. Stohler, D.M.D.,  
Dr. Med. Dent.**  
University of Maryland Dental School

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

**John Watson, Ph.D.**  
University of California San Diego

# *The Third Scientific Meeting of the TMJ Association Advancing Diagnostic Approaches for TMJ Diseases and Disorders*

Hyatt Regency Bethesda, Bethesda, MD  
May 6 and 7, 2004

## **Thursday, May 6, 2004**

**8:00 – 8:15 a.m.**

### **Welcome**

Terrie Cowley, President, The TMJ Association, Milwaukee, WI

### **Introduction and Opening Remarks**

Allen W. Cowley, Jr. Ph.D., Scientific Meeting Planning Committee Chair,  
Medical College of Wisconsin, Milwaukee, WI

Henning Birkedal-Hansen, Acting Deputy Director,  
National Institute of Dental and Craniofacial Research, Bethesda, MD

Belinda Seto, Acting Deputy Director for the Office of Extramural Research,  
National Institute for Biomedical Imaging and Bioengineering, Bethesda, MD

## **Session 1**

### *TMJ Diseases and Disorders and the Need for Innovative Diagnostic Tools*

**8:15 – 9:00 a.m.**

### **TMJ Diseases and Disorders: Difficult but not Impossible to Solve**

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

**9:00 – 9:30 a.m.**

### **Patient Presentations – TMJ Diseases and Disorder**

Moderated by Stephen B. Milam, D.D.S., Ph.D., University of Texas Health Science Center,  
San Antonio, Texas

## **Session 2**

### *Current and Future Methodologies of Imaging for TMJ Diseases and Disorders (Including X-Ray, MRI, fMRI, PET, NMRI, Ultrasound, and Thermography Imaging)*

Discussion Chair Leaders – Thomas F. Budinger, M.D., Ph.D., University of California, Berkeley, CA  
Tore A. Larheim, D.D.S., Ph.D., University of Oslo, Oslo, Norway

**9:30 – 9:55 a.m.**

### **Current Radiographic Approaches for Assessment of TMJ Disease Progression**

Sigvard Kopp, D.D.S., Ph.D., Institute of Odontology at Karolinska Institutet, Sweden

**9:55– 10:20 a.m.**

### **fMRI During Jaw Motion**

James S. Hyde, Ph.D., Medical College of Wisconsin, Milwaukee, WI

**10:20 – 10:35 a.m.**

### **Break**

**10:35 – 11:00 a.m.**

### **3D X-Ray/PET Imaging Approaches and Uses in Neurovascular Diseases**

Kieran Murphy, M.D., Johns Hopkins Hospital, Baltimore, MD

**11:00 – 11:25 a.m.**

### **Evolving Techniques for the Investigation of Muscle Bioenergetics and Oxygenation**

Russell S. Richardson, Ph.D., University of California San Diego, La Jolla, CA

**11:25 – 11:50 a.m.**

### **High-Resolution Ultrasonography of the TM Joint - Sonography Versus Magnetic Resonance Imaging**

Rudiger Emshoff, M.D., D.M.D., University of Innsbruck, Austria

**11:50 – 12:20 p.m.**

### **Discussion – The speakers in this session will lead a general discussion of relevant questions.**

**12:20 – 2:00 p.m.**

### **Lunch / Poster Session**

### Session 3

#### *Methodologies for Brain Imaging Related to TMJ Diseases and Disorders*

Discussion Chair Leader – Jon-Kar Zubieta, M.D., Ph.D., University of Michigan, Ann Arbor, MI

- 2:00 – 2:25 p.m.**      **Why Look in the Brain for Answers to TMJ Pain?**  
Joel D. Greenspan, Ph.D., University of Maryland, Baltimore, MD
- 2:25 – 2:50 p.m.**      **Neural Correlates of the Subjective Experience of Pain**  
Robert C. Coghill, Ph.D., Wake Forest University School of Medicine, Winston-Salem, NC
- 2:50 – 3:15 p.m.**      **Interindividual Variations in the Neurochemical Regulation of Temporomandibular Pain**  
Jon-Kar Zubieta, M.D., Ph.D., University of Michigan, Ann Arbor, MI
- 3:15 – 3:45 p.m.**      **Discussion - The speakers in this session will lead a general discussion of relevant questions.**
- 3:45 – 4:00 p.m.**      **Break**

### Session 4

#### *Applications of Nanotechnologies for Imaging and Targeted Joint Therapy*

Discussion Chair Leader – Thomas F. Budinger, M.D., Ph.D., University of California, Berkeley, CA

- 4:00 – 4:25 p.m.**      **Targeted Nanoparticle Emulsions For Molecular Imaging and Drug Delivery**  
Samuel A. Wickline, M.D., Washington University School of Medicine, St. Louis, MO
- 4:25 – 4:50 p.m.**      **Potential of MRI and PET in Early and Presymptomatic Characterization of TMJ Disease**  
Thomas F. Budinger, M.D., Ph.D., University of California, Berkeley, CA
- 4:50 – 5:20 p.m.**      **Discussion - The speakers in this session will lead a general discussion of relevant questions.**
- 6:30 p.m.**              **Dinner at Hyatt Regency Bethesda**

**Friday, May 7, 2004**

### Session 5 Part A

#### *Clinical Research Use of Imaging Technologies for TMJ Diseases and Disorders*

Discussion Chair Leader – Stephen B. Milam, D.D.S., Ph.D., University of Texas Health Science Center San Antonio, TX

- 8:00 – 8:25 a.m.**      **Role of MRI in Clinical Diagnosis of the Temporomandibular Joint**  
Tore A. Larheim, D.D.S., Ph.D., University of Oslo, Oslo, Norway
- 8:25 – 8:50 a.m.**      **TMD Symptoms and Specificity - A Longitudinal Clinical TMJ Study**  
Jos Dibbets, D.D.S., Ph.D., Philipps University, Marburg, Germany
- 8:50 – 9:15 a.m.**      **Imaging Tools – Lessons from the Knee Joint**  
Carl S. Winalski, M.D., Brigham and Women's Hospital, Boston, MA

### Session 5 Part B

#### *Computational Approaches for Modeling of TM Joint Mechanics and Morphology*

Discussion Chair Leaders – Luigi M. Gallo, P.D., University of Zurich, Switzerland  
Susan W. Herring, Ph.D., University of Washington, Seattle, WA

- 9:15 – 9:40 a.m.**      **Mechanical Actions of Different Partitions of Masticatory Muscles**  
Arthur W. English, Ph.D., Emory University School of Medicine, Atlanta, GA
- 9:40 – 10:05 a.m.**      **TMJ Mechanics (Condyle, Capsule, and Disc)**  
Susan W. Herring, Ph.D., University of Washington, Seattle, WA
- 10:05 – 10:20 a.m.**      **Break**

- 10:20 – 10:45 a.m.      Modeling of TMJ Function Using MRI and Jaw Tracking Technologies - Mechanics**  
Luigi M. Gallo, P.D., University of Zurich, Switzerland
- 10:45 – 11:10 a.m.      Anatomically Based Modeling of the Human Jaw and Face**  
Peter Hunter, D. Phil., University of Auckland, Auckland, New Zealand
- 11:10 – 11:35 a.m.      Multifactorial Modeling of Temporomandibular Anatomy and Orthopaedic Relationships in Normal and Disc Displaced Joints**  
Andrew Pullinger, D.D.S., M.Sc., University of California Los Angeles, Los Angeles, CA
- 11:35 – 12:05 p.m.      Discussion - The speakers in this session will lead a general discussion of relevant questions.**
- 12:05 – 1:00 p.m.      Lunch/Poster Session**

## Session 6

### *Interactions Between Technical and Applied Users to Develop Recommendations for Diagnostic Criteria for TMJ Diseases and Disorders*

Chair/Moderator – Stephen L. Gordon, Ph.D., Cognate Therapeutics, Bethesda, MD

- 1:00 p.m. – 3:00 p.m.** *Development of Recommendations: This session will be divided into two discussion panels, both with the goal of leading a general discussion aimed at developing a set of recommendations to the NIH regarding the application of these technologies in the TMJ research field. The invited panelists who will lead these discussions will be provided with abstracts/summaries of presentations prior to the meeting. The panelists in Part A will assess the current detection limits, technological barriers, and limits of the current non-invasive imaging technologies and develop a summary document of recommendations whereby currently available technologies could be immediately used to establish standardized methods for diagnosis of temporomandibular diseases and disorders. The panelists in Part B will address novel investigative approaches that could open up new avenues of research or be applicable to the development of new or improved instruments and technologies for use in research and clinical diagnostics, and preventive strategies. Recommendations will be derived from these discussions regarding how to move beyond the technological limits of current approaches.*
- 1:00 – 2:00 p.m.      Session 6/Part A: Clinical Discussions**  
Panel Members:  
1. Stephen Feinberg, Ph.D., D.D.S. M.S., University of Michigan Medical Center, Ann Arbor, MI  
2. Sigvard Kopp, D.D.S., Ph.D., Institute of Odontology at Karolinska Institutet, Sweden  
3. Stephen B. Milam, D.D.S., Ph.D. University of Texas Health Science Center, San Antonio, TX  
4. Randall Wilk, D.D.S., Ph.D., M.D., Louisiana State University, LA
- 2:00 – 3:00 p.m.      Session 6/Part B: Research Discussions**  
Panel members:  
1. David E. Altobelli, D.M.D., M.D., DEKA Research and Development, Manchester, NH  
2. Thomas F. Budinger, M.D., Ph.D., University of California, Berkeley, CA  
3. Stephen L. Gordon, Ph.D., Cognate Therapeutics, Bethesda, MD  
4. John Watson, Ph.D., University of California San Diego, La Jolla, CA  
5. Jon-Kar Zubieta, M.D., Ph.D., University of Michigan, Ann Arbor, MI
- 3:00 - 3:15 p.m.      Closing Remarks**  
Lawrence Tabak, D.D.S., Ph.D., Director, National Institute of Dental and Craniofacial Research, Bethesda, MD

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**Office of Rare Diseases**

**National Institute of Biomedical Imaging and Bioengineering**

**Office of Research on Women's Health**

**National Institute of Arthritis and Musculoskeletal and Skin Diseases**

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