

Development of the DC/TMD:

A brief outline of major steps leading to the published protocol

- 2001 -2006: The RDC/TMD Validation Project (Schiffman, Study PI and Site-PIs Richard Ohrbach and Edmond Truelove) was funded by NIDCR/NIH, and an External Advisory Panel was appointed by the funding agency to provide annual oversight. The goal of the Validation Project was to assess the validity of the RDC/TMD and to develop revised Axis I diagnostic algorithms and new Axis II instruments as indicated. The Panel insured integration of findings from the diagnostic medical literature as well as monitored study adherence to best practices. The Panel was comprised of members with expertise in biostatistics, neuroscience, psychology, rheumatology, radiology, oral and maxillofacial surgery, and TMD and orofacial pain.
- July 2008: Toronto symposium (Consortium Network / IADR) – full-day open forum wherein findings from the Validation Project were presented by study investigators, followed by invited critical commentary and open discussion. The presented papers were subsequently published in the Journal of Oral Rehabilitation.
- March 2009: International consensus workshop, Miami (Consortium Network / IADR) – 2.5 day invitational workshop, with 35 participants distributed across 4 workgroups: muscle disorders, TMJ disorders, biobehavioral factors, and orofacial pain disorders, for the specific purpose of developing a consensus-based DC/TMD. An ad hoc Taxonomy Committee, comprised of the meeting organizers, was appointed by the workshop members to provide oversight of application of the workshop recommendations to the DC/TMD. The Executive Summary was subsequently published in the Journal of Oral Rehabilitation.
- April 2009 – September 2009: The Taxonomy Committee consolidated the discussion and voting from the Miami workshop into a summary document.
- October 2009: Two members of the Taxonomy Committee met in Malmö, Sweden and worked actively to identify unresolved questions.
- November 2009 – December 2009: Unresolved questions were discussed among Taxonomy Committee members and with the lead author of the DC/TMD manuscript. The Miami workgroup chair persons were consulted as needed.
- January 2010: The Miami workshop summary was released and posted on the Consortium Network website.
- February 2010 – April 2010: The DC/TMD lead author critically reviewed the Miami workshop recommendations and discussed details with the Taxonomy Committee chair; together, they worked out a plan for how to translate the recommendations into a coherent diagnostic taxonomy.
- March 2010: Six manuscripts from the Validation Project describing the reliability and validity findings regarding the RDC/TMD were published in the Journal of Orofacial Pain.

- May 2010 – December 2010: Using the Validation Study dataset, the sensitivity and specificity analyses were revised in order to implement the revised criteria as recommended by the Miami 2009 workshop. These revisions required considerable evaluation due to the complexity of translating the recommendations into sensible operationalizations of already collected data.
- July 2010: Current DC/TMD developments were presented at the IADR meeting in Barcelona, Spain. The presentations were followed by open discussion from the audience.
- September 2010 – February 2011: The first draft of the DC/TMD manuscript was written and the Taxonomy Committee chair provided oversight in terms of representing the Miami workshop recommendations.
- March 2011: Reviews of the completed first draft manuscript (including tables and figures) were obtained from the other Taxonomy Committee members and one additional co-author.
- March 2011: International consensus workshop, San Diego (Consortium Network / IADR) – 2.5 day invitational workshop, with 27 participants distributed across 3 workgroups: diagnostic criteria, history and instruments, and axis III. The diagnostic criteria workgroup agreed with the specific criteria and disorder organization of the DC/TMD. The primary workgroup goal was to further develop the expanded taxonomy for TMD, as developed to that date by the lead-author of the DC/TMD and the Taxonomy Committee, starting with the current taxonomy of the American Academy of Orofacial Pain. The history and instruments workgroup agreed with the Axis II formulation for the DC/TMD. Instruments and tests not recommended by the Miami workshop for inclusion in the DC/TMD were reviewed again, and no substantial changes were recommended. The Axis III biomarkers workgroup's activities indicated that Axis III is not yet ready for inclusion as a formal axis. The outcomes from this workshop will be published as the projects are completed.
- April 2011: The DC/TMD manuscript was revised according to the internal reviews.
- June 2011: A field trial (i.e., examiner reliability study) of the DC/TMD examination protocol was conducted in Buffalo, New York with naïve examiners and revisions were made to the specifications based on identified problem areas for clarity.
- July 2011: The Impact Study (Schiffman, Study PI and Site-PIs Richard Ohrbach and Edmond Truelove) was funded by NIDCR/NIH. The Impact Study is an 8-year follow-up of subjects from the Validation Project and the start-up of that project provided an opportunity to implement the full DC/TMD, allowing further field testing of all aspects during the development phase of the study.
- August 2011: Recommended instruments, as stemming from the Miami workshop, for assessing the core constructs of depression, non-specific physical symptoms, and anxiety were reviewed in light of recent developments in medicine. From the PRIME-MD project, the PHQ-9 was noted to be increasingly recognized as an especially good screener for depression, exhibited excellent psychometric properties, was available in the public domain, and had already been translated into many languages. Discussions were held with other pain psychologists with experience in using both SCL-90 based RDC/TMD screeners and the PHQ-9; all independently agreed that the change to the PHQ-9 was wise, for a variety of utilitarian reasons. With that change in the

assessment instrument for depression, the recommended instruments for non-specific physical symptoms and anxiety were similarly reviewed and changed from SCL90-based to the other PRIME-MD-based instruments (PHQ-15 for physical symptoms, GAD-7 for anxiety). In making these changes in core Axis II assessment instruments, we also recognized that changing the selected screening instruments from the traditional RDC/TMD instruments to the PHQ-9, GAD-7, and PHQ-15 did not mean that DC/TMD users cannot or should not continue to use the SCL-based instruments if continuity in legacy data is critical. The Impact Study is administering both legacy and new instruments and, with the help of a consultant psychometrician, will create an equivalency map whereby scores from the legacy instruments and the new instruments can be compared, thus ensuring that data from the legacy tools will be viable into the future.

- August – October 2011: The Patient History Questionnaire for assessing required symptom characteristics associated with the new Axis I algorithms was developed.
- September 2011: Another examiner field trial was conducted in Malmö, Sweden, from which additional improvements were made to the examiner specifications. A professional photographer also took all of the photos for the illustrations accompanying the examiner specs document.
- October 2011: Journal submissions of a scientific version of the DC/TMD and a clinical executive summary version of the DC/TMD were discussed with the respective journal editors.
- December 2011: Another field trial of the DC/TMD examination protocol was held in Minnesota for the Impact Study. The examiner specifications were extensively reviewed at this time and no substantive changes were required, indicating that the operationalized instructions appeared final. The DC/TMD Patient History Questionnaire was revised.
- January-March 2012: Based on field usage with TMD subjects, further revisions were made of the DC/TMD Patient History Questionnaire, and the diagnostic decision-trees were also revised based on examiner usage in the Impact Study.
- January-May 2012: Field trials of the DC/TMD examination protocol were held in Malmö, Sweden; Aarhus, Denmark; and Heidelberg, Germany. The outcome of these studies confirmed that the examination specifications were sufficient, appropriately operationalized, readily implemented, and sufficiently clear native speakers of the three respective languages could readily understand the procedures.
- March 2012: An examiner training video was initiated at the University at Buffalo and will be placed on the Consortium web site.
- March-May 2012: Another translation field trial of the DC/TMD examination specifications was conducted in Spanish; the complete specifications were translated in this trial, and no problems in the source language were identified.
- April 2012: Review of the DC/TMD decision-trees, diagnostic criteria, and many small parts of the overall examination protocol was provided by the Taxonomy Committee and one additional co-author.

- May 2012: The manuscript (including tables and figures) was vetted by an additional 6 co-authors.
- June 2012: International consensus workshop, Iguacu Falls, Brazil (IADR) – a 2-day workshop held as an extension from the workshop held in San Diego, 2011, in order to continue development of the expanded TMD taxonomy as well as the Axis II research tools.
- June 2012: An open symposium was held at Iguacu Falls, Brazil (IADR) and the current status of the DC/TMD was presented along with the developments in Axis I, Axis II, and Axis III for further research. The presentations were followed by critical commentary and open discussion from the audience.
- June 2012: The DC/TMD manuscript (including tables and figures) was edited and approved by the remainder of the co-authors.
- August 2012: An examiner field trial was conducted at the Karolinska Institute in Stockholm, Sweden. Minor errors were identified in the required specifications, and these were immediately corrected.
- October 2012: The examiner training video was completed and sent out to collaborators for field testing and recommendations.
- December 2012: The DC/TMD manuscript was completed and submitted to the Journal of Orofacial Pain.
- February – May, 2013: Manuscript was revised in response to scientific review, decision-tree algorithm was refined to create consistency in logic of criteria for disc displacements and degenerative joint disease, sensitivity and specificity statistics were recomputed, and examiner reliability results were added. Manuscript was reviewed by all contributing authors.
- June – August, 2013: Finalize manuscript, submit, and receive approval from the Journal.
- September 2013 – January 2014: With the Journal editor, make revisions in the galleys for concordance in taxonomy and criteria between this manuscript and that by Peck et al (Journal of Oral Rehabil, 2014), and expand the subtypes of myalgia in the DC/TMD to match those listed in the expanded taxonomy.

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