

# The Relationship Between Centric Occlusion and The Maximal Intercuspal Position and Their Use as Treatment Positions for Complete Mouth Rehabilitation: Best Evidence Consensus Statement

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#### Keywords

Intercuspal position; centric relation; prosthodontic rehabilitation; occlusion; maximal intercuspal position.

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## Abstract

**Purpose:** The purpose of this Best Evidence Consensus Statement was to evaluate the existing literature relative to two focus questions: How often does centric occlusion coincide with maximal intercuspal position in dentate and partially dentate populations?; and should centric occlusion or maximal intercuspal positions be equivalent for dentate and partially dentate patients undergoing complete mouth rehabilitation? **Materials and Methods:** Keywords used in the initial search were: intercuspal position, centric occlusion, centric relation, maximal intercuspal position, prosthodontic rehabilitation, and occlusion. The search was then limited to Systematic Reviews, Randomized Controlled Studies, Meta-analyses and Clinical Trials.

**Results:** The initial search strategy related to the selected search terms resulted in more than 15,000 articles. When the subsequent search was limited to Systematic Reviews, Randomized Controlled Studies, and Meta-Analysis and Clinical Trials, 313 articles were selected for further analysis.

**Conclusions:** Review of the literature reveals that most dentate and partially dentate patients do not have coincident centric occlusion and maximal intercuspal position. There is support for coincidence between centric occlusion and maximal intercuspal position as the preferred occlusal relationship in complete mouth rehabilitations. The literature does not report conclusive evidence of adverse prosthodontic outcomes with complete rehabilitations in centric occlusion or maximal intercuspal position in a healthy population. However, there is support for an association between centric occlusion-maximal intercuspal position discrepancies and occlusal instability as well as temporomandibular joint disorders. Hence, it is concluded that partially and completely dentate patients requiring complete mouth rehabilitation should be restored in centric occlusion.

Nomenclature revisions have occurred over the years in keeping with emerging scientific evidence and accepted expert opinion.<sup>1,2</sup> At times, these changes have led to some misperceptions, as well as debates as to how observations are named, or devices described and what they really mean. Centric relation (CR) has been described with different terminology in the literature such as the retruded condylar position, retruded contact position, retruded axis position, hinge axis, transverse horizontal axis, and seated condylar position.<sup>1,3–8</sup> Similarly, maximal intercuspal position (MIP) has been referred to as the intercuspal position, intercuspation, maximum intercuspation, and centric occlusion (CO).

Occasionally, descriptions of MIP have been confused with the term CO, creating additional challenges in searching and critically appraising the literature. For example, searches for CO may result in identifying disparate outdated literature, while more recent publications on CO are based on the occlusion with the condyles in CR. This finding requires an awareness by the reader or researcher to distinguish between past changes compared to current accepted terminology, hopefully with less debate, greater dialogue and a better understanding.

The Glossary of Prosthodontics Terms<sup>1</sup> defines centric relation as the maxillomandibular relationship, independent of tooth contact, in which the condyles articulate in the anteriorsuperior position against the posterior slopes of the articular eminences; in this position, the mandible is restricted to a purely rotary movement; from this unstrained, physiologic, maxillomandibular relationship, the patient can make vertical, lateral or protrusive movements; it is a clinically useful, repeatable reference position. Centric occlusion is defined as the occlusion of opposing teeth when the mandible is in centric relation; this may or may not coincide with the maximal intercuspal position.<sup>1</sup> Maximal intercuspal position is defined as the complete intercuspation of the opposing teeth independent of condylar position, sometimes referred to as the best fit of the teeth regardless of the condylar position.<sup>1</sup>

The purpose of this Best Evidence Consensus Statement is to review the literature to answer two focus questions related to CR, CO, and MIP.

# Focus question 1: How often does CO coincide with MIP in dentate and partially dentate populations?

Search terms used were: centric occlusion, centric relation, condylar position, maximal intercuspal position and intercuspal position.

The search strategy was related to the two focus questions and limited to Systematic Reviews (SR), Randomized Controlled Studies (RCT), Meta-analyses, and Clinical Trials. As an example of the search process, initial search results for term occlusion without any filters applied yielded more than 220,000 results. This included medical topics which deviated from the topic of interest. Searches for CR, CO, MIP, intercuspal position, condylar position and prosthodontic rehabilitation yielded 2,096; 3,369; 287; 774; 1694 and 13,794 results respectively. Titles were reviewed and selected if they related to the focus questions for further evaluation and selection. When limited to SRs, RCT's and Meta-Analysis, and Clinical Trials among all search terms, 138 articles were selected for further analysis. The varying terminology in prosthodontics over the years was factored into the report preparation. The terminology used in this paper reflects the current edition of the Glossary of Prosthodontic Terms.

Centric relation (CR) is a condylar position that has been vigorously discussed over the years. The application, reproducibility, positional accuracy, recording ability and reliability of CR as a treatment position in complete mouth rehabilitation has been investigated.<sup>9</sup> There are many research and opinion based publications on the selection of CR and CO for comprehensive rehabilitation. In contradistinction, there is minimal evidence-based support for the use of the MIP as a starting treatment position in complete prosthodontic rehabilitations.

The occurrence of a CO-MIP discrepancy has ranged from 56% to 100% in multiple studies and has been considered to be the norm for most of the population.<sup>10-12</sup> Posselt<sup>10</sup> in 1952 studied superimposed cephalometric radiographs on 50 dental students and reported that the CO-MIP discrepancy was ob-

served in 88% of the subjects. The average CO-MIP discrepancy at the mandibular incisor region antero-posteriorly was  $1.25 \pm 1.00$  mm and caudally  $0.9 \pm 0.75$  mm. Hodge and Mahan<sup>11</sup> evaluated 101 patients using a position gnathometer to measure mandibular movement from CO to MIP and reported a difference in 56% of the patients with an average horizontal and vertical discrepancy of  $0.44 \pm 0.54$  mm and  $0.47 \pm 0.64$  mm, respectively.

Rieder<sup>12</sup> used a simple technique with scribed lines on the mandibular and maxillary incisors of 323 subjects. Horizontal and vertical differences between CO and MIP were found in 86% of the population studied. Shildkraut et al<sup>13</sup> compared the reliability of cephalometric measurements at CR using a mandibular position indicator on patients with a CO-MIP discrepancy. The subjects included 68 patients (64 adolescents and 4 adults) selected from 131 consecutively treated orthodontic patients. The study group had a 2.0 mm or greater CO-MIP discrepancy as measured with a mandibular position indicator on articulator mounted casts. Cephalometric imaging revealed that the condyles were seated inferior and posterior in MIP when compared to CR. While the vertical component was greater than the horizontal aspect in 96% of the subjects, 10% of the subjects had only a horizontal component. Henriques et al<sup>14</sup> evaluated the condylar positions through radiographic analysis on 20 young adult patients. They noted small discrepancies in average measurement values in 90% of the subjects, but reported these discrepancies were not statistically significant.

Shafagh et al<sup>15</sup> used a Vericheck instrument to determine the reproducibility of condylar positions in CR. They found a significant difference in diurnal and nocturnal CR recordings for most of the 13 dental students who had recordings done at 3 different time intervals (9AM, 3PM, and 9PM). They attributed their findings to changes in the TMJ fluid content throughout the day. These findings concur with the findings of another study by Latta,<sup>16</sup> although this study was on an edentulous population.

Cordray<sup>17</sup> in a 3-dimensional analysis of condylar position on 536 asymptomatic orthodontic patients found that the condyle was vertically displaced from CR in 97% of individuals and most frequently positioned posteriorly when teeth shifted to MIP. The condylar position for CR was located superior to the condylar position when the patient was in MIP. Cordray concluded that condylar location that was directed by the occlusion (MIP) was significantly different from the condylar location in CR. These findings are in agreement with the current definition of CR. Lelis et al<sup>18</sup> examined the condylar positions in 20 subjects with symptoms of temporomandibular disorders (TMD) compared to 20 asymptomatic young adult subjects. They reported that CO-MIP discrepancies were found in 83.4% of the symptomatic groups and 85.0% of the asymptomatic groups, which was not statistically significant.

Ismail et al<sup>19</sup> in a radiographic study of 40 patients assessed the spatial positioning of the condyles in the mandibular fossa when the mandible was in CO and MIP. They found that the condyles were positioned superiorly and posteriorly in CO compared to MIP. In a cone beam computed tomography (CBCT) study, Ferreira et al<sup>20</sup> compared condylar positions in CR and in MIP and concluded there was no statistically significant imaging difference between those two positions. However, this study included a low subject number of only 10 asymptomatic young adults.

Utt et al<sup>21</sup> used a mandibular position indicator to compare condylar position in CO and MIP in 107 patients. Only 1 patient had a coincident CO-MIP position in all 3 spatial planes. They reported that the average difference was 0.61 mm anteroposteriorly, 0.84 mm supero-inferiorly and 0.27 mm laterally for the majority of subjects. 19% of the subjects had a CO-MIP sagittal discrepancy greater than 2.0 mm. In a study conducted on 28 healthy adults (22-35 years old) with an Angle's Class I jaw relationship, Alexander et al<sup>22</sup> used magnetic resonance imaging of the condyles and reported a significant and distinct difference in jaw position between CO and MIP condylar positions. They reported the condylar position in MIP to be inferior and anterior to CR as a result of deflective occlusal contacts.

# Discussion

Roth and Rolf <sup>23</sup> explained that deflective occlusal contacts during jaw closure in CO causes a mandibular slide into MIP in an attempt to obtain a stable uniform occlusal position. This altered jaw closure is what creates intercuspal and condylar position discrepancies. According to the authors, the significance of this slide and the resulting CO-MIP discrepancy is that premature tooth contacts could lead to increased leveraged occlusal forces from the irregular jaw closure during mastication or from parafunctional activities that would have a higher potential for injury to the temporomandibular joints.

The literature search revealed multiple methods to record the differences of condylar positions in CO and in MIP. Condylar position indicators have been used with a variety of articulators and visually demonstrate and allow measurement of the dissimilar condylar positions between CO and MIP in three planes. Currently, there is no specific term that has been used in the dental literature to describe the altered condylar position when the mandible is in the MIP. Therefore, it is proposed that the Glossary of Prosthodontic terms consider adding terminology that describes the condylar position in MIP using a term such as Condylar Maximal Intercuspation Position (CMIP).

#### Focus Question 1: Evidence-based conclusions

- A coincident CO-MIP does not occur in the majority of the population.
- 2. There is a circadian influence when recording CR.
- 3. Relative to the vertical position, the CO condylar position is more superiorly located compared to the condylar position in MIP.
- 4. Relative to the horizontal and transverse positions, the MIP condylar position is variable compared to the condylar position when the mandible is in CO.
- 5. It is recommended that the Glossary of Prosthodontic Terms add terminology related to the Condylar Maximal Intercuspation Position.

#### Focus question 2: Should CO-MIP positions be equivalent for dentate and partially dentate patients undergoing complete mouth rehabilitation?

Search terms used were: maximal intercuspal position, intercuspation, intercuspal position, centric occlusion, centric relation and prosthodontic rehabilitation.

Initial search results for these search terms without any filters applied yielded more than 18,509 results. This included medical topics which deviated from the topic of interest. Searches for MIP, intercuspation, intercuspal position CO, CR, and prosthodontic rehabilitation yielded 155; 1158; 774; 3374; 2096; and 13,794 results, respectively. SRs, RCT's and Meta-Analysis, and Clinical Trials among all search terms resulted in 2219 articles. Titles were reviewed and selected if they related to the focus questions for further review and selection. One hundred and seventy-five articles were selected for further analysis.

Clear scientific evidence is lacking when comparing complete mouth rehabilitation outcomes in CO or MIP. This observation may be because CR and CO is generally considered to be reliable and reproducible reference locations during complete arch rehabilitations.<sup>9</sup> It is believed that the superior anterior position of the condyles in the glenoid fossa in CR reduces the potentially harmful deflective contacts in excursive movements.<sup>13,17,19,23</sup> During the literature searches multiple studies investigated the association between CO-MIP discrepancies and TMD.<sup>24–33</sup>

Hellman et al<sup>34</sup> conducted a study on condylar positions in CO before and after a simulated reconstruction. Occlusal devices were fabricated on 41 dental students in CR. Records were obtained by asking the subjects to position the tip of the tongue at the posterior aspect of the palate combined with guidance of the mandible by the operator. The authors placed and adjusted the occlusal devices in CR until the occlusal contact was uniformly achieved within 10 micrometers. Using a modified ultrasonic telemetry system, they reported that CR was reproducible before and after simulated reconstruction within a spatial accuracy of 0.3 mm.

Manfredini et al<sup>35</sup> stated that there is no scientific correlation between TMD and occlusion at different condylar positions. This statement implies that both CO and MIP are acceptable rehabilitation positions. In a systematic review that included data from 25 selected articles, the authors reported an association between TMD and mediotrusive occlusal interferences and a weaker association with a CO-MIP discrepancy. Their findings were not in agreement with the views stated in the conclusion of their publication.

In a lateral cephalometric study, Ekberg et al<sup>32</sup> compared the effects of occlusal devices fabricated in CO and MIP for patients with TMD of arthrogenous origins. They found that occlusal devices fabricated in CR resulted in a change in the condylar position. This change was believed to lead to a better treatment outcome that reduced TMD symptoms as compared to occlusal devices fabricated at MIP. However, for TMD patients of myogenous origin, both CO and MIP occlusal devices had similar effects in mandibular repositioning, muscular activity and pain reduction.<sup>33</sup> A recent MRI study by Kandasamy et al<sup>36</sup> recorded the condylar positions in CR achieved by using 2 different techniques (chin point guidance and Roth power centric) and in MIP. They reported no significant differences and advocated using MIP instead of CO when treating orthodontic patients. MIP was assumed to be a non-pathological physiological position that patients adapted to and that any condylar position changes are unnecessary and might be harmful.

Crawford<sup>24</sup> compared patient histories, clinical examinations and condylar position indicator (CPI) measurements data between 30 complete mouth rehabilitation patients who had been restored with a coincident CO and MIP and a control group of 30 untreated patients. They reported that patients who had been restored using CR as a reference position revealed lower CPI values (<1.0 mm) along with an 84% reduction in symptoms. They concluded a high correlation existed between the signs and symptoms of TMD and higher CPI values.

Lim et al<sup>26</sup> reported that adult patients with backward positioning and rotation of the mandible should be carefully evaluated as a possible consequence of a CO-MIP discrepancy. They classified and studied adult female patients seeking orthodontic treatment into 2 groups, one group of 20 subjects with large CO-MIP discrepancies greater than 2.0 mm and a second group of 27 subjects with less than 1.0 mm discrepancies. Lateral cephalograms were analyzed to identify differences in 16 cephalometric variables between CO and MIP in subjects with larger discrepancies. The test group with larger discrepancies had posterior positioning and clockwise rotation of the mandible along with TMJ disc displacement.

Padala et al<sup>27</sup> in a study of 40 patients reported significantly greater vertical and horizontal condylar discrepancies between CO-MIP for symptomatic subjects compared to nonsymptomatic subjects. Weffort and de Fantini<sup>28</sup> in a study on 70 individuals, reported the significance of discrepancies in the transverse plane with TMD symptoms. They stated that transverse plane discrepancies greater than 0.5 mm were more likely to have TMD symptoms. In another study, He et al<sup>29</sup> conducted a study on 177 patients who were divided into two groups: symptomatic and non-symptomatic patients. They found that 72.9% of the symptomatic TMD patients had CO-MIP discrepancies compared to only 11.4% in the non-symptomatic group.

Rosner and Goldberg<sup>30</sup> studied condylar positions in CO and MIP in a population of 75 patients. They used a condylar recording instrument attached to the articulator to study relative condylar positions at CO and MIP using scattergrams. This data was used in a subsequent report that correlated a patient questionnaire with the scattergrams from their first study.<sup>31</sup> They reported a significant difference in the sagittal peripheral outline between the group of 38 patients without primary symptoms and the group of 37 patients with one or more primary symptoms of mandibular dysfunction. There were higher peripheral scattergrams for the subject groups that were symptomatic.<sup>31</sup>

A systematic review by Silva et al<sup>37</sup> reported that there was no association between CO-MIP discrepancies and TMD. They narrowed their initial search from 467 articles to 20 articles from which data was collected for analysis. The authors found the quality of evidence to be low but did note a correlation between muscle and joint disorders, when compared to

CO-MIP discrepancies. However, due to a lack of consistent results among the studies reviewed it was not possible to determine any definite conclusions.

Hamata et al<sup>33</sup> in a randomized controlled trial on 20 TMD patients compared occlusal devices fabricated in CO and MIP to muscle pain reduction. The 20 patients with TMD of myogenous origin and bruxism were divided into two groups that were treated with occlusal devices designed in either in CO or MIP. Clinical, electrognathographic and electromyographic examinations were performed before and three months after placement of the occlusal devices. They reported that both or-thoses were effective for pain control and effectiveness. The results suggested that MIP may be used for fabrication of occlusal devices in patients with occlusal stability without large CO-MIP discrepancies.

A detailed report regarding TMD and CO-MIP discrepancy will be provided in another BECS.

Most of the studies that did not report significant CO-MIP condylar discrepancies were observed on subjects who were young adults or the study design had a small sample size.<sup>14,18,20</sup> However, Alexander et al<sup>22</sup> who also studied a younger adult population reported a CO-MIP discrepancy in half of the population studied. Cordray<sup>25</sup> reported on his analysis of 1192 subjects, also consisting a younger population of which 596 were symptomatic with TMD and 596 were asymptomatic. The author studied articulated dental casts of subjects mounted in CR to determine condylar displacement in CO and MIP for asymptomatic and symptomatic subjects using a Panadent Condyle Position Indicator. All subjects displayed a displacement between CR and condylar position in MIP in at least 1 plane. The magnitude of condylar displacement was higher in the horizontal, vertical and transverse direction for the symptomatic subjects.

Techniques used to evaluate CO-MIP discrepancies included cephalometric radiographs, CBCT, magnetic resonance imaging, condylar position indicators, and Gnathometer. Table 1 lists the relevant studies and information used to answer focus questions 1 and 2.

Based on the above studies, there appears to be some support for an association in the literature that subjects with larger CO-MIP differences had a greater association with TMJ symptoms.

#### Discussion

In 2005, Baker et al<sup>38</sup> reported on a dental educators' survey on maxillomandibular relationship philosophies in the United States regarding prosthodontic restorations. They concluded there was a continuing controversy regarding the preferred mandibular position for treatment of dentulous and partially edentulous patients among dental educators at both the predoctoral and postdoctoral levels in the United States. In 2012, the American College of Prosthodontics Task Force on Assessment of Occlusion Curriculum performed a survey on occlusion education. Forty-eight dental institutions in the United States responded to the survey with a total of 83 respondents. Relative to topics on CR, CO, and MIP the educators stated these topics are normally included 88 to 98% of the time.<sup>39</sup>

Prior to the GPT-9th edition, Goldstein et al<sup>9</sup> conducted a study among the Fellows of the Academy of Prosthodontics

- i				CO/CR- MIP discrepancy	
FIRST AUTNOR	Study type	Sample size	Technique	(%)	TMD association reported
Posselt <sup>10</sup>	Clinical	50	Cephalometric	88%	NA
Hodge <sup>11</sup>	Clinical	10	Gnathometer	56%	NA
Rieder <sup>12</sup>	Clinical	323	Direct measurements	86%	NA
Shildkraut <sup>13</sup>	Clinical	68	Cephalometric	96%	NA
Henriques <sup>14</sup>	Clinical	20	CBCT	80%	NA
Shafagh <sup>15</sup>	Clinical	13	Vericheck instrument	100%	NA
Cordray <sup>17</sup>	Clinical	536	Articulator measurements	97%	NA
Lelis <sup>18</sup>	Clinical	40	CBCT	83.4%/85%	No
Ismail <sup>19</sup>	Clinical	40	Radiographic		
Ferreira <sup>20</sup>	Clinical	10	CBCT		NA
Utt <sup>21</sup>	Clinical	107	Mandibular position	99.1%	NA
			indicator		
Alexander <sup>22</sup>	Clinical	28	Magnetic Resonance	50%	NA
			Imaging		
Crawford <sup>24</sup>	Clinical	60	Condylar position indicator		Yes
Cordray <sup>25</sup>	Clinical	1192	Condylar position indicator	100%	Yes
			and cast measurements		
Lim <sup>26</sup>	Clinical	47	Cephalometric	100%	Yes
Padala <sup>27</sup>	Clinical	40	MCD (measured condylar		Yes
			deviation) device		
He <sup>29</sup>	Clinical	177	Condyle position indicator	84.3%	Yes
				(1 mm vertical or horizontal_0.5 mm	
				transverse)	
Rosner <sup>30</sup>	Clinical	75	Condylar recording instrument		Yes
Manfradini <sup>35</sup>	Svstematic Beview				No Mes
Silva <sup>37</sup>	Systematic Review				No

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 Table 1
 List of relevant studies and information used to answer focus questions 1 and 2

to determine whether there was agreement on the definition of CR. The response rate was 86% (n = 83). The authors also noted areas of both agreement and disagreement regarding the definition of CR. This variance was attributed to different training period and education eras of the respondents. When asked about a preference between MIP and CO/CR when restoring both maxillary and mandibular arches, 92% of respondents preferred CR compared to 5% who chose MIP. When asked about a preference when restoring one complete arch, 80% of the respondents preferred CR compared to 16% who preferred MIP.

Occlusal interferences in the anterior-posterior, vertical and lateral planes are well documented in the CO-MIP discrepancy literature presented here. As such, the impact of interferences is an important consideration. Posterior tooth loss has been reported to influence occlusal stability and initial contact in CO and associated with higher number of occlusal interferences. Craddock<sup>40</sup> reported a comparison study on 100 test and control patients to determine if posterior tooth loss was associated with occlusal interferences in CO. Test subjects had multiple and control subjects had fewer types of interferences. The author concluded that unopposed posterior teeth were more likely to be involved with occlusal interferences when compared to their matched controls. Occlusal interferences were associated with the degree of supraeruption of the unopposed tooth and resulting tooth migration due to the posterior tooth loss.

Consequences and sequela as a result of CO-MIP discrepancies that might impact complete prosthodontic rehabilitations have not been extensively studied to draw meaningful conclusions. Topics like prognosis, outcomes, complications, maintenance, survival, fractures as well as biological sequela like inflammation, gingival health, probing depths, bone loss have not been examined relative to CO-MIP discrepancies. And finally, patient outcomes such as satisfaction, comfort, quality of life, esthetics and function are of great importance but have yet to be examined relative to CO-MIP discrepancies.

Other observations during the initial search included several case reports predominantly from one group of authors who described techniques for complete mouth rehabilitation with complete or partial coverage restorations in MIP.<sup>41–45</sup> It was noted that patients did not have TMD or reported occlusal instability prior to treatment. The authors did not observe any complications following treatment completion. Long term outcomes data were not presented, and these articles were not included as they did not meet the search inclusion criteria. However, they are mentioned to provide a balanced perspective, yet with the lack of overwhelming evidence, prudence is indicated.

In what can only be considered a weaker form of scientific evidence gleaned mostly from expert opinion, the authors agree that complete mouth rehabilitations should be performed in CR/CO. Also, it is the opinion of the authors that deflective occlusal contacts should be identified and eliminated to fully manage the functional occlusion in complete mouth rehabilitations. In addition, the authors take a teleological viewpoint in regard to CR. It is a position that is reliable during rehabilitations that include single complete arches or both arches. There is evidence based on expert opinions and studies on TMD that CR achieves a condylar position that is physiologic, reliable and reproducible during complete mouth rehabilitations.

#### Focus question 2: Evidence-based conclusions

- As a reference position, CR provides a physiologic, reliable and reproducible treatment position for performing complete mouth rehabilitations.
- 2. There appears to be an association between CO-MIP discrepancies and TMJ symptomatology.
- Prosthodontic rehabilitations of TMD patients should occur only after a stable condylar (CR) and CO position have been established.

#### **Consensus statement**

There is supporting evidence that even though CO-MIP are not coincident in the majority of the population, complete prosthodontic rehabilitations in CO-MIP is the preferred treatment methodology. The literature also suggests an association between CO-MIP discrepancies and TMJ symptomatology. There is documentation that the condyles in CR are in a superior and anterior position in the glenoid fossae. This is considered a predictable, physiologic, reliable and reproducible location from which pathologic occlusal contacts are minimized in excursive movements. Complete mouth reconstructions in MIP on patients with CO-MIP discrepancies have not been widely reported. This may be because they lead to adverse outcomes, and/or this is not a complete mouth prosthodontic rehabilitation philosophy taught in most prosthodontic programs.

The authors believe that the adaptive capacity of each individual play a significant role in overcoming some of the potential harm that can occur from a 'less than ideal' occlusal scheme. However, the repeatability, the predictable and safe envelope of function from CR makes it a desirable diagnostic and treatment position in complete mouth prosthodontic reconstructions. The evidence identifying decreased TMJ symptomatology in patients with little or no CO-MIP differences further supports the concept of a coincident CO-MIP as a preferred position for complete mouth rehabilitation of the dentate and partially dentate patient.

#### **Consensus conclusions**

Review of the literature reveals that most dentate and partially dentate patients have CO and MIP positions that are not coincident. There is support for coincidence between CO and MIP as the preferred occlusal relationship in complete rehabilitations. The literature does not report conclusive evidence of adverse prosthodontic outcomes with complete rehabilitations in CO or MIP in a healthy population based on the search criteria used. However, there is support for an association between CO-MIP discrepancies and occlusal instability as well as TMD. As a result, it is concluded that partially and completely dentate patients requiring complete mouth rehabilitation should be restored in CO. Well-defined prospective clinical trials that focus on clinical outcomes and long-term complications are needed. It is further recommended that the Glossary of Prosthodontic Terms examine the concept of the Condylar Maximal Intercuspation Position and add terminology related to the condylar position in MIP.

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