

# Spear *Perspective*

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The art and science of exceptional  
esthetic and restorative dentistry

## Occlusion in the New Millennium: *The Controversy Continues*

### Part 1 *by Frank Spear, DDS, MSD*

The goals for the creation of a new occlusion are quite simple to describe. Control the load applied to the temporomandibular joints. Control the load applied to the teeth and periodontium. And, provide muscle comfort and function. The clinician providing occlusal therapy alters how, when, and where the teeth contact each other to achieve these goals.

When examining the desired effects of the tooth contacts, the control of applied force is obviously the key to controlling joint and tooth loading as well as muscle comfort. There are only two ways the dentist can effect the applied force by altering the occlusion. The first is to reduce the level of muscle activity by altering the occlusion so the muscles can accomplish the task of mandibular movement with less force. And, the second is to redistribute the applied force to more favorable locations, i.e. to more teeth or different teeth.

In controlling tooth contacts, five variables must be evaluated:

**1** Which teeth will touch in centric closure.

**2** Which will touch in eccentric movements.



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**3** The steepness of the anterior overbite and posterior occlusal anatomy.

**4** The vertical dimension of occlusion.

**5** And, the condylar position, which is used to build the occlusion.

It is important to evaluate each of these areas to determine its impact on the ultimate goals of the occlusion.

*In this issue, I will address the first three variables:*

#### **1. Which teeth should touch in centric closure?**

The one thing that virtually all occlusal philosophies agree with today is even simultaneous tooth contacts on all posterior teeth and canines in centric closure. From a load distribution standpoint this is

very logical. When a patient can touch just a few posterior teeth, they are capable of producing maximum muscular contraction. If only a few teeth are touching this means all the force is going to those few teeth. Having even contacts on all the posterior teeth redistributes this load evenly so each tooth ultimately gets a reduced load.

From the perspective of the temporomandibular joints, even contact of the posterior teeth also makes sense. Since the mandible functions as a Class III lever system, where the joint is the fulcrum,  
*continued inside ...*

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# Occlusion in the New Millennium: *The Controversy Continues* continued from front ...

the muscle provides the power, and the teeth the resistance. In a Class III lever, the farther the resistance point is from the fulcrum, the less force is applied to the point of resistance. For example, a second molar which is closest to the muscle and the joint receives on average nine times the bite force that an incisor receives which is the farthest tooth away from the joint and muscle. However, when the patient produces tooth-to-tooth contacts, the Class III lever can function in reverse. That is, the teeth can become the fulcrum, the muscle the source of power, and the joint must offer resistance.

It has been shown that when only anterior teeth touch, 60% of all the bite force goes to the joint. If the second molars touch, only 5% of the bite force is allowed to reach the joint. The molars and other posterior teeth absorb the remaining force. Even posterior contact not only redistributes the load on the teeth, but also reduces the load received by the joint. Please note that in none of these occlusal contact scenarios does the actual axis of rotation leave the condylar area.

Some authors have suggested that upon closure, when molars contact, the axis of rotation moves to the cervical vertebral area and the condyle is distracted inferiorly, opening the joint space which then allows the anterior teeth to gain contact. This concept would require that there be an elevator muscle anterior to the molars, which could close the anteriors together. Anatomically the masseters, temporalis, and medial pterygoids

are all anatomically posterior to the molars making it physically impossible to move the condyle inferior by simply building up posterior teeth. This is also why when changes in vertical dimension are planned, that they must be done around the condylar axis of rotation on an articulator.

Using an instrument such as an Acculiner and opening the vertical dimension straight up and down will produce an anterior open bite. This occurs because of premature molar contacts unless the patient postures their mandible anteriorly to bring the anterior teeth together by bringing the condyle inferiorly and forward, but still against the eminence.

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*“The one thing that virtually all occlusal philosophies agree with today is even, simultaneous tooth contacts on all posterior teeth and canines in centric closure.”*

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## **2. Which teeth will touch in eccentric contacts?**

This is also an area in which most occlusal philosophies today agree. That is, when the mandible moves from maximum intercuspation, the anterior teeth should guide the contact, and the posterior teeth should not touch, either on the working side (side the patient is moving towards) or the non-working side (side the patient is moving away from). This

is logical from the point of view of muscles and load distribution.

From the muscles perspective, having only anterior tooth contacts, i.e. canines and incisors, has been clearly shown to produce less elevator muscle activity than when a posterior tooth is allowed to touch on the working side (group function) or non-working side (balancing interference) during lateral movements. From a force distribution perspective, anterior guidance is also logical. Since anterior teeth receive less load due to the Class III lever principle, it makes more sense to have them receive lateral loads, than the posterior teeth, which receive far more force.

There are exceptions to this principle of anterior guidance, but they are not common.

## **3. What overbite and posterior anatomy should I use?**

This is the first area in which significant discrepancies arise between occlusal philosophies. Simply put, the major differences are whether the anterior guidance developed can alter the way the mandible moves and functions. Or does the way the mandible moves and functions determine the anterior guidance?

Classically, gnathology would trace the pathways of condylar movement, and then use them in developing the anatomy of the posterior teeth. The anterior guidance was then created as an analog of condylar guidance and to disclude the posterior teeth. This creates a very precise occlusal scheme in which the posterior disclusion is achieved by cusps traveling through pathways in the opposing teeth.

To create this near miss type of guidance and disclusion requires tracking mandibular movement precisely and transferring it ideally via a pantograph to a fully adjustable articulator. Bioesthetics developed by the late Dr. Robert Lee was an evolution of gnathology. After studying the skulls of humans with unworn teeth, the concept of Bioesthetics was developed. It proposes a fixed anterior guidance where the maxillary centrals are 12mm in length, the mandibular centrals are 10mm in length, and the vertical dimension is set by placing the CEJ's of the upper and lower centrals 18mm apart. This produces an overbite of 4 to 5mm, the overjet is set at 2mm for the incisors, and 1mm for the canines.

With this steep guidance pattern, it allows the creation of very steep posterior occlusal anatomy and still have disclusion. This steep posterior anatomy is felt to reduce muscle activity during chewing thereby reducing the force on the anterior teeth. The difficulty I have with both the pure gnathology and pure bioesthetic approach is their attempt to create occlusal schemes based upon purely mechanical formulas that don't take into account the neuromuscular variability that exists between patients.

This leads us to the Pankey-Dawson concept of occlusion. In both philosophies the anterior guidance is developed first around the patient's neuromuscular requirements using tooth wear, fremitus, mobility, phonetics, and patient comfort to develop the anterior guidance. Only after the anterior guidance is completed, is the posterior anatomy created which allows for immediate disclusion of the posterior teeth.

In general, the posterior anatomy is shallower with cusp tip to flat plane contacts or shallow tripod or reciprocal contacts, than in gnathology or bioesthetics. This results in the ability to use a semi-adjustable articulator and still get an acceptable occlusion in the mouth since the posterior teeth

were not designed to nearly miss each other in excursive movements.

In my opinion this concept of developing a customized anterior guidance to fit the patient's neuromuscular pattern is critical to the longevity of today's all ceramic restorations.

## Featured Products

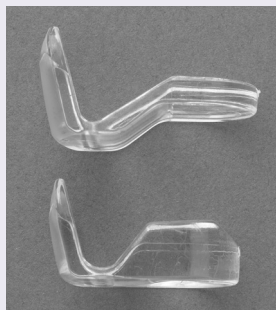
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