Introduction
I hope everyone has been enjoying the beautiful weather that we have been having here in the Pacific Northwest. I’ve definitely been outside quite a bit! The theme for this issue is pulp testing. We start off with an article that looks at the most predictable pulp testing methods. We then have an article that discusses the best technique when using Endo Ice. Finally we have a set of three studies that determine the optimal placement of the EPT probe.

Spotlight on Pulp Testing
Just as the correct diagnosis is important in other aspects of dentistry, it is critical in endodontics as well. Diagnosis in endodontics is made by using a combination of history, clinical examination, radiographs, and perhaps most importantly pulp testing. Commonly using pulp tests include percussion, palpation, mobility, perio probing, cold, hot, and EPT. The first four are used to evaluate the periodontium, whereas the last three help determine the health of the nerve itself. I find that the cold test is the most useful pulp test, as it allows me to determine not only if the nerve is alive (vital versus necrotic), but also the health of the nerve (normal versus reversible pulpitis versus irreversible pulpitis). Using commercially available Endo Ice, it is also very convenient to perform. Endo Ice is 1,1,1,2-tetrafluoroethane (TFE) which is a refrigerant that evaporates immediately causing cooling of the sprayed area (previously it was dichlorodifluoromethane or DDM which served the same purpose but was replaced by TFE due to environmental concerns). While we have many tests, it is always important to remember that these are imperfect diagnostic aids that sometimes give false positive or false negatives, so your professional judgment is required. Sometimes even if a tooth is suspicious but the testing is unclear, we will choose to watch the tooth – we feel it is better to be sure about our diagnosis before committing to the tooth to root canal therapy.

This clinical study evaluated the effectiveness of five different pulp testing methods – electric pulp tester (EPT), CO₂ snow (dry ice), dichlorodifluoromethane (DDM, a refrigerant similar to Endo Ice), ethyl chloride, and ice. The authors tested these techniques on 96 clinically sound healthy premolars in 24 patients, ranging from ages 9 to 34 years old. In addition, they measured the effect of the cold tests at the pulpodentinal border in extracted teeth. They found the EPT, CO₂, and DDM were more dependable than ethyl chloride or ice in producing a response in adults. In children, the EPT was less effective that CO₂ or DDM, but still more reliable than the other two. They also found that in vitro the CO₂ and DDM were more effective than ethyl chloride and ice in lowering the temperature at the pulpodentinal border. **SUMMARY: EPT, CO₂, and DDM (a refrigerant similar to Endo Ice) are the most reliable ways to test adult teeth; children’s teeth should be tested with CO₂ or DDM.**
This laboratory study evaluated the temperature change in the pulp of an extracted tooth to
determine what method was the most effective when using dichlorodifluoromethane (a
refrigerant similar to Endo Ice). Four techniques were used – a large (#2) cotton pellet held in
cotton pliers, a small (#4) cotton pellet held in cotton pliers, a wooden stick cotton tip applicator,
and a cotton roll. Each of these carriers were either sprayed or submerged in the refrigerant
and applied to the outside of an extracted mandibular incisor for 10 seconds. A thermocouple placed
in the pulp chamber measured the changed in temperature caused by the cold test. They found
that using the large (#2) cotton pellet was the most effective method to cool the pulp chamber.
Moreover, no significant difference was found when the carrier was sprayed or dipped in the
refrigerant. However, although some of the doctors in our practice use the larger #2 cotton
pellet, others use the smaller #4 cotton pellet because of concern for false positive tests due to the
gingiva. SUMMARY: A large (#2) cotton pellet held in cotton pliers is the most effective way to
perform a cold test using refrigerant spray.

Bender IB, Landau MA, Fonseca S, Trowbridge HO. The optimum placement-site of the


Lin J, Chandler N, Purton D, Monteith B. Appropriate electrode placement site for electric

These three studies all looked at where the EPT tip should be placed on the tooth. The authors
placed the EPT probe in different regions of the tooth and measured where the lowest response
was found clinically (Bender, et al. and Lin, et al.) or in the laboratory (Jacobson). Bender, et al.
found in anterior teeth that the incisal edge regions was the best location. Jacobson determined
in bicuspids that the occlusal third region was the optimal area. Lin, et al. showed for molars
that the MB cusp tip was the best. Although Jacobson also found the middle third was preferred
for incisors, I would follow the advice from Bender’s study because his was a clinical study
whereas Jacobson did his work in a laboratory. Conveniently, these three study show that the
EPT probe should be placed on the most easily accessible location of the tooth. SUMMARY:
The EPT probe should be placed on the incisal edge in anterior teeth, the occlusal third in
bicuspids, and the MB cusp tip in molars.