Intraoral Photography
Using a $299 Camera

High quality intraoral photos can be obtained without spending $1400 for a dental camera

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sizing gauge (below) used with the periapical xray helps to determine the correct implant size to use:

![Image of P.A. Film Implant Overlay](https://example.com/image.png)

**Pediatric Dentistry:**

**Sealants on Primary Teeth**

Psaltis has stated recently that sealants on primary teeth are contraindicated for two reasons. One is that most (70%) decay on primary teeth occurs interproximally, not on the occlusal surface. Secondly, the enamel on primary teeth does not lend itself to etching and bonding and sealants on these teeth will be short lived. Since initial decay on permanent teeth occurs (90%) on the occlusal, buccal or lingual surfaces, sealants can provide some benefit for these areas.

Now whether sealants actually serve a useful purpose is debatable. Long time readers of DU will recall from a previous issue (vol. 9, pg 37), that after an extensive review of the literature (113 articles), Mejare concluded that sealants provided little or no benefit for preventing occlusal decay in permanent teeth.

**Photography - Intraoral:**

This is the article I alluded to in the last issue in which we are going to show you how to take excellent intraoral photographs with a simple $300 off-the-shelf camera!

Saving cosmetic images of teeth or portraits of patients within practice management software's program will degrade the image to the point where future prints or seminar uses are required, the image will be unusable. This is because the practice software compresses the image to the smallest possible size to save storage space and in doing so, the resolution with which the original image was made is forever lost.

Excellent and inexpensive photo editing and storing software is available from many sources. Noted dental photography expert, Dr. James Dunn recommends "acdsee" software (www.acdsee.com) which sells for $69.95 and can be downloaded in a trial version.

Another inexpensive photo software recommended by Dunn is "ThumbsPlus" (www.cerious.com) and sells for $50 in the standard version and $90 in the "Pro" version. The Pro version can work with "RAW" high resolution images from upper end digital cameras and other technical features probably not of interest except to a graphical designer.

A simple to use photo software program I like and have used for several years is from Corel (www.corel.com) called "Paint Shop Pro X". It sells for $79, is very intuitive and easy to learn. This software can also be downloaded in a trial version at the website. Once you have chosen and installed one of these simple photo software programs, you DO NOT NEED TO INSTALL ANY OTHER PHOTO SOFTWARE which comes with digital cameras and many ink jet printers. You will needlessly clutter up your hard drive with duplicate photo software which essentially all do the same thing. Perhaps repeating myself, you DO NOT NEED THE SOFTWARE THAT COMES WITH THE CAMERA to download images from the camera. The easiest way to download images is to use a card reader (about $15) which reads the camera memory card without any additional software needed. You just have to direct it to the folder in which you wish to download your images. Actually, most ink jet printers now come with card slots built into them for downloading the images from your camera so you don't even need a card reader. The card reader might however be useful in your office to download images immediately into your practice computer chairside or at the server.

Of course the industry standard for digital image manipulation is Adobe's Photoshop (www.adobe.com) however, for me, it is way too complex for everyday use and requires a steep learning curve to master all the intricacies of the software.

All your patient's images can be saved on the hard drive of your office computer outside the practice software by creating a folder titled: "Patient Photos" or whatever. Subfolders (subcatagories) can be created to further subdivide your photos if desired. By renaming the files (photos) into pt. Last Name, First Name, they will be stored alphabetically. Further words can be added to the file name to describe the contents, for example: JonesSue veneer; or SmithBobEndo8. By adding descriptive words to the file after the name, Windows XP "SEARCH" feature can pull up all the patient photos showing "Empress" crowns, or who have had "veneers".

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24 Psaltis G: Hinman Meeting 2006
25 Dunn J: Hinman Meeting 2006; Atlanta, GA
26 Dunn J: Greater New York Dental Meeting 2005, New York, NY
Photomed (www.photomed.net) offers a relatively inexpensive kit of products for taking better portrait "glamour" shots of your patients. It consists of a special Hollywood black backdrop cloth, a patient held reflector and a special diffuser which softens the flash exposure. If you've seen wedding photographers recently, they use a similar white opaque diffuser over their flash for close-up bridal photos. Check them out at www.photomed.net/portrait.htm.

Before making any decision on a digital camera, whether for personal use or in the office, check out this website: www.dpreview.com. There are hundreds of in-depth reviews of all types of digital cameras and side-by-side comparisons which make it easier for you to make a decision on which brand or model to buy. I just recently (3-06) bought a Casio EX-Z750 which has already been superseded by newer models and is out of production. The camera was $299 from 17th Street Photo (www.17photo.com), an online dealer I have used many times with excellent results over the years. They sell NO grey-market merchandise and everything comes factory sealed with a US warranty, important considerations when buying from an online vendor. The Casio EX-Z750 is a 7.2 megapixel "point-and-shoot" camera, i.e., pocket sized. It also takes 640x480 MPEG-4 videos for as long as you have space on the video card. Many digital cameras, including my old Canon, only record video in 30 second clips, which is inadequate for most video scenes. I have taken videos with the camera, and while they're not as good as those from an actual digital video camcorder, they are not bad for home viewing, especially when you consider that you have a high resolution still photo camera and a video camera which can fit in your shirt pocket! On a recent vacation with neighbors, my photos were sharper, clearer, and had better color than my neighbor using a Minolta Maxima SLR with slide film.

As far as taking photographs, the color and sharpness are simply astounding with this Casio. I have finally laid my old Nikon F film camera and all the Nikkor lenses to rest. Casio's new model, the EX-Z1000, is a 10 megapixel camera for only $299 online. While all intraoral photos in this section were taken with the EX-Z750 and is certainly adequate, I would recommend going to the higher 10 megapixel EX-Z1000 as it costs no more and the added resolution will make your pictures even clearer and sharper. You can even get a factory underwater housing (right) which allows you to operate virtually every control underwater (for you fellow SCUBA divers). In this section, I am going to show you how to take pictures like you see here with this camera or other brands with NO OTHER ACCESSORIES. Have I gotten your attention?

There are TWO WAYS to take a high resolution intraoral photograph. One is to use an expensive, special "dental" camera fitted with a fancy macro lens and ring flash so you can get real close to the tooth. OR, you can buy an off-the-shelf high resolution (high megapixel) point-and-shoot camera, stand back a little bit to take the picture and BLOW THE PICTURE UP using the simple photo software described previously. Because the point-and-shoot cameras today have such high resolution, you can blow the picture considerably and not lose image clarity. In summary, you can spend a lot of money to get close to the tooth to take a picture, or spend much less and stand further back. The choice is yours. So let's look at how it's done.

As those of you who have point and shoot digital cameras already know, they are not simple "instamatic" type cameras. These cameras have a wide variety of adjustments and picture modes which take a while to absorb from the 100+ page instruction manual. The good news is, once the camera is set up properly to take intraoral photos, all you have to do is turn it on and "point and shoot". Most dentists who've purchased a Canon Rebel, Fuji SLR or Nikon D100 can certainly be proud of those cameras, but they're not going to be operated by your assistant! You are the one who's going to have to take all the pictures. With the point and shoots, anyone in the office can use it to take intraoral photos. Let's get started.

I'm going to describe the set up for the Casio EX-Z750 (mine) which is similar to the later models 850 and the 1000 (and you think the bonding manufacturers are coming out with products quickly?!?!). The basic instructions can also be applied to other brands of point and shoots, like Sony, Canon, Nikon, Olympus, Panasonic and others. You will need to read and understand how to adjust the manual settings of your particular camera. A built-in flash that's close to the center axis of the lens is a good feature in a point and shoot, otherwise you
will get unwanted shadows in your intraoral photos. A Sony model has it right over the lens, that's good.

I'm not going to go into great detail on which button to push to get into which menu, yada, yada, as this piece would be boring and too long. I will tell you all the setting changes I've made and locked in to the camera's memory. Let's look at how the camera is set up in the "point and shoot" mode.

The camera's factory default focus setting is usually sampled from multiple areas of the picture as is the exposure setting, and the exposure is set automatically. All of these need to be changed as does the flash which is too strong for intraoral close-ups. Most brands of point-and-shoots come with a MACRO setting (it's usually a "flower" icon on the display). Macro focus lenses allow you to take pictures close up. So here we go with the setting changes.

The Casio EX-Z750 has a "Snapshot" setting on the main dial (A) which, as the name implies, allows you to take most any picture by just pushing the button -- see, these can be simple to operate! The Snapshot does however allow you to change the settings which we will do. When I mention "button" it means there is a button on the camera to do this. When I mention "menu", it means you have to go into the camera's menu system to change settings. Here's the changes you will need to make:

1. Press the BUTTON (B) to open a menu to change the focus to POINT FOCUS. This will cause the camera to focus on the object in the very center of the view screen. Therefore, if you center a tooth of interest in the center of the view screen, it will be in focus.

2. Press the BUTTON (C) at 12 o'clock until the MACRO FOCUS icon (flower) appears. This means the camera will now focus on objects very close to the lens. This works best with the telephoto set at WIDE ANGLE. Do not use the zoom control to get closer to the teeth, move the camera closer within the limits of the macro lens (usually no closer than 4-6 inches, depending on the brand).

3. Press the BUTTON (C) 6 o'clock so the FLASH icon is displayed (a lightning bolt), this means the flash will flash every time regardless of whether it's needed. You DO NOT want auto flash, red-eye reduction or no flash settings.

4. Press the MENU BUTTON (B) and go to SET UP>>SOUNDS and make sure the HALF SHUTTER has a sound associated with it (I've chosen the frog croaking sound). The reason for this is so that when the shutter button is half depressed, you will hear the frog croaking sound if the camera is in focus (there is also a light indicator but the frog sound is much more attention getting). If for example you are TOO CLOSE for the macro lens to focus, the frog won't croak and that's telling you that if you take the picture, it will be out of focus. You will then need to BACK UP a little, repress the shutter halfway and hopefully now hear the frog croak which means you're ready to snap the picture. Sometimes when taking an upper occlusal shot, the POINT FOCUS is on the dark palate and it can't focus because there's not enough contrasting background. If this happens, just move the camera aim so that the central FOCUS POINT is on a posterior tooth. It should now snap in focus and you'll still get the whole arch in the picture.

5. While still in the camera's MAIN MENU, go to QUALITY and make sure the picture SIZE is set at the highest resolution, and the QUALITY is set to FINE. This will maximize the megapixels of the camera and give you the best resolution. I have a 2 gig card in the camera which allows me to take about 500 pictures at max resolution. Storage is cheap, so get a big card, 1-2 gig minimum.

6. Again in the MAIN MENU, go to QUALITY and scroll to the second screen (there's two). Under METERING, chose SPOT. Under FLASH INTENSITY, chose -2 (minus 2). This will give you spot metering from the center of the picture and turn the power of the flash down, as it is too strong for oral close-ups.

7. Again in the MAIN MENU, go to REC then to L/R KEY and select "E/V SHIFT" option. This will allow you to adjust the exposure, if necessary from the viewing screen while framing the picture (you push the main BUTTON (C) in the 9 o'clock or 3 o'clock position).

8. There should now be an "E/V" adjustment on the display screen, it has a +/- icon and can be adjusted up or down by pushing the main BUTTON (C) at the 9 o'clock or 3 o'clock position. Set the E/V to -2 (minus 2). This will turn DOWN the exposure due to the strong flash at close distances to keep the picture from being washed out.

9. Leave the other factory settings as is for now, you can fool with them later if you wish after you become more familiar with the instruction manual.

10. Do NOT turn the camera off at this point as some of the settings will revert back to default. We need to "save" these settings you've just made and we can do that in the BEST SHOT mode (BS on the dial), however do not go there yet. While still in SNAPSHOT mode with all your setting changes just made, you need to take a quick close-up picture of some teeth (I'll explain why in a moment). By taking this
photograph, the camera will "remember" ALL the settings which were set for that particular picture.

11. Now go to BEST SHOT (BS) with dial "A" and push the central SET button (D) and scroll (rt. or left) until you see a screen that says, "REGISTER USER SCENE". Again press the central SET (D) button and your last shot (teeth) should be displayed, push the central SET button to SAVE these settings.

You're Done!

Here's how easy it is from now on. Leave the dial set on BS (BEST SHOT). When you turn on the camera, it will queue up which ever Best Shot scheme you used last. If you only take close-ups of teeth with this camera, that will always be the one to appear. Notice how the "tooth photo" appears momentarily on the view screen to let you know your in the "tooth 'Best Shot' mode". If you do wish to take a portrait or full face shot, the tooth setting may work fine also, try it and see how it looks. I've tried shooting a full face portrait shot in the "tooth best shot" mode and it looks fine. So now you have a camera set for shooting intraoral photos or full face shots, ALL YOU HAVE TO DO IS TURN IT ON AND TURN IT OFF !! How easy (and inexpensive) can it be?

You can show the patient the picture instantly on the camera's large view screen (Casio and Sony have the largest) and can ZOOM IN for a super close-up on any part of the picture using the wide-angle/telephoto control. Notice how large the LCD screen is on this camera. This is one feature to have on a camera used in this manner. There's no need to upload it to a computer for communicating to your patient. You can scroll from one picture to the next to inform your patient of their needs and upload the pictures later to your computer. Or remove the SD card out and print them out immediately.

Of course, you will want to save the pictures to the patient's file or the office computer and you will need to upload them from the SD card of the camera. I have found the easiest way to upload the pictures to your computer is to use a CARD READER (about $14) or use the card slots which come with most ink jet printers now. Throw the camera software away, you don't need it to upload the pictures and I've never liked the software that comes with cameras. Use the JASC Paint Shop Photo Album software I described earlier for all your photo manipulations. This is where you will crop and "fix" your pictures if necessary. The real advantages to digital photography occur after the photograph is taken using the simple software we've described.

A little practice with the mirrors, retractors and camera position will make you a whiz photographer in no time. Remember if the frog ain't croaking (or other sound), you're not in focus and you either need to back up or aim at something with some detail. If taking a picture of the centrals gives a too-bright image and washes out the color, just hold up a balled up piece of Kleenex in front of the flash to diffuse the light some. That works great.

Judging by these photographs, do you really want to spend $2000+ for a Fuji or Nikon system and then have to take all the pictures yourself? All of the intraoral photographs you see here were taken with the Casio point-and-shoot and are UNALTERED except for cropping and rotating if needed. The actual images are sharper than the ones shown here as these have been highly compressed so the newsletter can be emailed.
The above 3 photos could have been better if I had taken them in the office with assistance with lip retraction and better room lighting but I took these of myself at home, by myself, looking in a bathroom mirror to aim the camera! I say this to illustrate that this is obviously not very "technique sensitive"
Remember, when taking any photo with a mirror, the final image must be flipped L-R to match the patient as the eye would see it, since the mirror’s image is reversed.

Below is an example of a quick occlusal shot to show a patient an amalgam which needs replacement. A mirror is inserted, photo made, and the image can be shown instantly on the camera as well:

Below are a few more examples of what the "simple point-and-shoot" camera can do:
A Few Final Points on Digital Photography

- The Sony brand is an excellent camera, however they nickel and dime you to death with their proprietary accessories like the memory card which has to be a Sony Memory Stick.

- If you are considering the Casio brand and want to have a camera which will go SCUBA diving, make sure your model has Casio's underwater case (www.casio.com).

- Even though your settings are "locked in" and don't need to be monkeyed with for your dental oral photography, if your shots are coming out too dark, you can increase the "E/V" (exposure) setting on the screen using the BUTTON (C). After you shut off the camera, it will return to your old settings, they're "locked in".

- If you are not particularly "camera savvy", take this article to your nearest camera nerd and get some help. These simple looking "point-and-shoot" cameras are actually much more sophisticated, versatile and complicated than they look. But that's what makes them so great.

- If you want to take your point-and-shoot on vacation with you, by all means do so. As long as you have the dental settings locked in, they will stay safe, no matter how much you monkey with it on your trip.

- Once again, if you're not the least bit computer savvy or technologically curious, then this is NOT for you, but I offer you this advice: GET WITH IT, it's fun and stimulating to learn this stuff.

Occlusion:

Interferences and Abfractions

While the actual cause of abfraction lesions remains somewhat unclear, it is generally thought to be caused by excessive B-L flexing of the tooth from bruxism. At least that's the theory anyway.

This study may cast some doubt as to that theory however. In patients with at least two abfraction lesions, the lesions were first measured for size, then on one of the teeth, an occlusal adjustment was performed to relieve excursive trauma and excessive occlusal forces. Three years later, the patients two abfraction lesions were again measured. There was no observable halt to the progression of the lesions in the occlusally adjusted tooth which grew larger in a similar manner to the unadjusted tooth. Interesting, no? This is what makes reading the literature so much fun, many of the popular paradigms are shot down, yet few know about it.

Veneers:

Try-In Pastes

Bertolotti and Harald Heymann are two leading experts who do NOT recommend the use of try-in pastes prior to veneer cementation for 2 very good reasons. First, the pastes are notoriously poor stand-ins for the actual color of the resin cement they represent. Secondly, as anyone who has tried to clean the stuff out after using, the glycerin based try-in pastes can testify, they are very difficult to remove completely from the intaglio surface of the veneer. Unless this material is completely cleaned out, the porcelain re-acidified and properly silanated, a weak bond will result. Bertolotti notes that a complete debond of the veneer may be the result. Heymann recommends trying in the veneers with plain water.

Bertolotti and Danville Engineering have developed a clever solution to this dilemma. It is a try-in paste made of the same composite as the final cement but with only very small amounts of the camphoroquinone light curing catalyst. Since the try-in paste is identical to the resin cement, minus the catalyst, not only will it not harden but one does not have to scrupulously clean it all out prior to applying the actual resin cement to the veneer. The try-in paste is called Accolade™ PV Try-in and the cement is called Accolade™ PV.

Ray notes that only three shades of try-in and cement are needed for the vast majority of veneer cases: translucent, Light and Extra Light.

Sensitivity Reduction

A continuing problem with total-etch bonding agents, especially on deeply prepared veneer cases is the dreaded post-op sensitivity. A recent visit to the Kerr website (www.kerrdental.com) revealed a training video for seating veneers by Dr. Rhys Spoer. He recommended that sensitivity can be greatly reduced if, after etching with 37% phosphoric acid, the dentin surface i.e. re-wetted with an oxalate desensitizer called Super Seal (Phoenix Dental). Other similar products are Oxa-Gel and BisBlock™ (Bisco). If you go to the Super Seal website

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27 Wood I: AADR Meeting 2006; abstract #0139
28 Bertolotti R: Adhesion Dentistry Newsletter 2006; #27 (January) www.adhesion.com
29 Heymann H: Hinman Meeting 2006, Atlanta, GA
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