



the
∞ **143RD** ∞
CHICAGO DENTAL SOCIETY
MIDWINTER MEETING

The respected leader in scientific dental meetings

SCIENTIFIC PROGRAM: FEBRUARY 21 - 24, 2008

EXHIBIT DATES: FEBRUARY 22 - 24, 2008

COURSE P06
DIGITAL DENTAL PHOTOGRAPHY
JAMES R. DUNN, DDS
THURSDAY, FEBRUARY 21, 2008

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CHICAGO DENTAL SOCIETY MIDWINTER MEETING COURSE EVALUATION

SPEAKER: _____ DATE: _____

SUBJECT: _____ NUMBER OF ATTENDEES: _____

PLEASE RATE YOUR SPEAKER AS TO:

	Excellent	Good	Fair	Poor	N/A
SUBJECT SELECTED	4	3	2	1	0
TIMELINESS OF SUBJECT	4	3	2	1	0
COMPREHENSIVENESS	4	3	2	1	0
MEETING YOUR EXPECTATIONS.....	4	3	2	1	0
CONTENT LEVEL	4	3	2	1	0
DELIVERY.....	4	3	2	1	0
VOICE QUALITY	4	3	2	1	0
HOLDING YOUR INTEREST.....	4	3	2	1	0
APPROPRIATE AUDIOVISUALS	4	3	2	1	0
EFFECTIVE AUDIOVISUALS.....	4	3	2	1	0
OVERALL EVALUATION OF SPEAKERS	4	3	2	1	0
OVERALL EVALUATION OF THE PROGRAM	4	3	2	1	0

SHOULD THIS SPEAKER BE INVITED FOR FUTURE MEETINGS? YES NO

WHAT TOPICS INTEREST YOU FOR THE FUTURE? _____

COMMENTS (use reverse if you need additional space): _____

NAME (REQUESTED BUT NOT REQUIRED—PLEASE PRINT): _____

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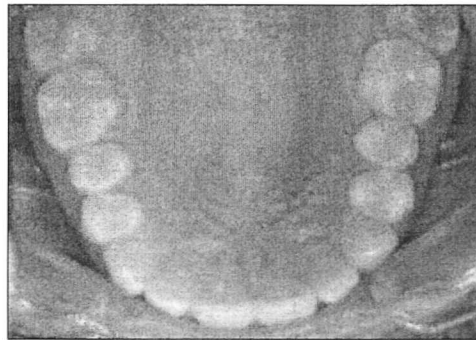
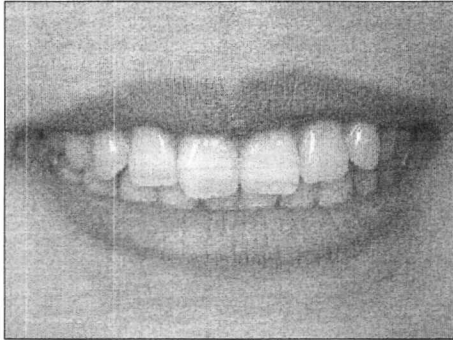


DO NOT FOLD CARD. FOR CDS PERMANENT FILES.

RETURN EVALUATION CARD TO:
Chicago Dental Society
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401 N. Michigan Ave., Suite 200
Chicago, IL 60611-5585

An Introduction to Digital Dental Photography

James R. Dunn DDS



Dental Digital Photography is still Photography!

1. Principles of Photography apply to dental photography

Lighting-Most Important-quality, amount and direction
Use light to make subject appear most attractive

Composition-frame and isolate subject you want to photograph
Exclude unwanted or distracting items from the image.

Clarity-focus, depth of focus. Subject (all of subject) should be clear and sharp. Use large "f stop" for "long depth of field" -- Front to back focus.

Color-Accurate, natural tooth, gingiva, and skin color
Depends on Camera, computer, monitor, printer, software settings and capability. White balance, sensor quality, exposure.

(Resolution)-Number of pixels per image. Higher is better. Maximum need in dentistry? Minimum approx. 8 Mp, Above 12 Mp difficult to manage or use in dentistry. Sensor and pixel quality, wide tonal range, high dynamic range. (visit glossary at www.dpreview.com for explanations of terms)

Three Levels of Dental Digital Photography for dentistry

1. **BASIC** "Snapshots", in-office, patient, Lab use

- Simplified camera equipment
- Simple image storage and organization
- Simple printing and presentations primarily with prints
- Snapshot portraits for patient identification
- Auxiliaries take most photos

2. **HIGH QUALITY-INTERMEDIATE** marketing, web, portraits, diagnosis

- Modified point-and-shoot cameras and introductory SLR's**
- More sophisticated organization and manipulation image software
- Presentation and manipulation software (Power Point and Thumbs plus type software)
- More **sophisticated image quality**, marketing quality
- On camera lighting, mirrors, contractors
- Higher quality portraits using small size lighting equipment and backgrounds
- Printing, higher quality, dye sublimation, copies to patients
- Dentist and/or highly trained auxiliaries take photos

3. **ADVANCED** artistic professional quality, marketing, presentations

- High resolution SLR** for majority of images, modified P & S for basic images
- Equipment and software to meet higher image quality expectations
- Image manipulation, enhancement, cropping, and corrections
- Artistic quality images**-lighting control, multiple flash, mirrors, contrastors
- Patient photos organized in folders
- Diagnosis, Treatment planning-full mouth photo series
- Marketing with images-web sites, printed brochures
- Digital radiographs-photos of radiographs or direct digital
- Laboratory communications-prints, email, CD
- Experience of imaging and photographic dental art
- Specialty referrals-email or CD of photos to Doctors
- Presentations to patients, service, educational and professional groups
- Glamour portraits**-external lighting and backgrounds
- Accreditation, memberships, and presentations to high end dental

organizations. Dentist usually takes majority of photos

Digital Photos in Dentistry

1. **Photos for Dentist use.** Used to visually record, document, share and communicate dental information to dentists, patients, laboratories, specialists, insurance, peers and the public. Diagnosis and treatment planning, lectures, publications, accreditations, competition. Use slide shows or Power Point..

3. **Photos for Patients.** Any view patients see in normal environment. Smiles-anterior, lateral, oblique, non-medical glamour, or attractive portraits, Can print or burn photos to CD. Best marketing dental photos.

Imaging Equipment

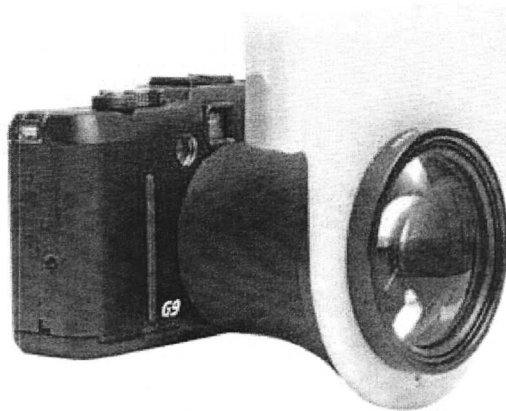
Cameras

Modified consumer with PhotoMed flash/macro attachment.

Adequate quality for dentistry. 7-8 Mega-Pixel cameras. Will not take one or two teeth, but adequate for portraits, smile, occlusal, quadrants.

Canon, Fuji, Olympus and Nikon. \$1,200-2,000. Lens and flash attached to camera, not changeable. Must use supplied close-up lens and flash diffuser for dental close-up photos. Can be used with one hand and by one person.





Imaging Equipment, cont'd...

Cameras-SLR-Professional or semi Professional camera bodies with 100mm macro lens and flash attached to the end of the lens. Similar to 35mm in use. Canon 30D, 40D, Canon Digital Rebel XTi, Nikon D40, Nikon D300 systems \$2,500 to 4,000.US Very high quality. Heavy-bulky camera/lens. Canon, 5D, 1Ds Mark III, Nikon D300, Canon 1Ds Mark III-very high quality, very expensive. Bodies from \$4,000-8,000 have a questionable need in dental use for highest end cameras. A macro lens and macro flash must be attached to the camera body to take dental images. Requires two hands and assistance. High image quality.

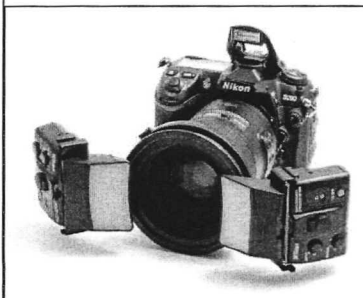
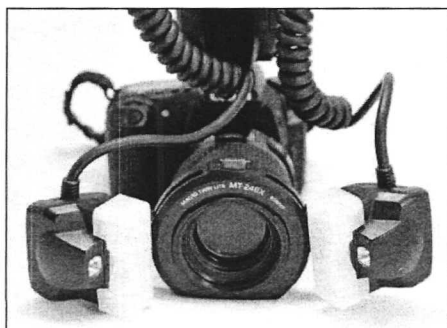
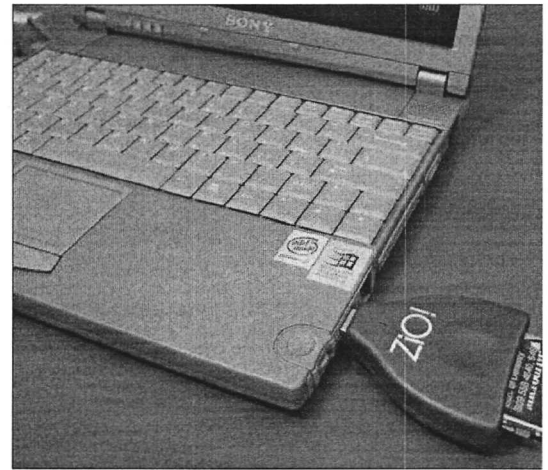
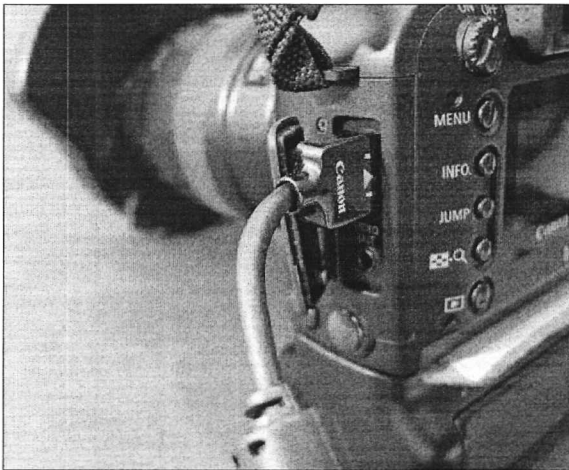


Image quality is determined by chip size, lack of chip artifacts and noise, pixel size, number of pixels, quality and power of the Analog to digital processor. The larger the chip, more pixels, larger pixels, and more powerful A-D processor will give higher quality images. SLR's inherently give better images.

JPEG files of high resolution adequate for dentistry (1-3 Mega bytes)-Will need to decrease size to email. RAW files need processing to a working file type (TIFF or JPEG). Discussion and differing opinions on need for RAW image files in dental imaging. High quality JPEG files are adequate and save processing time. RAW files required in AACD accreditation process.

Input\Output Devices

To transfer the image to a **computer**, the camera can be connected directly to a computer with a USB 2 (or firewire) cable, or the camera's **memory card** is placed in a **card reader** connected to the USB port of the computer. Other input devices are Scanners, CD's or DVD's and the internet. Images can be transferred from the computer to viewing monitors, printers (ink jet, lasers or dye sublimation), the internet, or to external storage, CD's and DVD's.



Computers

A Computer with adequate RAM memory (1 gigabyte minimum), operating speed, hard drive capacity, CD and DVD writers, Ethernet or wireless connection is a necessity for managing digital images. It is recommended that dental images not be stored in the office management systems. An external hard drive is useful to store the large files digital images can create.

Software - Image Management software organizes and helps file the images into named folders. \$50-\$130 range. Thumbs Plus7 Pro Cerious software, ACDSee Pro 2, ACD software, Windows Explorer, Piscasa (Google).

Software - Image Manipulation allows alteration of the image (crop, rotate, color correction, etc.). Most dental images can be managed by inexpensive software.

Photoshop Elements 6 (inexpensive yet has many features needed by dentist)

Photoshiop CS3 (powerful and expensive with many features not needed by dentist, used by professional photographers and graphic designers)

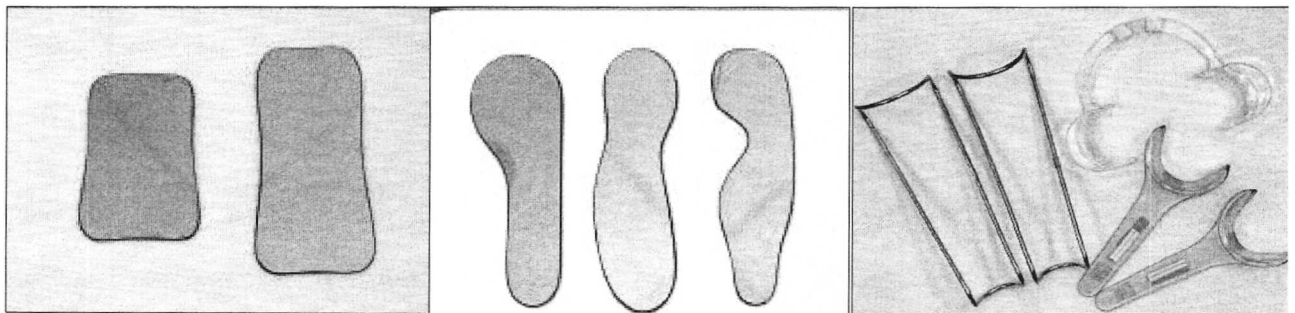
Software - Designed for Dentistry includes the ability to create predictive dentistry, commonly called "computer dentistry". These programs also can integrate with associated dental management systems. Dental terminology is used in all image management. Most dental image management programs degrade or permanently compress the image quality. If you want to retain the original image quality, store the original images in separate organizing software. (windows explorer, Thumbs Plus, ACDSee Pro 2).

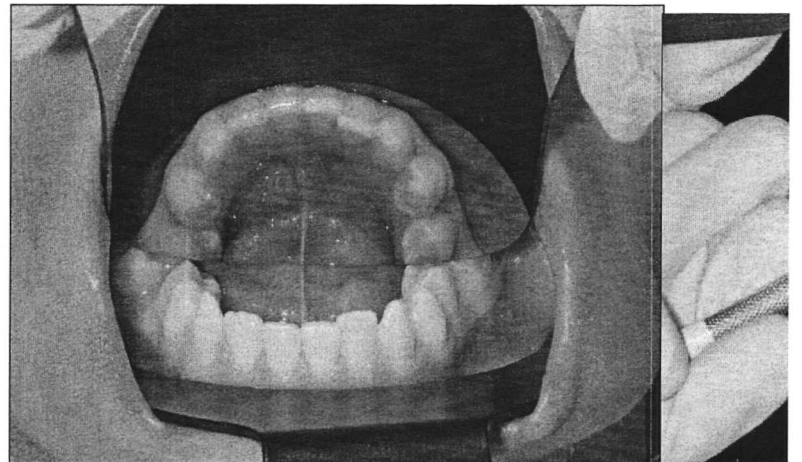
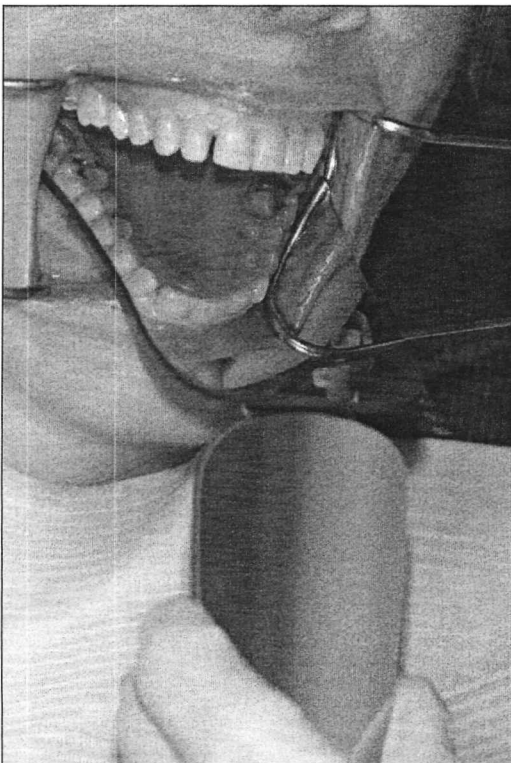
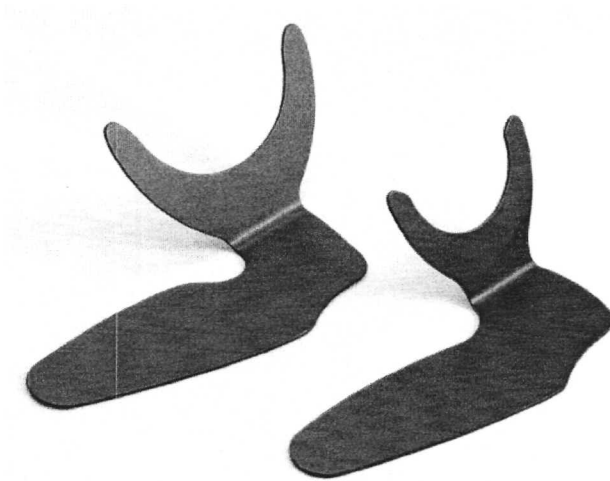
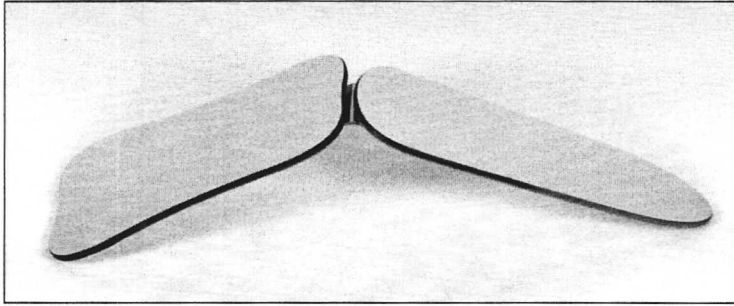
Software - Power Point--Microsoft Office presentation software is used to create patient diagnostic and treatment planning presentations, and presentations to other groups.

Accessories

Sterilizable cheek retractors (metal, or plastic), front surface mirrors, contrastors (black tooth backgrounds) are needed for high quality intraoral images. External strobes, diffusers essential for high quality portraits.

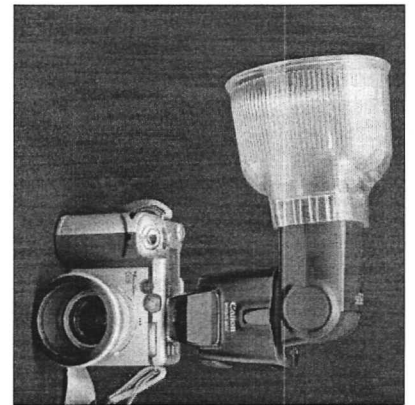
Sources: In Southern California-www.photomed.net





External flash

Flash diffusers and a background are needed for portraits. (Canon has a flash system (430 EX and 580 EX series) for use with EX flash compatible digital cameras—G series and D SLRs.



Techniques: Workshops or individual mentoring best

No detailed, technique books currently available.

Diagnostic Series-number and view depends on dentist

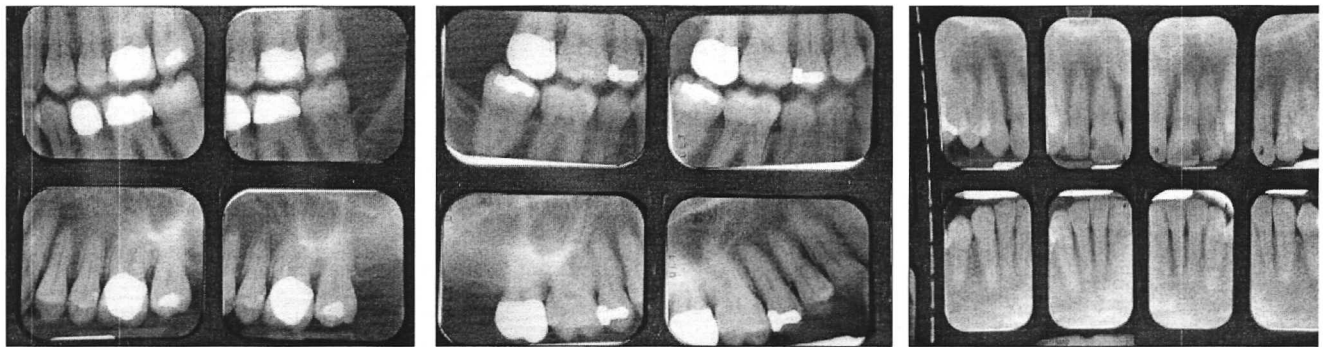
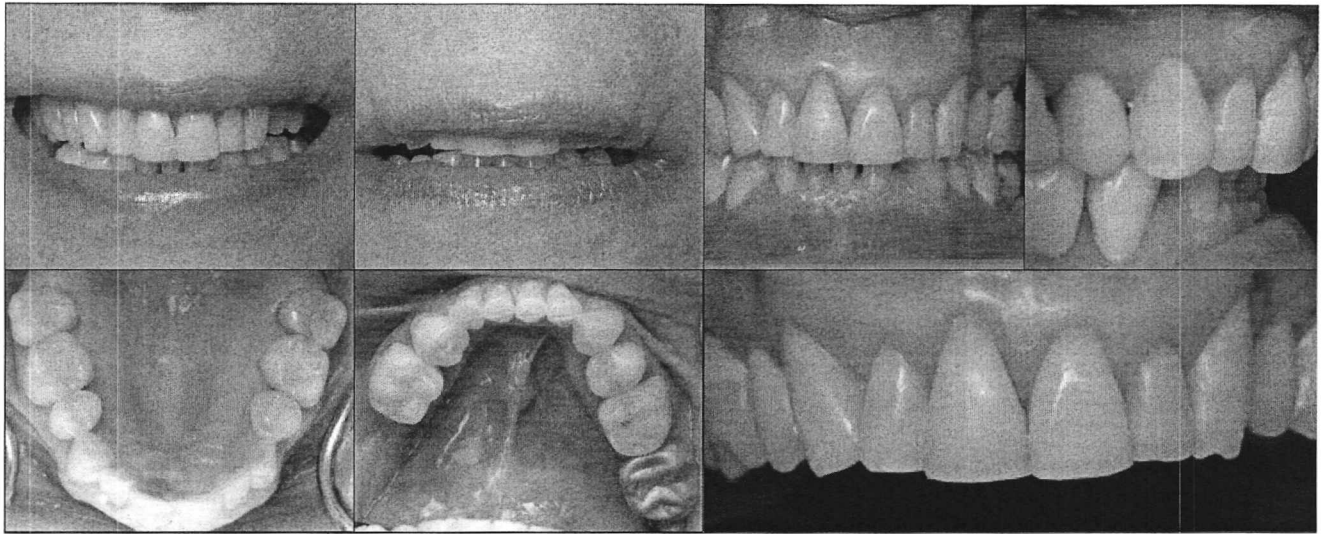
Smile-open lips

Anterior View-retracted lips. Cheek retractors

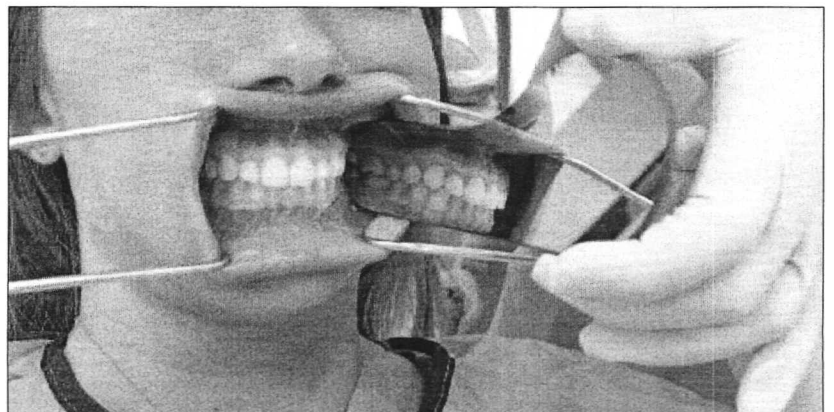
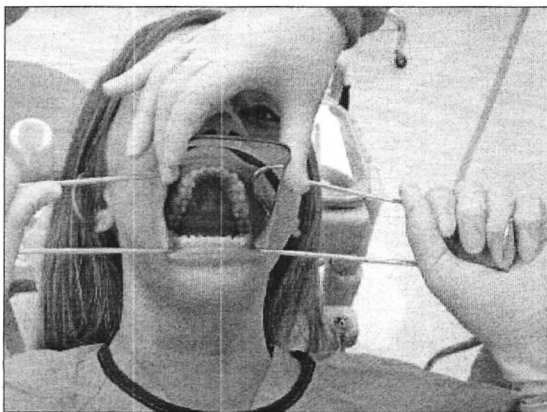
Occlusal-Maxillary and Mandibular. Cheek retractors, Occlusal contrastor and mirror,

Quadrants-anterior or posterior-facial, lingual, Incisal\occlusal. Retractors, Contrastors, mirrors

Portrait-(optional), X-Rays (optional).

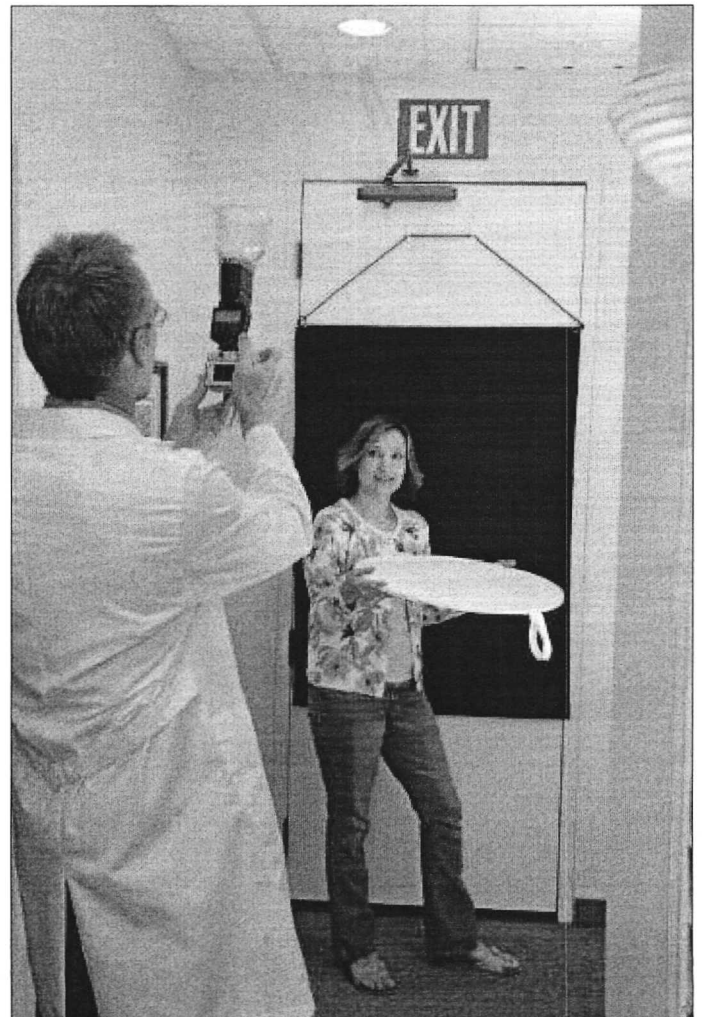
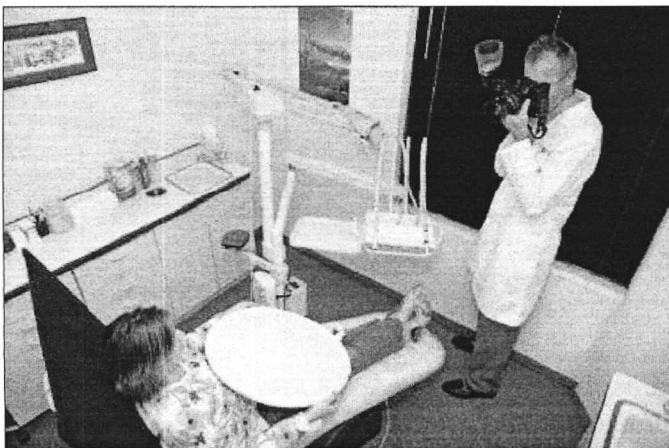
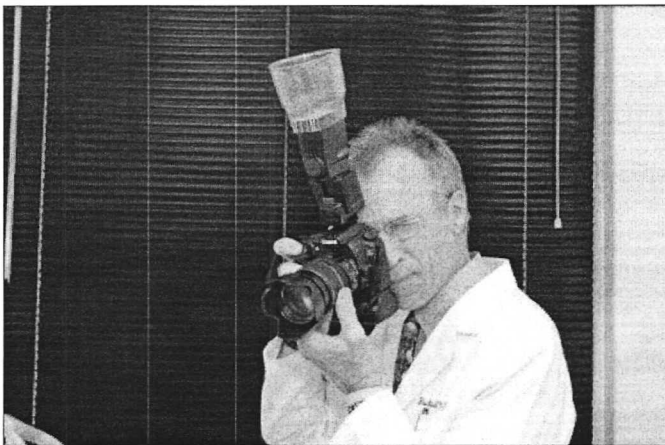
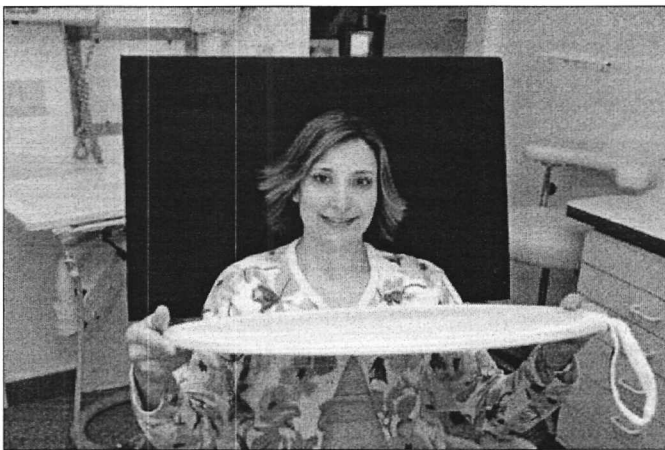


AACD dental series required for accreditation
 (see www.aacd.com for guidelines and digital protocol))



Simplified Dental Portrait-New dental style portraits are more artistic than "medical" portraits. Requires external flash!

1. Lighting and background most important
2. External Flash with diffuser to soften light, reduce shadows, light bounced to ceiling to highlight hair.
3. Black, non-reflecting background fabric attached to a foam board or hanging from a wall or door.
4. Lap reflector. Brightens face by reducing shadows under nose and chin. White board or Collapsible spring fabric. Reflects light bounced from ceiling.



Modified Consumer (point and Shoot) Systems

<p>Canon G7, G9 with PhotoMed flash attachment.* (TTL Flash) with 7-10 MP</p> <p>430 EX and 580 EX Canon Flash with Fong diffusers ST E2 Canon speedlite Transmitter</p> <p>*Ideal modified P&S for dentistry at the moment. (Earlier Canon "G" Series—Only a few available)</p>	<ol style="list-style-type: none"> 1. Light weight, Easy to use, 10, 12 megapixel 2. Magnification: Portrait (without attachment) macro .to approximately 5 teeth. Uses zoom control for magnification selection. 3. Macro attachment gives soft, even light. 4. Video viewfinder- 5. Compact Flash Type I and II memory cards (to 1 qigabyte) 6 Allows off-camera TTL flash for portraits or small object photography.
<p>Olympus C-5060 with PhotoMed flash attachment (TTL Flash)</p>	<ol style="list-style-type: none"> 1. Light weight, Easy to use, 5 megapixel 2. Magnification: Portrait (without attachment) to approximately 4 teeth macro. 3. Macro attachment gives soft, even light. 5. C F, Smart Media, and xD memory card compatibility 6. No accessory flash systems available 7. Must use in-camera TTL flash for portrait
<p>Canon A620-640 with PhotoMed flash attachment</p>	<ol style="list-style-type: none"> 1. Light weight, Easy to use, 7 Megapixel 2. Magnification: Portrait (without attachment) to approximately 4 teeth macro. 3. Macro flash attachment gives soft, even light. 4. Video viewfinder-wide swivel-easy to see image from multiple positions 5. S D and Multimedia memory card compatibility 6. No accessory flash systems available 7. Must use in-camera TTL flash for portrait

SB 29s Nikon "ring" flash (Discontinued by Nikon)	<ol style="list-style-type: none"> 1. TTL only with Fuji S2 Pro 2. 2-point lights-use both or one (L or R) 3. Flash can be removed from front of lens for portraits. 4. No Nikon external flash units for TTL multiple flash portrait or small object lighting.
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SLR Professional Systems

<p>Canon EOS 1Ds Mk III (21 MP) (Full frame sensor) with 100 macro and MR 14EX Macro Ring Lite or MT 24EX Macro Twin Lite with diffusers (Canon EOS 1D Mark III—10 MP, 1.3 Mag. Ratio) Fong diffuser with 580 EX II for portraits</p>	<ol style="list-style-type: none"> 1. Very expensive, heavy, high resolution (higher than film) (21MP), Professional color management 2. Full frame CMOS chip (No mag. Ratio) 2. Used very little in Dentistry because of cost 3. TTL Flash with Canon flash system
<p>Canon EOS 5D (12 MP) (Full frame sensor) with 100 macro lens and MR 14 EX Macro Ring Lite or MT 24 EX Macro Twin Lite with diffusers Fong diffuser with 580 EXII for portraits</p>	<ol style="list-style-type: none"> 1. Expensive, high resolution full 35mm size sensor, no magnification ratio. 2. Higher resolution than 30D, and slightly larger, lighter weight than 1Ds Mk II. 3. Very high quality image, and color accuracy.
<p>Nikon D300 (12 M P) with 105 Micro lens and Nikon R1 flash, or Sigma macro 140DG "ring" flash</p>	<ol style="list-style-type: none"> 1. Heavy Magnesium body, 12 MP CCD Sensor 2. TTL flash exposure with R 1 flash 3. New 105 VR micro lens and R1 TTL twin flash just introduced.

(Pt. and shoot) vs. SLR in Dental Use.

Canon SLR Semi-Pro Systems

<p>EOS 30D* 40D (8.3 MP, 12 MP with new Digic II (III) A-D processor) with 100 mm macro lens and (1) MR 14EX Macro Ring Lite or (2) MT 24EX Macro Twin Lite with flash “diffusers” (Sigma “ring” flash for Canon now available)</p> <p>*at this time an ideal digital camera body for high quality, size and ease of use.</p> <p>Rebel XTi 10 MP good introduction SLR dental camera.</p>	<ol style="list-style-type: none"> 1. Moderate cost SLR digital body with high resolution and image sharpness. Can use all EOS lens and flash. 2. MR 14EX has 2-curved flash lamps, use both as a ring light and one (either right or left) as a near point system. Lighting effect similar to a ring light. 3. MT 24EX has 2-point lights controlled as separate or dual lights. Lighting effect similar to point source. Must be used with diffusers on flash head to light molars in occlusal views. 4. MR 14 EX and MT 24EX can be used with 430EX and 580 EX II for multiple flash lighting.
<p>430 EX and 580 EX II Canon Speedlite Flash with Fong diffusers ST E2 Canon speedlite Transmitter</p>	<ol style="list-style-type: none"> 3. Allows off-camera TTL flash for portraits or small object photography. Can use multiple speedlites for studio lighting effect. Controls external Canon Speedlites in TTL mode without a speedlite attached to the EOS camera body.

Nikon Based SLR Semi-Pro Systems

<p>Fuji S3 Pro with 105 Micro lens and Sigma 140DG macro “ring” flash TTL.</p>	<ol style="list-style-type: none"> 1. Built on Nikon N 80 film body 2. Fuji film electronics 3. 6.1 MP Super CCD sensor, 12.1 MB file 4. TTL flash with Sigma 140DG Macro Flash 5. Heavy, Uses multiple batteries 6. High resolution
<p>Nikon D 40x with 105 Micro lens and Nikon R1 C1 flash (New Sigma EM 140DG macro “ring” flash only TTL flash with D50, D70) NEW! D80-10 MP Not yet tested</p>	<ol style="list-style-type: none"> 1. Built on Nikon N 80 film body 2. Manual flash exposure with Nikon SB 29s 3. 6.0 MP

Modified Consumer (pt. and shoot)

1. Light weight, easy to use, high resolution, shallow dept of focus (f 8), lowest cost
2. Technique easily learned (few settings and details)
3. Use Video screen for viewing
4. Magnification controlled by zoom
5. Limited image repeatability
6. Limited flash variability (except Canon)
7. Non-interchangeable lens

SLR (Semi-Pro)

1. Heavy, large, requires two hands to operate, highest resolution, good depth of focus (f 32), expensive
2. Technique more difficult (multiple settings and detail)
3. Uses view finder for viewing
4. Magnification set on lens
5. Easy image repeatability
6. Multiple flash options
7. Interchangeable lens

SLR Dental Cameras Lens and Accessory options.

<p>Lens: Portraits, groups, buildings, rooms, equipment, materials, articulators, casts, nature.</p>	<p>Wide Angle Zoom: 24-105mm for wide to moderate telephoto view. "high quality" Cameras with above 8 MP need the manufacturers higher quality lens. Designated as "L", "ED", or other symbols. Normal lens may not record camera's high resolution image</p> <p>Telephoto Zoom: 28-300mm, or 70-200mm. High quality, used for distance objects or magnification from a distance.</p> <p>Lens: Ultrawide zoom: 10-30mm, 16-35mm. Used to record rooms in office or any area where space is small or difficult to record. May distort perspective of image.</p>
<p>Lighting: portraits, groups, rooms, nature, table top, still life, nature.</p>	<p>External flash systems: Canon 580 EX, 430 EX. Can be wireless TTL controlled by external transmitter, or by a 580 EX II on the camera set to master and the other flashes set to slave. Can use multiple flashes for artistic lighting. Used with diffusers for softer lighting. Nikon has near equivalent systems SB 800 AF and Su-4 Wireless remote.</p>

	Nature close-up use dental configuration. Twin light gives more attractive lighting.
Lighting: Reflectors, Diffusers, Backgrounds:	<p>Reflectors: reflect or absorb light. White or black foam board, collapsible white, silver or black cloth. Used in portraits to add light or fill shadows. Absorb excess light or give black background.</p> <p>Diffusers: Translucent material on flash or near subject to soften light and reduce shadows. Stofen Omi Bounce, Fong Diffuser. Translucent Collapsible cloth, Plastic.</p> <p>Backgrounds: Portraits (Google search on materials, colors patterns and lighting) Dental: Non reflective Black or White. Can use mirror with black background as 3-D effect for crowns or dental materials.</p>

Point and Shoot Consumer Dental Cameras

Cameras:	Use Dental point and Shoot cameras without the close-up attachment as multi use camera.
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Sources:

www.photomed.net Source for dental cameras, equipment, ancillary items, and indefinite support with purchase.

ADA Technical report #1029 "Guide to Digital Dental Photography and Imaging" available at www.ada.org

Wolfgang Bengel, *Mastering Digital Dental Photography*, Quintessence Books, 2006

Irfan Ahmd, *Dental Photography*, Quintessence Books, 2004

Robert Maher, *Simple High Tech Case Presentation and Imaging*
elpaseodoc@msn.com

Photographic Documentation and Evaluation in Cosmetic Dentistry a

guide to Accreditation Photography, American Academy of Cosmetic Dentistry www.aacd.com

Thomas K. Hedge, Digital Dentistry, www.dentalhealthcenter.com

www.normankoren.com/Tutorials/ In depth source for mathematics of digital imaging.

www.dpreview.com Very good single source for camera reviews and information on Digital Imaging

www.kodak.com/US/en/digital/dlc/index.ihtml General information on Digital Imaging

www.photomed.net Best source in Southern California for imaging systems and support

www.dinecorp.com Dental camera systems

www.clinpix-on-line.com Dental Camera Systems

www.normancamera.com Dental Camera Systems

www.xrite.com source for information on digital dental shade taking and color information

www.luminous-landscape.com/ Broad source of Information about digital photography

(Various Dental/Medical Photographic supply companies sell high end digital camera equipment)

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