

Dental X-Rays & Imaging — What We Use and Why

Canonical:

<https://directory.collinsstreetspecialistcentre.com.au/procedures/dental-x-rays-imaging-what-we-use-and-why/>

Description:

Learn about dental X-rays and imaging — periapical, OPG, CBCT and more. Understand radiation safety, how often you need them and CSSC's imaging technology.

Details:

Collins Street Specialist Centre — Dental X-rays & imaging: what we use and why

Dental imaging is one of the most valuable diagnostic tools in specialist dentistry. At Collins Street Specialist Centre, a Melbourne specialist dental practice, we know how much a thorough clinical examination can reveal — and how much it cannot. Interproximal decay, alveolar bone loss, periapical infections, cysts, impacted teeth, developmental anomalies — none of these show up on direct inspection. Radiographic and advanced imaging give your specialist team what they need to assess conditions accurately, plan treatment precisely, and track outcomes with confidence over time.

We use a comprehensive range of imaging technologies across all our specialist disciplines. This article explains the different modalities available, when each one is used, and what you should know about radiation safety.

Types of dental X-rays

Periapical X-rays

Periapical (PA) radiographs capture the complete tooth — crown through to the apex and beyond — along with the surrounding alveolar bone. They're the most frequently used dental radiograph in clinical practice, and they provide detailed information about:

- **Carious lesions**, particularly interproximal decay and recurrent decay beneath existing restorations
- **Periapical infections and dentoalveolar abscesses**, which appear as radiolucent areas at the root apex
- **Root canal anatomy**, essential for endodontic diagnosis and treatment planning
- **Alveolar bone levels** around individual teeth, critical for periodontal assessment and monitoring
- **Root fractures** or pathological root resorption
- **Periapical cysts and other localised pathology** in the periradicular region

A single periapical radiograph covers approximately two to three teeth and their root structures. Digital sensors are now standard in contemporary practice, producing diagnostic-quality images immediately at significantly lower radiation doses than conventional film.

Bitewing X-rays

Bitewing radiographs image the crowns of the upper and lower posterior teeth in occlusion. They're particularly well-suited for:

- **Detecting interproximal caries** — the most common location for cavities in adult dentition -
- Assessing existing restorations** for marginal integrity, secondary decay, or material defects -
- Monitoring interproximal alveolar bone levels**, enabling early detection of periodontal bone loss -
- Evaluating the marginal fit** of crowns, inlays, and other indirect restorations

A standard bitewing series comprises two to four images covering the premolar and molar regions bilaterally. They're taken at regular recall intervals — generally every one to two years — as part of routine monitoring, with frequency adjusted to each patient's individual caries risk.

Occlusal X-rays

Occlusal radiographs provide a broader view of an entire dental arch. The receptor sits on the occlusal surface while the patient bites down gently, allowing the clinician to assess:

- Developing dentition in paediatric patients - Supernumerary or impacted teeth not visible on standard periapical views - Palatal pathology including cysts, tumours, or structural anomalies associated with cleft palate - Jaw fractures in selected clinical presentations

These are used less frequently than periapical or bitewing views, but they provide clinically valuable information in specific situations that other modalities can't readily address.

Panoramic X-rays (OPG)

What is an OPG?

An orthopantomogram (OPG), or panoramic radiograph, captures the entire dentition and surrounding structures in a single two-dimensional image. The X-ray unit rotates around the patient's head, producing a flat representation of:

- The complete upper and lower dentition - Both jawbones (the mandible and maxilla) - The temporomandibular joints (TMJs) bilaterally - The maxillary sinuses - The nasal region and adjacent structures

When an OPG is used

Panoramic radiographs are clinically indicated across a broad range of situations:

- **General screening:** A comprehensive overview of dental and skeletal jaw health - **Wisdom teeth assessment:** Evaluating the position, angulation, and proximity of third molars to the inferior alveolar nerve and maxillary sinuses - **Orthodontic assessment:** Reviewing tooth development, identifying missing or supernumerary teeth, and evaluating jaw growth patterns - **Implant preliminary planning:** Assessing available bone height at potential implant sites (though CBCT provides considerably more detail) - **Jaw pathology:** Identifying cysts, tumours, and other osseous abnormalities within the jaws - **TMJ assessment:** Initial evaluation of temporomandibular joint anatomy and gross structural changes - **Trauma screening:** A rapid overview of the dentition and jaws following facial injury - **Paediatric assessment:** Monitoring developing dentition and identifying developmental anomalies early

Limitations

OPG radiographs are extremely useful for broad-based assessment, but they have real limitations clinicians need to keep in mind:

- The image is two-dimensional, so it provides no information about bone width or buccolingual depth - Inherent magnification and geometric distortion are characteristic of the panoramic technique - Fine detail resolution is less precise than periapical radiographs - OPGs can't replace more focused, site-specific imaging when precise diagnostic information is required

Cone beam computed tomography (CBCT)

What is CBCT?

CBCT is the most significant advance in dental imaging technology in recent decades. It produces three-dimensional volumetric images of the teeth, alveolar bone, adjacent soft tissues, and neurovascular pathways using a cone-shaped X-ray beam that rotates around the patient's head. The acquired data is reconstructed computationally into a three-dimensional volume that can be examined in any imaging plane — axial (horizontal cross-sections), coronal (anterior-to-posterior sections), sagittal (lateral sections) — and rendered as a three-dimensional surface model.

Why CBCT changes what's possible

CBCT provides diagnostic information that two-dimensional radiography simply cannot deliver.

****For dental implant planning:**** - Precise measurement of available bone height, buccolingual width, and bone density at proposed implant sites - Accurate identification of the inferior alveolar nerve, mental foramen, and maxillary sinus boundaries - Virtual implant placement and prosthetic-driven treatment planning - Production of surgical guides for guided implant placement protocols - Assessment of bone quality and volume for augmentation and grafting procedures

****For endodontics:**** - Identification of additional or aberrant root canal anatomy not visible on conventional radiographs - Detection of vertical root fractures that may be entirely invisible on standard two-dimensional views - Assessment of the three-dimensional extent of periapical pathology - Evaluation of complex anatomical variations prior to root canal treatment

****For oral and maxillofacial surgery:**** - Precise three-dimensional assessment of the relationship between third molars and the inferior alveolar nerve - Characterisation of jaw pathology — cysts and tumours — in three dimensions for surgical planning - Pre-surgical planning for orthognathic (corrective jaw) surgery - Evaluation of jaw fractures and their displacement - Detailed assessment of temporomandibular joint anatomy

****For orthodontics:**** - Comprehensive assessment of impacted teeth, particularly maxillary canines, and their relationship to adjacent roots - Evaluation of alveolar bone volume available for tooth movement - Monitoring of root resorption during active orthodontic treatment - Airway analysis relevant to sleep-disordered breathing assessment

****For periodontics:**** - Three-dimensional characterisation of osseous defects around teeth - Treatment planning for guided bone regeneration and bone grafting procedures - Detailed evaluation of furcation involvement in multi-rooted teeth

Radiation dose comparison

Radiation dose is a common and reasonable concern for patients considering CBCT. The dose is higher than conventional dental radiographs, but it remains substantially lower than a medical CT scan of the head:

Imaging Modality	Approximate Dose
Single periapical X-ray (digital)	1–8 µSv
Full-mouth series (digital)	35–170 µSv
OPG (panoramic)	10–25 µSv
CBCT (small field of view)	20–100 µSv
CBCT (large field of view)	70–200 µSv
Medical CT of the head	1,500–2,000 µSv

To put those numbers in context: the average annual background radiation exposure in Australia, from natural sources including cosmic radiation and environmental radon, is approximately 1,500–2,000 µSv. A dental CBCT scan represents a small fraction of what Australians absorb from background sources every year.

CBCT vs medical CT

CBCT is specifically engineered for dental and maxillofacial imaging. Compared to conventional medical CT:

- Radiation dose is considerably lower, often ten to twenty times less
- Spatial resolution for mineralised dental structures — bone and teeth — is superior
- The open, upright gantry design is less confining and better tolerated by patients
- Scan acquisition is fast, typically ten to thirty seconds
- The cost is substantially lower than medical CT

Medical CT retains advantages in soft tissue contrast resolution and remains the preferred modality where soft tissue pathology is the primary clinical concern.

Lateral cephalometric radiographs

What they are

A lateral cephalometric radiograph is a precisely standardised lateral skull projection taken with the patient's head positioned in a cephalostat — a calibrated head-holding device that ensures consistent, reproducible positioning between serial examinations.

Primary use: orthodontic diagnosis and planning

Lateral cephalometric radiographs are a foundational element of orthodontic diagnosis and treatment planning. They allow:

- **Cephalometric analysis:** Precise angular and linear measurement of jaw size, skeletal position, and dentoskeletal relationships using standardised anatomical landmarks
- **Growth assessment:** In growing patients, serial lateral cephalometric radiographs let clinicians track jaw growth trajectories and anticipate developmental changes
- **Treatment planning:** Determining whether orthodontic tooth movement alone will achieve the desired outcome, or whether combined orthodontic and orthognathic surgical treatment is needed
- **Outcome evaluation:** Comparing pre- and post-treatment cephalometric measurements to objectively assess results

Additional clinical applications

Beyond orthodontics, lateral cephalometric radiographs have established roles in airway assessment for sleep-disordered breathing evaluation, facial profile analysis in treatment planning, and evaluation of adenoid and tonsillar size in paediatric patients where upper airway obstruction is a concern.

Radiation safety — what you should know

The ALARA principle

All dental radiographic practice follows the ALARA principle — As Low As Reasonably Achievable. In practice, this means:

- Radiographs are only taken when there's a clear clinical justification — the imaging needs to provide information that meaningfully influences diagnosis or treatment
- The lowest effective dose is used for each examination
- The smallest anatomical area necessary to answer the clinical question is imaged
- Appropriate technique and well-maintained modern equipment minimise unnecessary exposure at every stage

Safety measures at Collins Street Specialist Centre

Our practice uses multiple layers of radiation safety:

- **Digital imaging throughout:** All radiographic systems at Collins Street Specialist Centre are fully digital, producing diagnostic-quality images at substantially lower radiation doses than conventional film

- **Lead aprons and thyroid collars:** Provided where clinically appropriate to protect non-target body regions

- **Rectangular collimation:** Where technically feasible, the X-ray beam is restricted to the smallest possible area, meaningfully reducing scatter radiation to adjacent tissues

- **Modern, well-maintained equipment:** All imaging equipment is regularly serviced and calibrated for optimal diagnostic performance and minimal radiation output

- **Evidence-based imaging guidelines:** Our specialist clinicians follow current evidence-based guidelines for imaging frequency and selection — radiographs are never taken without clear clinical indication

Pregnancy and dental X-rays

This is one of the questions we're asked most often. The key points:

- The radiation dose from dental radiographs is extremely low, and the X-ray beam is directed at the jaw, well removed from the abdomen and pelvis

- With appropriate lead apron shielding protecting the abdomen, foetal radiation exposure from a dental radiograph is effectively negligible

- As a precautionary measure, elective (non-urgent) dental radiographs are generally deferred until after delivery where clinically feasible

- Where radiographic imaging is clinically necessary during pregnancy — for example, to diagnose and manage an acute dental infection — it can be safely undertaken with appropriate protective shielding

Please let our team know if you're pregnant or think you may be, so we can plan your care accordingly.

How often do you need dental X-rays?

There's no single answer. Appropriate imaging frequency depends on each patient's individual clinical circumstances and risk profile:

- **Low-risk patients (no active disease, stable oral health):** Bitewing radiographs every two to three years; periapical radiographs as clinically indicated

- **Moderate-risk patients:** Bitewing radiographs every twelve to eighteen months

- **High-risk patients (active caries, periodontal disease, complex restorations):** Bitewing radiographs every six to twelve months; periapical radiographs as clinically required

- **OPG:** As clinically indicated — not routinely at every recall visit

- **CBCT:** Only when three-dimensional information is required for diagnosis or treatment planning that can't be adequately obtained from conventional two-dimensional radiography

Your specialist will recommend imaging based on your specific clinical needs and risk profile, not a standardised schedule applied to everyone.

Collins Street Specialist Centre's imaging capabilities

Collins Street Specialist Centre is equipped with a comprehensive, fully integrated imaging suite designed to support our complete range of specialist services:

- **Digital periapical and bitewing systems** available chairside in all treatment rooms for immediate diagnostic imaging

- **Digital OPG (panoramic radiography)** for broad-view skeletal and dental assessment

- **CBCT (cone beam computed tomography)** for three-dimensional imaging and surgical treatment planning

- **Lateral cephalometric radiography** for orthodontic cephalometric analysis and airway assessment

- **Intraoral and extraoral clinical photography** for comprehensive clinical documentation

- **Digital impressions and intraoral scanning** — whilst not radiographic, digital scanning forms an important part of our diagnostic and treatment planning workflow

Having all imaging modalities on-site means your specialist can get the diagnostic information they need without sending you to an external imaging centre — streamlining your care, saving you time, and enabling more efficient, well-informed treatment planning from the start.

Your questions answered

Do dental X-rays cause cancer?

The radiation dose from dental radiographs is extremely low, and the risk of radiation-induced malignancy from dental imaging is considered negligible. The diagnostic benefit of identifying and characterising dental disease far outweighs the minimal radiation risk associated with appropriately indicated radiographic examination.

Can I decline dental X-rays?

Yes, always. It's worth understanding, though, that without radiographic assessment your clinician may not be able to detect or fully characterise certain conditions. Your specialist will explain clearly why specific imaging has been recommended, and you're encouraged to ask questions so you can make a fully informed decision about your care.

Are dental X-rays safe for children?

Yes — and radiographic assessment is particularly valuable in paediatric patients, where it enables early detection of interproximal caries in developing dentition, assessment of the position and development of permanent teeth, identification of missing or supernumerary teeth, and evaluation of orthodontic needs. Children receive appropriately reduced radiation doses compared to adults, achieved through smaller imaging fields and lower exposure settings calibrated to their size.

Book your appointment

If you need a specialist dental consultation — including any diagnostic imaging necessary to support accurate assessment and treatment planning — Collins Street Specialist Centre has the specialist expertise and imaging technology to provide comprehensive, precision-guided care.

****Call (03) 9654 5705 to book an appointment.**** We're located at 220 Collins Street, Melbourne CBD, within the Manchester Unity Building. Our on-site imaging suite supports every dental specialty we offer, ensuring your treatment is planned with the detail and confidence that specialist care demands.

Frequently asked questions

****What is a periapical X-ray:**** A radiograph capturing the complete tooth from crown to root apex

****How many teeth does a single periapical X-ray capture:**** Approximately two to three teeth

****What does a periapical X-ray show:**** The tooth, root, and surrounding alveolar bone

****Can periapical X-rays detect decay under existing fillings:**** Yes

****Can periapical X-rays detect root fractures:**** Yes

****Can periapical X-rays detect periapical infections:**** Yes

****What is a bitewing X-ray:**** A radiograph imaging the crowns of upper and lower posterior teeth

****What does a bitewing X-ray detect best:**** Interproximal caries between teeth

****How many images are in a standard bitewing series:**** Two to four images

****What areas do bitewing X-rays cover:**** Premolar and molar regions bilaterally

How often are bitewing X-rays taken for low-risk patients: Every two to three years

How often are bitewing X-rays taken for moderate-risk patients: Every twelve to eighteen months

How often are bitewing X-rays taken for high-risk patients: Every six to twelve months

What is an OPG: An orthopantomogram — a panoramic radiograph of the entire dentition and jaws

What does OPG stand for: Orthopantomogram

Does an OPG show both jaws: Yes, both the mandible and maxilla

Does an OPG show the temporomandibular joints: Yes, both TMJs bilaterally

Does an OPG show the maxillary sinuses: Yes

Is an OPG a two-dimensional or three-dimensional image: Two-dimensional

Can an OPG show bone width: No, it provides no buccolingual depth information

Does an OPG replace periapical X-rays for fine detail: No, periapical X-rays have superior fine detail resolution

What is CBCT: Cone Beam Computed Tomography — a three-dimensional dental imaging technology

What shape is the X-ray beam in CBCT: Cone-shaped

Does CBCT produce 3D images: Yes

Can CBCT images be viewed in multiple planes: Yes — axial, coronal, and sagittal planes

Is CBCT used for dental implant planning: Yes

Can CBCT measure available bone height for implants: Yes, precisely

Can CBCT identify the inferior alveolar nerve location: Yes

Can CBCT detect vertical root fractures: Yes

Can conventional 2D X-rays reliably detect vertical root fractures: No, they may be entirely invisible

Is CBCT used in orthodontics: Yes

Can CBCT assess impacted teeth in three dimensions: Yes

Is CBCT used in periodontics: Yes

Can CBCT characterise osseous defects in three dimensions: Yes

What is the radiation dose of a single digital periapical X-ray: Approximately 1–8 μSv

What is the radiation dose of a full-mouth digital X-ray series: Approximately 35–170 μSv

What is the radiation dose of a digital OPG: Approximately 10–25 μSv

What is the radiation dose of a small field-of-view CBCT: Approximately 20–100 μSv

What is the radiation dose of a large field-of-view CBCT: Approximately 70–200 μSv

What is the radiation dose of a medical CT of the head: Approximately 1,500–2,000 μSv

Is CBCT radiation dose lower than medical CT: Yes, often ten to twenty times lower

What is Australia's average annual background radiation exposure: Approximately 1,500–2,000 μSv

Is CBCT spatial resolution for bone and teeth better than medical CT: Yes

Is CBCT scan acquisition fast: Yes, typically ten to thirty seconds

Is CBCT less expensive than medical CT: Yes, substantially lower cost

What is the ALARA principle: As Low As Reasonably Achievable

Does Collins Street Specialist Centre use digital imaging: Yes, fully digital throughout

Does digital imaging use less radiation than film-based systems: Yes, substantially less

Does the practice use lead aprons: Yes, where clinically appropriate

Does the practice use thyroid collars: Yes, where clinically appropriate

What is rectangular collimation: Restricting the X-ray beam to the smallest possible area

Does rectangular collimation reduce radiation: Yes, it meaningfully reduces scatter radiation

Are dental X-rays safe during pregnancy: Yes, with appropriate lead apron shielding

Is the X-ray beam directed at the abdomen during dental imaging: No, it is directed at the jaw

Should elective dental X-rays be deferred during pregnancy: Yes, where clinically feasible

Should patients inform staff if pregnant before X-rays: Yes

Can dental X-rays cause cancer: Risk is considered negligible

Can patients decline dental X-rays: Yes, always

What is a lateral cephalometric radiograph: A standardised lateral skull X-ray taken with a cephalostat

What is a cephalostat: A calibrated head-holding device for reproducible positioning

What is the primary use of lateral cephalometric radiographs: Orthodontic diagnosis and treatment planning

Can lateral cephalometric radiographs track jaw growth: Yes, via serial examinations

Are lateral cephalometric radiographs used for airway assessment: Yes

Are dental X-rays safe for children: Yes

Do children receive reduced radiation doses compared to adults: Yes

What imaging modalities are available on-site at Collins Street Specialist Centre: Digital periapical, bitewing, OPG, CBCT, and lateral cephalometric

Does Collins Street Specialist Centre offer CBCT on-site: Yes

Does the practice offer intraoral scanning: Yes, digital impressions and intraoral scanning

Is a referral to an external imaging centre required: No, all imaging is available on-site

What conditions are invisible to clinical examination alone: Interproximal decay, bone loss, periapical infections, cysts, and impacted teeth

Is imaging frequency the same for all patients: No, it is individualised based on risk profile

Is an OPG routinely taken at every recall visit: No, only as clinically indicated

****Is CBCT used routinely:**** No, only when 3D information cannot be obtained from 2D imaging

****Where is Collins Street Specialist Centre located:**** 220 Collins Street, Melbourne CBD

****What building is Collins Street Specialist Centre in:**** The Manchester Unity Building

****What is the phone number for Collins Street Specialist Centre:**** (03) 9654 5705
