Radiography is used in dental practices across the country every day. The very use of dental radiography suggests radiographs are an essential in quality patient care. It is particularly beneficial to the patient for diagnostic purposes, such as the detection of infection and inflammation, dental caries, and unerupted teeth (1). However, the use of radiographs does not come without its risks, the most well-known including the induction of cancer and damage to foetuses, resulting in ‘low weight’ babies and children later in their life (2) (3) (4). Despite nine million radiographs being conducted by primary care dentists in England alone in the year 2008 (5), some argue that dental radiography is too ‘risky’, implying the risks outweigh the benefits. This poster will assess whether dental radiography is, in fact, too risky or whether when the principle ‘ALARP’ (as low as reasonably possible) is imposed to the risk, the benefits outweigh the potential costs.

The use of dental radiography in dental practices is most effectively justified when the risks and benefits are suitably evaluated.

**Uses of Dental Radiography** – Dental radiography may be used for almost an infinite number of uses within dentistry. These include those mentioned in the introduction (see figures 1 and 2), detecting root morphology before an extraction, the presence or absence of teeth before orthodontics, as well as evaluating implants or lesions in the alveolar bone (1) - (4).

The detection of all of these anatomical features or abnormalities is beneficial to the patient as early (or in fact any) diagnosis would prevent progression or exacerbation of the problem at hand. This is particularly important as dentistry is becoming more preventative. One of the most important of these early detections is that of dental caries, particularly if hidden (known as ‘occult’), which is undetectable by visual inspection but detectable through radiographs (6). In a longitudinal epidemiological survey 26% of those under 14 years, 37.5% of 14-17 year olds, and 50% of 20 year olds had occult caries identified from x-rays in teeth that were considered ‘sound’ (free of decay) after a clinical examination, providing evidence for the necessity of dental radiography (7). (An example of occult caries is shown in figures 4 and 5).

Without diagnosis, caries will remain untreated, which could lead to a whole host of other problems. These are often identified in a (PFUA) clinical assessment as ulcerations caused by discolored tooth fragments and abscesses (8). The underdevelopment of children may also be one of these consequences, with those with dental caries weighing less than the control group without (9). The pain and discomfort associated with caries may lead to poor school performance, sleep and social interaction, and could be the cause of underachievement (9). Alternatively, underachievement could be caused by chronic inflammation and abscesses, associated with caries, interfering with metabolic pathways (9).

**Risks of Dental Radiography** – As mentioned in the introduction, x-rays pose a risk of causing cancer (2), most likely to occur to ‘critical organs’ (areas closest to the primary beam), including the thyroid gland, brain, salivary glands, and active bone marrow (10). Research into the risk of low dose x-rays has shown that there is no threshold below which there is no risk of cancer; this acts as evidence that diagnostic x-rays have the power to, and due to probability, will cause cancer (2). X-rays are able to cause cancer by acting as ‘mutation agents’ on human cells (11). It is right that every single x-ray one receives is able to receive around seven successive mutations, and then proliferate, for it to be deemed cancerous (11). The exposure to any dose of radiography has also been associated with a correlation to ‘offspring’, as well as increasing the risk of childhood cancers, including acute leukaemia, lymphoma and brain tumours (12) (3). Low dose (diagnostic) x-rays taken on expectant mothers may increase this risk by 1 in 10,000 (3).

**Risks are minimal** – Evidence suggests that diagnostic x-rays can only be accountable for 0.6% of the total risk of cancer in the UK, equal to just 700 cancer cases per year (2). The UK’s risk was the lowest out of 15 countries investigated, and collectively between all of these countries, the overall cancer risk from diagnostic x-rays was still just 2% (4). The risk of cancers in the oesophagus and thyroid are even lower than the total UK risk (0.6%), at 0.3% and 0.4% respectively; both of which are considered ‘critical organs’ (2). Although, this adds to the evidence that dental radiography is capable of causing cancers, the risk is so infinitesimal that the diagnosis is proven here to be minimal, and perhaps futile compared to the benefits.

Although a causal relationship between pre-natal diagnostic x-rays and an increased risk of childhood cancer is not universally accepted, as only an ‘association’ can be proven (13). This, again, poses the argument that because the risks are so small, if they do exist in fact, they are outweighed, justifying the use of dental radiography in dentistry.

**References**

13. ALARP: (as low as reasonably possible) is imposed to the risk, the benefits outweigh the potential costs.