

Future scoping: What's on the horizon?

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Aims and objectives

Aims

- To provide an overview of the developments, innovations and technological advancements in dentistry

Objectives

- Assess the direction of travel AI, 3D printing and digital dentistry are taking
- Discuss the benefits to both patient and practitioner
- Share the growth in these areas being discussed in journals
- Offer future predictions

What does good look like?

- Artificial intelligence... or should that be assisted intelligence?
- 3D printing... and not just in private dentistry
- Digital dentistry's journey to today

BUT

- Elephant in the room: will take time to trickle down to everyday NHS use
- Why? Money. And the lack of
- Changes driven by patient demand



Artificial intelligence

The good

- Moving at a frankly ridiculous pace
- Endless possibilities
- Diagnostics: dental caries, oral cancer
- Predictable – and repeatable – outcomes in treatment planning, design and manufacturing
- Inevitable – get ahead of the curve or be behind it
- ‘NextGen’ workforce born into technology – more likely to fully embrace and develop
- Speed *and* accuracy

The bad

- Moving at a frankly ridiculous pace
- AI is many things; caring and sympathetic it is not
- Misuse?
- Ethics! *‘Your scientists were so preoccupied with whether or not they could, they didn't stop to think if they should’*
- Labs and technicians worried about automation and job losses
- Can healthcare seriously keep up with it?

Or should that be assisted intelligence?

- *'Assisted intelligence refers to the integration of artificial intelligence (AI) systems and technologies into human-centred workflows to enhance and support human decision-making and performance. It aims to augment human capabilities by providing AI-powered tools, systems, or algorithms that assist individuals in completing tasks, making decisions, or solving problems more effectively and efficiently'*
- *'The goal of assisted intelligence is not to replace humans but to empower them with AI capabilities that enhance their performance, improve decision-making, and streamline processes. By leveraging AI technologies, assisted intelligence can automate routine or repetitive tasks, provide data-driven insights, assist in complex problem-solving, and free up human resources to focus on higher-level tasks that require human judgment, creativity, and emotional intelligence'*

Regardless of whether or not you think the robots are coming, there has to be an admission that both AI and ai will become greater influences within the dental profession and industry as time moves on and technologies develop

3D printing

The good

- Wide range of possibilities
- ‘New’ enough to get on board and develop alongside the tech rather than playing catch up
- Digital technologies such as intraoral scanners and 3D printers simplify workflows, reduce room for error, as well as the amount of labour required, which provides time and cost savings for the dental practice, laboratory and patients

The bad

- Still in its infancy
- Direct aligner printing – for example – is at an even earlier developmental stage. A long way to go
- Sustainability concerns?
- Research on force delivery, dimensional stability and degradation of aligners should be focused on
- Requires large expenditure – not always a given
- Unlikely to be technology in mainstream use for some time

Tangible benefit

- At the most recent CDS Annual Scientific Conference in Newport, one such presentation teased how to bring the potential of 3D printing outside of private dentistry to life
- ‘Digital denture scanning in care homes – a feasibility study’ discussed the potential future applications in special care dentistry and the CDS
- Why is this a thing?
- Research identified that, of 156 responses from community residential settings, 69% of settings experienced at least one denture lost in the last two years
- 60% of responders reported no dentures were labelled, only 64% had received training about how to care for dentures and 86% felt they would benefit from further training on mouth care
- When extrapolated, these data suggest that at least 10,205 dentures are lost annually in community residential settings and are never found, costing the NHS Business Service Authority more than £3 million

Regenerative dentistry

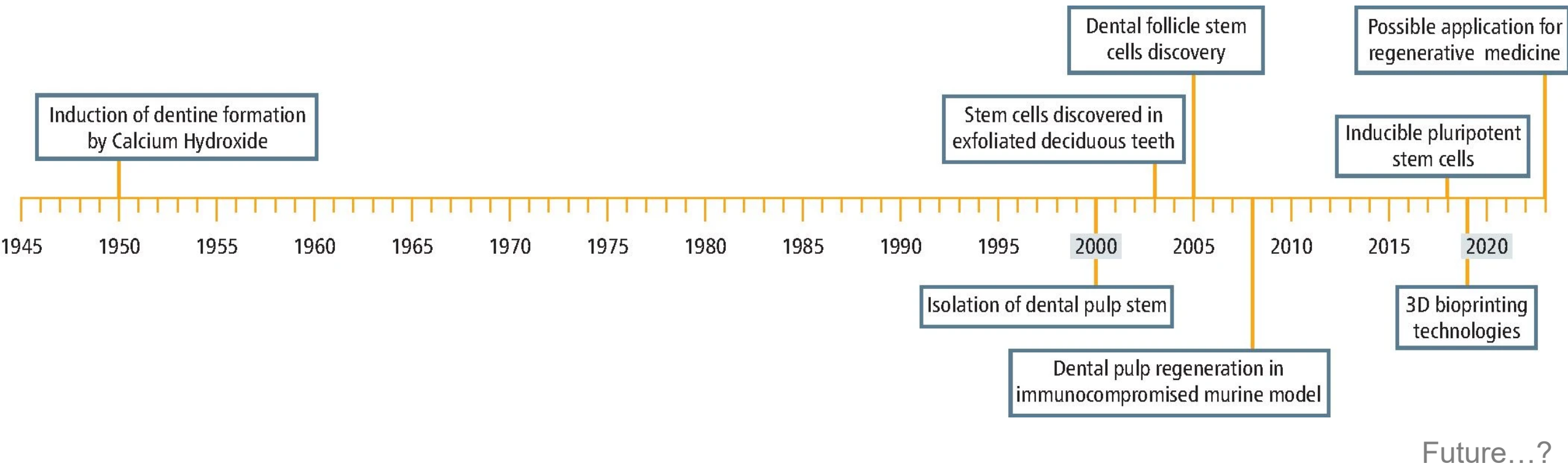
The good

- This multidisciplinary field, integrating cellular biology and tissue engineering, aims to restore and maintain biological vitality, unlike conventional dental therapies
- Emerging field
- Direct impact on all areas of the profession – including NHS
- RE-GROWING TEETH?!?!
- Better outcomes for patients
- Still a way to go to become mainstream

The bad

- Conflicting research – has been deemed ‘problematic and constrained by a number of factors that are still out of control’
- The rapid pace of innovative advancements in the field will pose the need of reinforcement of knowledge of basic sciences and biological processes – curriculum already packed?
- Research from KCL and UCL suggests that active dentists are ill-prepared for an era of ‘personalised biologically based dental treatments’ (don’t shoot the messenger folks)

Timeline of key developments and advancements within regenerative dentistry



Tomorrow's problem today

- Until such a time we find teeth regrowing themselves becomes mainstream, restorative materials will continue to be used, which brings us onto one that finds itself in the news: amalgam
- Silver amalgam is the most common material for NHS permanent fillings across the UK
- Fillings represent around a quarter of all courses of NHS treatment delivered in England, with amalgam used in around in around a third of procedures
- BDA estimate treatment times and costs of alternative materials are over 50% higher than those of amalgam
- This is a problem
- Why? The European Parliament's vote to ban dental amalgam from 1 January 2025
- Will have a disproportionate impact on services in Northern Ireland, which has the highest proportion of filled teeth of any UK nation
- Are there any restorative materials that compete with amalgam on speed of placement or longevity?
- NB – phase down is welcomed, but why so quickly?

Digital dentistry

The good

- Encompasses any dental technology that involves the use of computer-based components such as hardware devices and software solutions
- Embedded in so many workflows already – the area most likely to trickle down
- Unlike traditional workflows, digital technology in dentistry can make for more accuracy, automation, speed, and integration between disciplines

The bad

- Initial cost of adopting digital technologies provide a barrier to many
- The learning curve associated with mastering new digital tools and techniques may require additional training and time – do you have it?
- Reliance upon technology – if it fails, what then?
- Not all dental procedures can be fully replaced by digital technologies
- Concerns regarding data security and privacy need to be addressed to ensure the protection of patient information in digital systems

Direction of travel

- Will take time for some of these to filter down, but the same thing would have been said 20 years ago about technologies and treatments performed today
- Patience needed
- Exodus of practitioners to the private sector will only increase the number adopting and embracing these advances
- Were contract reform to happen and the NHS becomes attractive again, could those private folk consider a return, bringing their expertise? Unlikely, but not impossible
- Research is key – generates discussion and forges the way ahead
- Challenges – amalgam – and we shouldn't be left to figure out the answers
- Ever-growing patient demands more influential as time goes by
- IWWIWWIW
- Less invasive – everyone happy
- Superior oral health outcomes – isn't that the goal?
- Positives mostly outweigh the negatives

One last thing...

- We're talking 'what's good'...
- None of this happens without you
- You are the singular most impactful part of dentistry
- Your voice matters

- The *BDJ* portfolio can carry your voice, your opinion, your research
- These topics are in their infancy; you have the chance to shape the direction of travel
- Technology will not replace dentists, but those who do not use technology will be replaced by those who do

Thank you conference

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