Development of a Novel Dental Thermal Imaging Application

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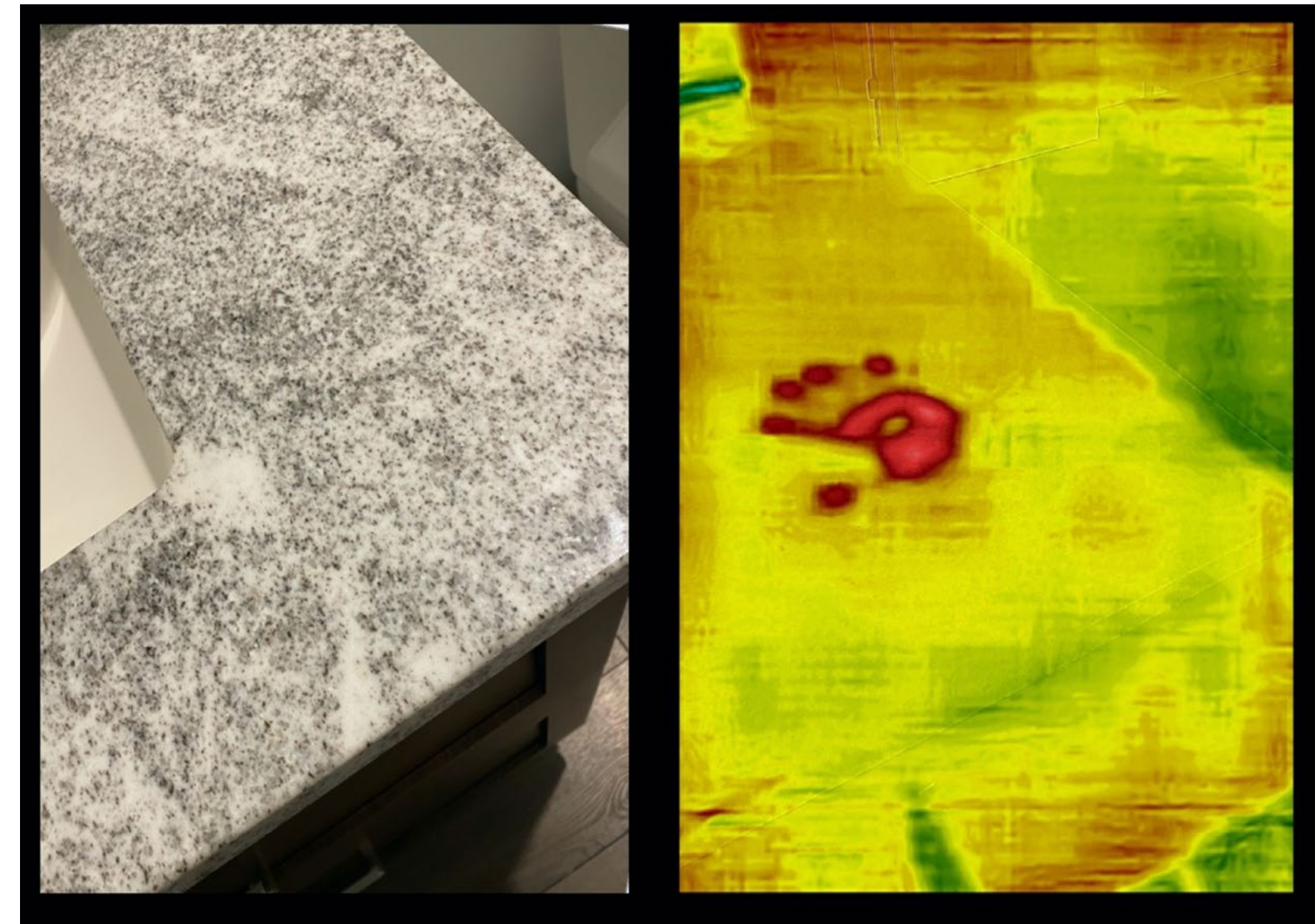Schulich School of Medicine & Dentistry • Western University

Figure 1. QR code for the DTA application.

Figure 2. DTA home screen.

Figure 3. Patient's surface temperature documentation.
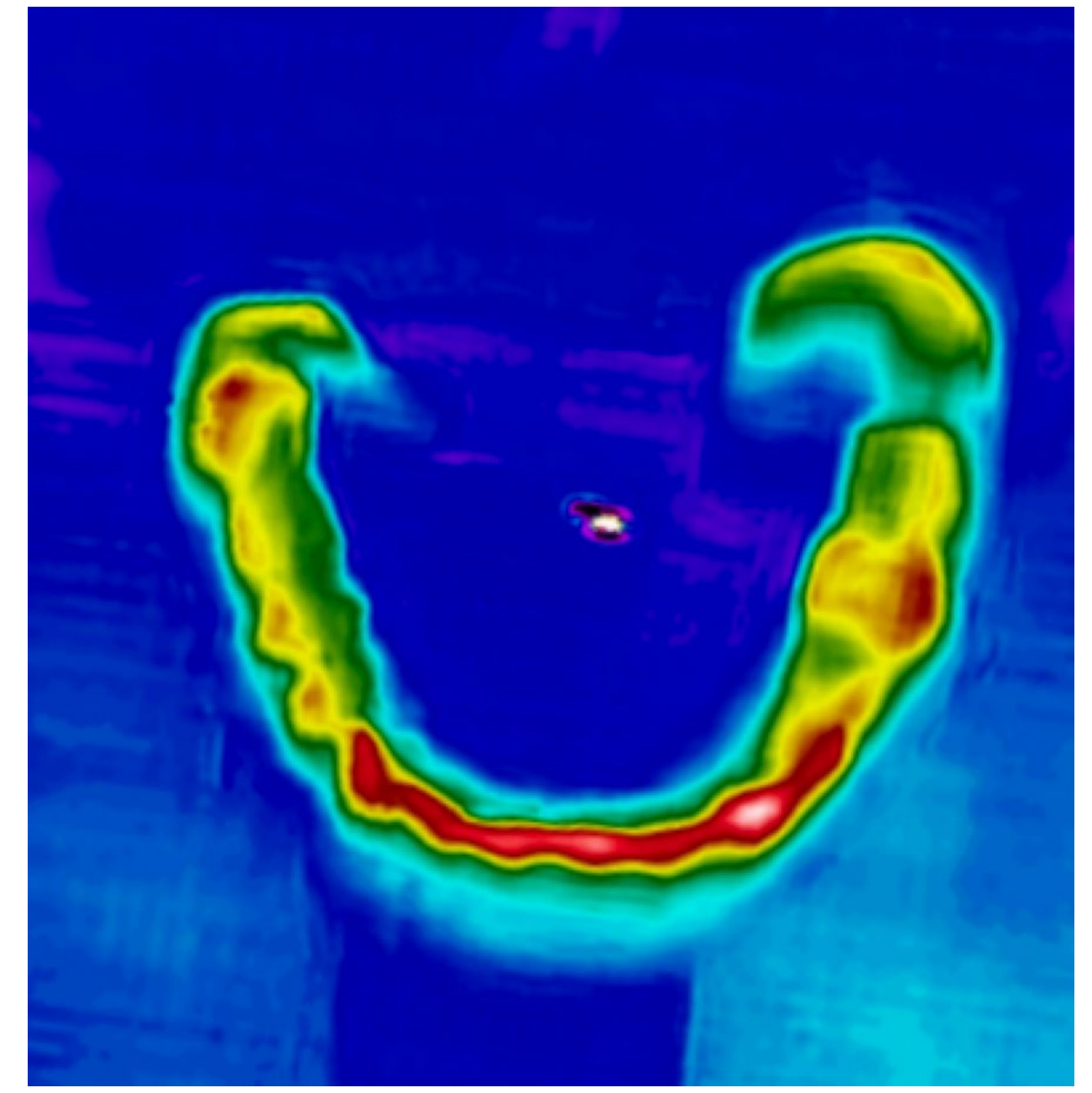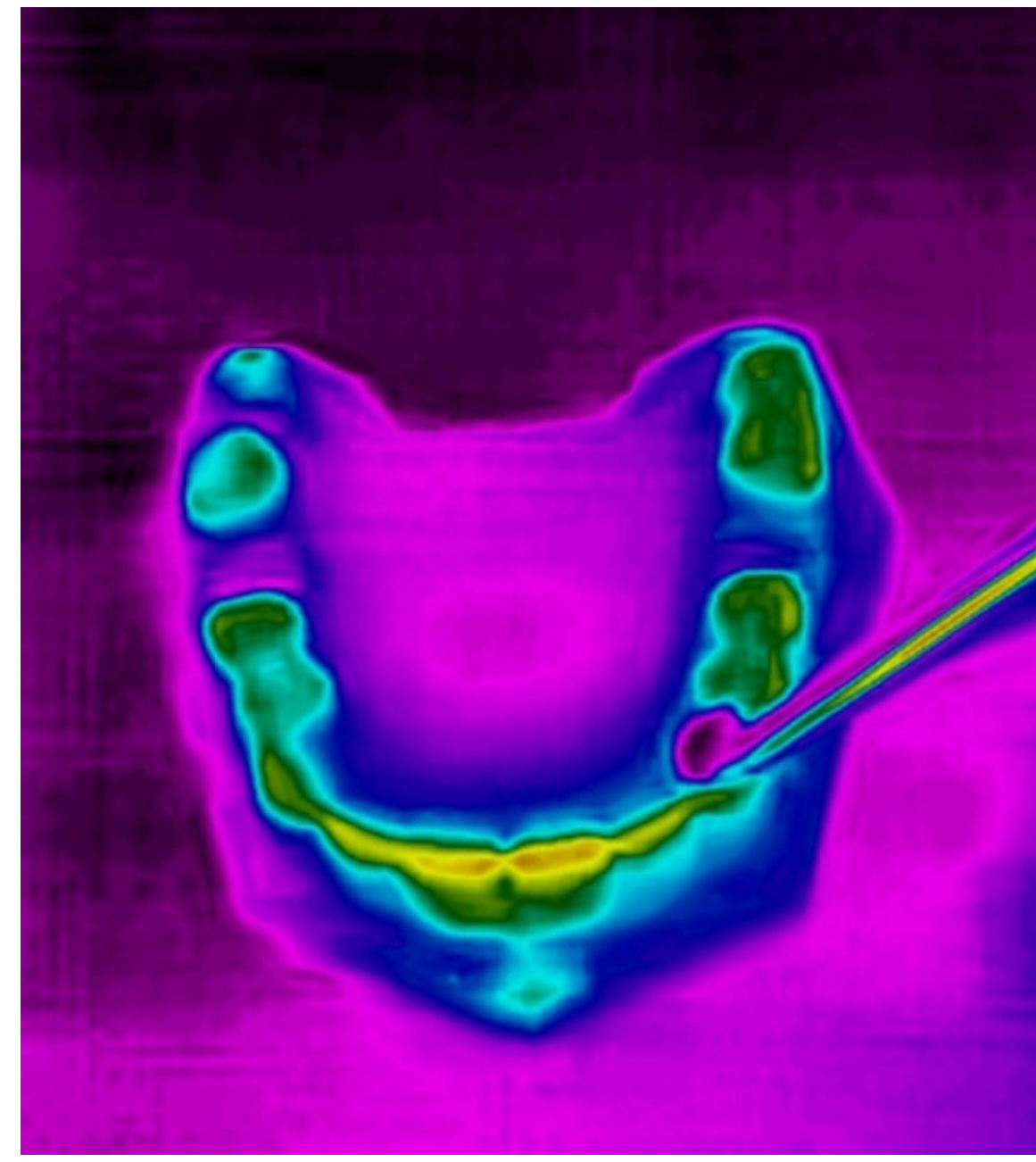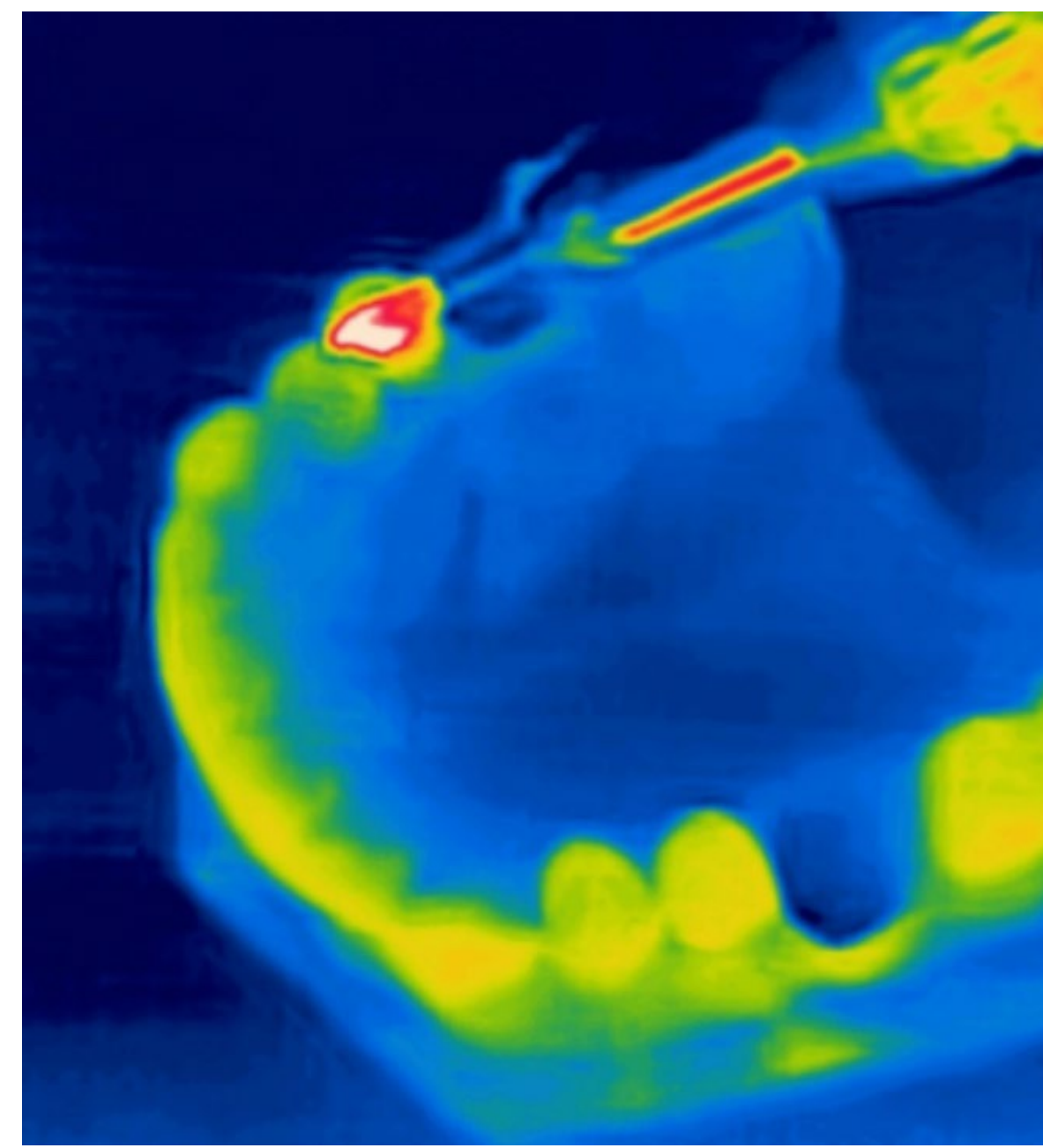

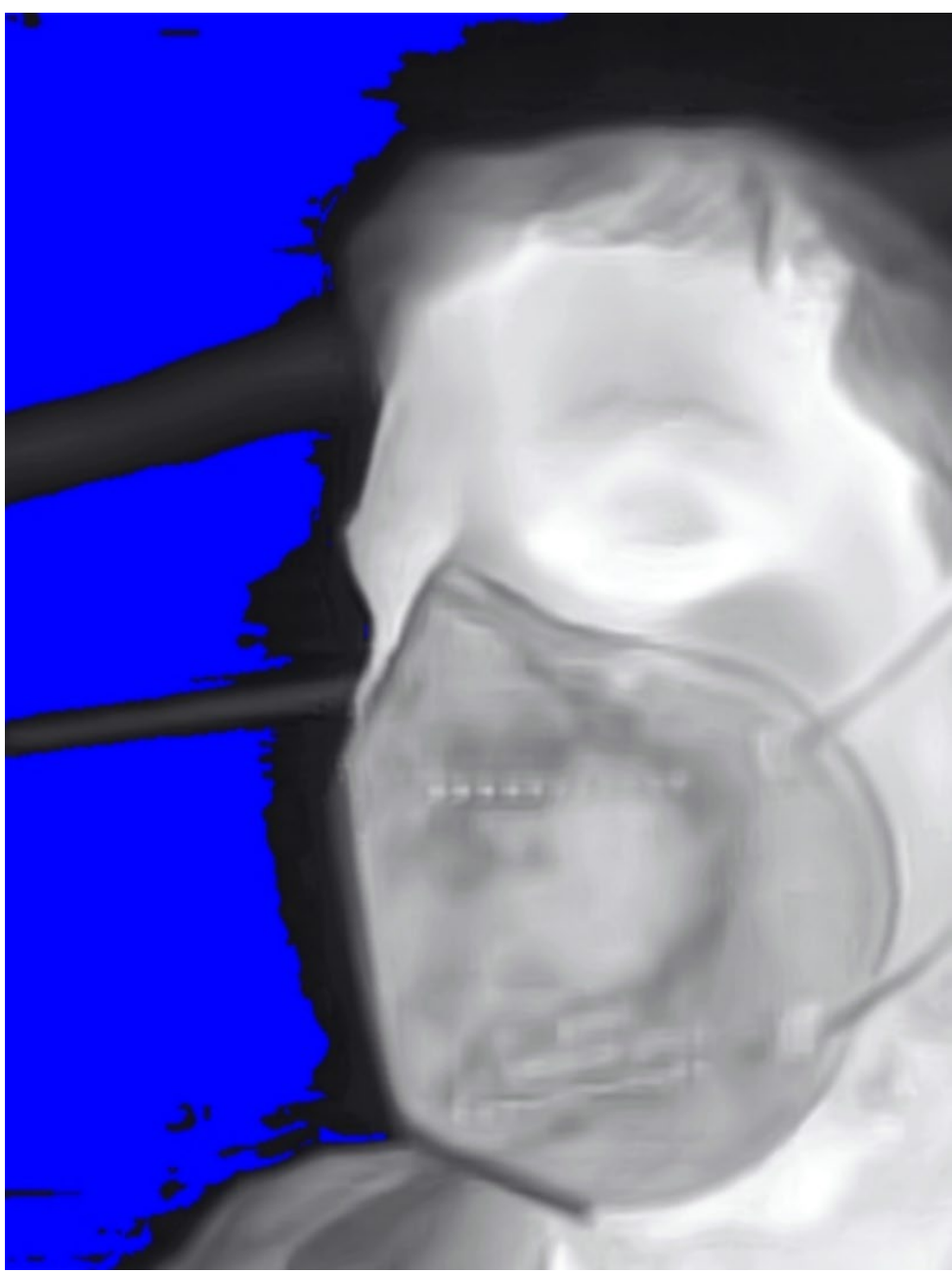Figures 4. Hard surface disinfection.

Figures 5. KN95 mask thermography.

Figure 6. Preparation drilling thermography.

Figure 7. Cold test thermography.

Figures 8. Thermography occlusion visualization.

INTRODUCTION

Background

- Thermography: a process where a thermal camera captures and generates an image using infrared radiation emitted from an object.
- Thermography has had limited use in dentistry, but with recent technological advances, has been employed to produce digital images.
- Digital dentistry tends to have limited use, due to the high cost of equipment, software and the challenging workflow.
- Dental Thermal App (DTA) was developed as a novel, non-invasive, non-contact, user-friendly, low cost and portable digital tool for dentistry.
- DTA is an alternative mobile tool that hopes to improve accessibility for clinicians and patients with applications in patient records, documentation, infection control, education, and laboratory clinical work.

Aim

- To use DTA to provide an alternative method for visualization for identification and assessment and documentation.

MATERIALS & METHODS

Functionality

- DTA functions on an Android-based mobile device and requires the connection of a FLIR camera, which produces high thermal resolution images.
- The app (Figure 2) is free on Google Play or by scanning the QR code (Figure 1).
- Several selectable icons across the top of the screen, such as Visual, MSX, Thermal Palettes and Temperature.
- Options allow the capture of thermal or non-thermal images and selection of different color representation of the heat energy of the object.
- Features:
  - zoom in/zoom out capability
  - draw on and write on image tools
  - minimum and maximum temperature range
  - temperature in Celsius or Fahrenheit
  - expanded section for pertinent notes
  - files labelled with patient or project name
  - simple and systematic clinically-based workflow
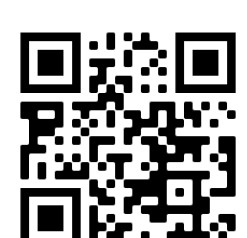
QR code for website.

RESULTS

- DTA has multiple applications, including patient records and documentation.
- Images above illustrate several possible applications for use.
- Figure 3: patient's surface temperature.
- Figure 4: infection control to assess hard surface disinfection.
- Figure 5: alternative for KN95 mask fit evaluation.
- Figure 6: education and operator documentation.
- Figure 7: education, to confirm proper execution of dental procedures.
- Figure 8: evaluation of occlusion through a novel workflow.
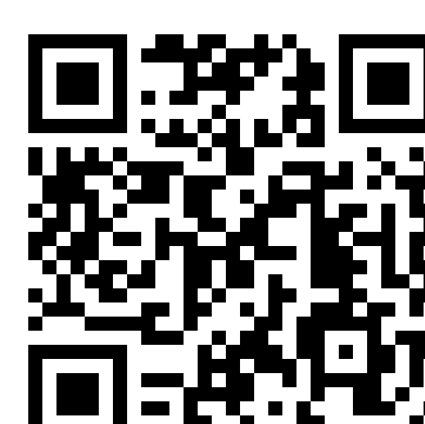
DISCUSSION

- Visualization is a key component to dental examination and thermal imaging provides an alternative method.
- The DTA app provides an opportunity to identify and rectify procedural issues before an iatrogenic problem occurs.
- Documentation remains a key component in clinical records and DTA provides a novel approach to provide documentation through images.
- Further research is required to explore novel applications and develop research investigations as DTA is a fluid and dynamic application, with many possibilities.

CONCLUSION

- Dental Thermal App has been tested and launched on Google Play, where it is now available for free download and use.
- The app has been approved by the Teledyne FLIR Developer Community.
- DTA is a novel, low-cost, portable, non-invasive digital tool for dentistry.
- DTA could provide limitless applications in imaging, assessment, identification and documentation.

REFERENCES

References available on request.

QR code for video presentation.