digitalhealth REWIRED BIRMINGHAM 12-13 MARCH 2024

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Regent Lee

Associate Professor, University of Oxford
Co-founder and Chief Medical Officer, AiSentia
UK Research Innovation Future Leaders Fellow

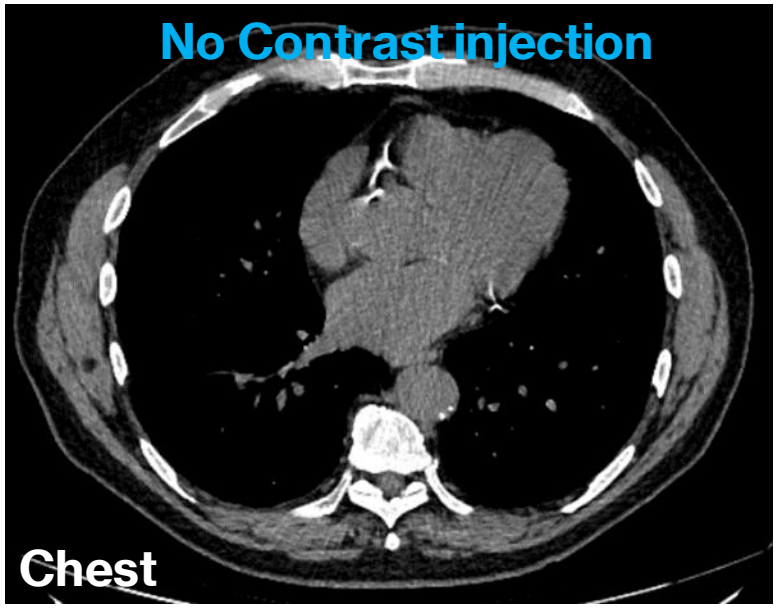
BEST PRACTICE SHOWCASE STAGE

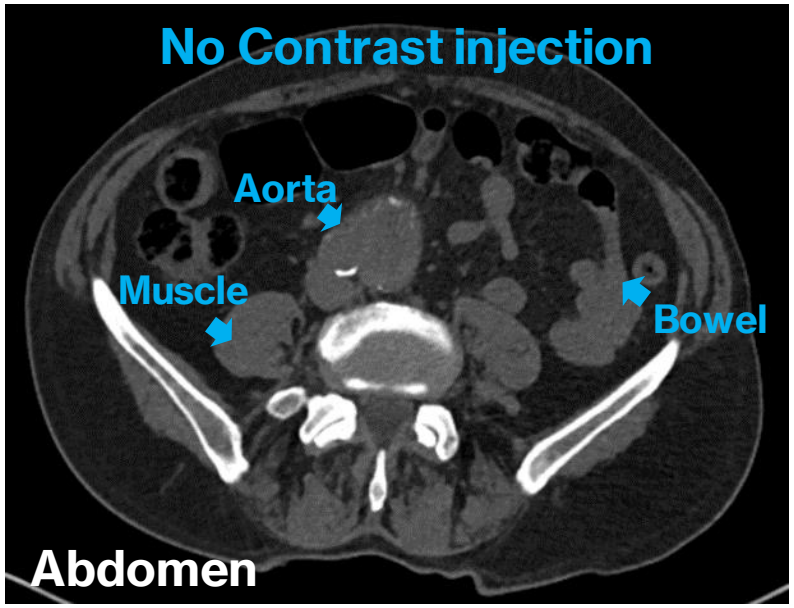
‘CT Digital Contrast’

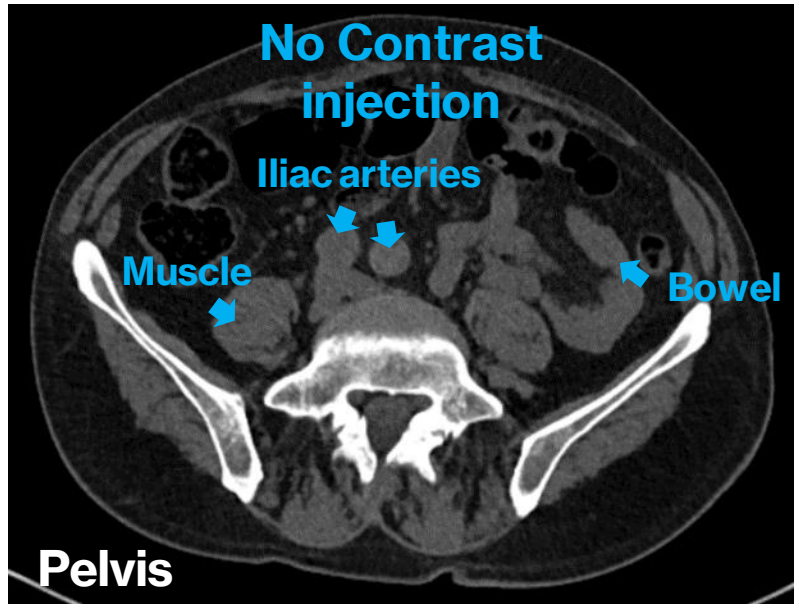
Let’s make CT scans faster, safter, equitable, sustainable

Disclosure: R Lee is Co-Founder and Chief Medical Officer of AiSentia

> 300 million CT scans are performed globally / year







A non-contrast CT contains much information that humans eyes can't see.

~**60% of CT scans** have intravenous iodinated radio contrast media (**RCM**) injection to obtain **Contrast-Enhanced CT scans**

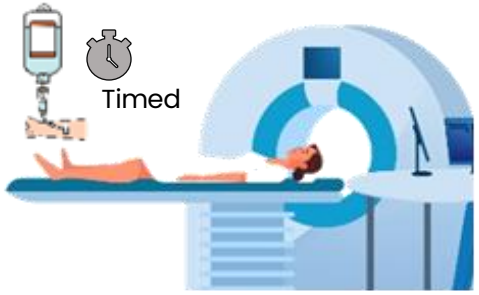
Conventional Patient Journey for a Contrast Enhanced CT

Needle IV line

1st scan no injection

Non-Contrast CT

2nd scan contrast injection



Contrast CT

Problems associated with the intravenous injection of contrast agent

Needle ('Drip') insertion related complications:

- Pain and discomfort
- Bleeding, haematoma
- Contrast leakage out of the drip: skin necrosis
- Injury of the nearby artery: pseudoaneurysm, ischaemia

Contrast related complications:

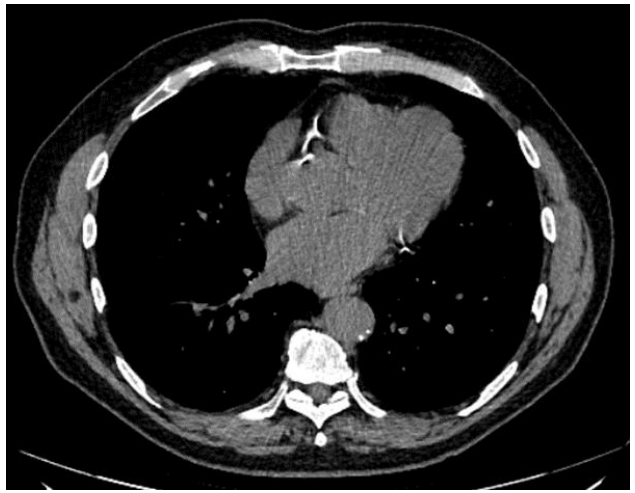
- Contrast allergy / anaphylactoid reactions
- Kidney toxicity:
  - contrast induced nephropathy
  - renal failure requiring dialysis / death (rare but devastating)

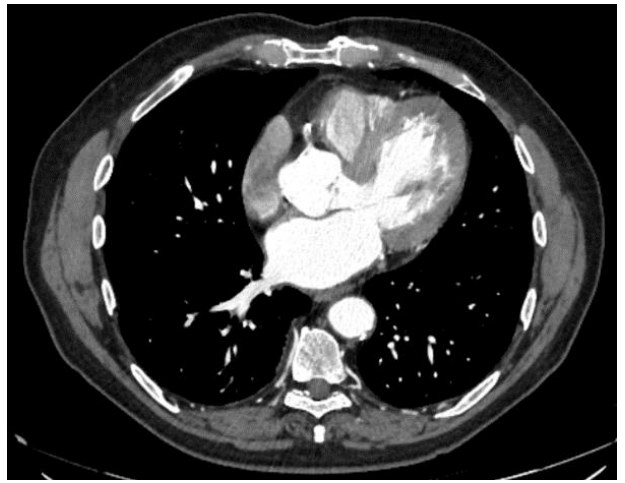
Cost of service provision:

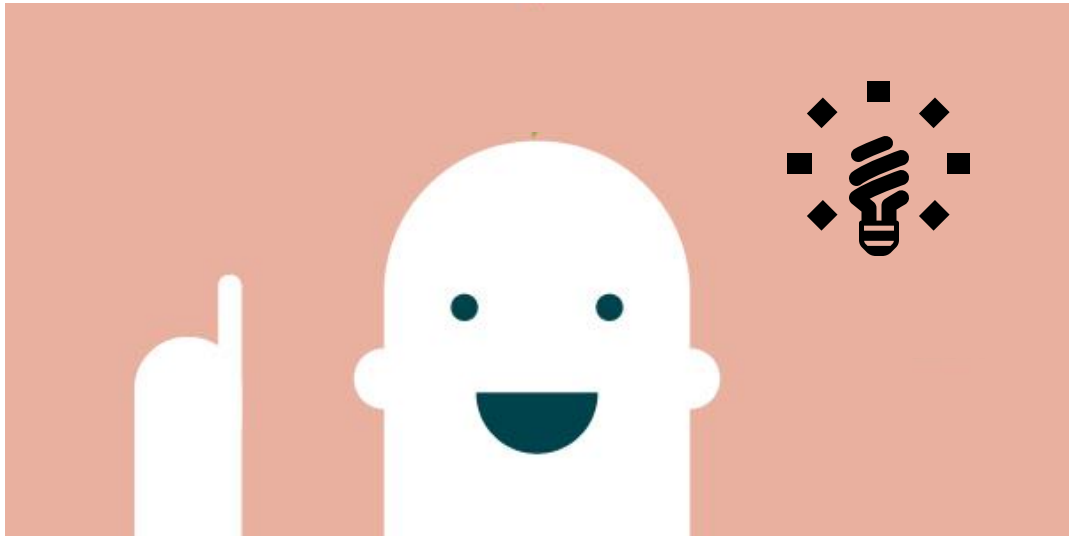
Contrast agent, longer scan, management of complications

Lack of supply chain resilience

What if we could generate contrast enhanced CT images without the need to inject intravenous contrast?







ANNALS OF SURGERY

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ORIGINAL ARTICLE: PDF ONLY

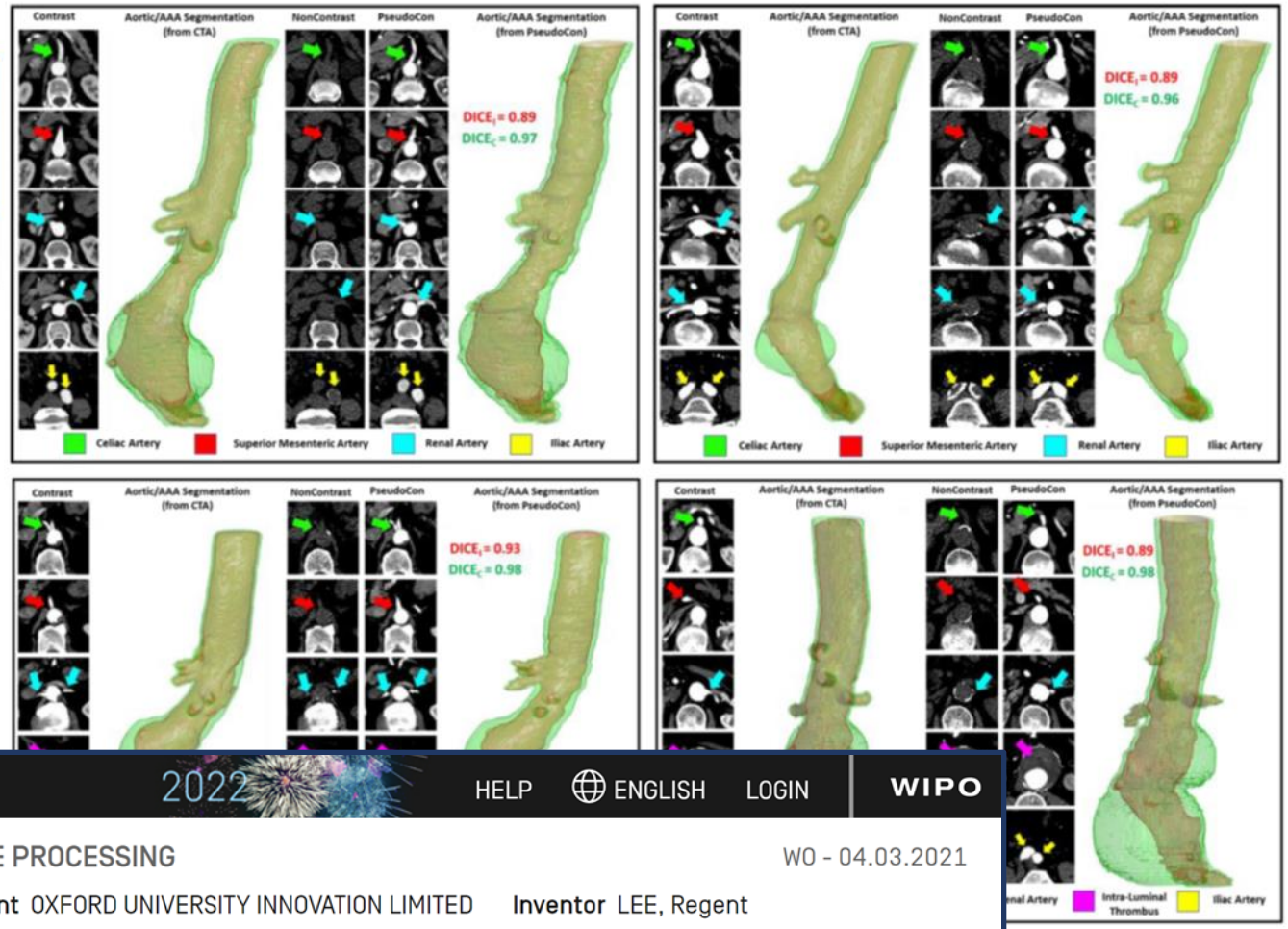
A Deep Learning Approach to Visualise Aortic Aneurysm Morphology without the Use of Intravenous Contrast Agents

Chandrashekar, Anirudh BE[*,‡]; Handa, Ashok MBBS, FRCS, MA[*,†]; Lapolla, Pierfrancesco[*]; Shivakumar, Natesh BSc, MBChB[*]; Uberoi, Raman MBBChir, MRCP, FRCR[‡]; Grau, Vicente PhD[§]; Lee, ***Regent*** MBBS MS, DPhil, FRCS[*,†]

Author Information

Annals of Surgery: March 04

doi: 10.1097/SLA.000000000



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4. **WO/2021/038202** COMPUTERISED TOMOGRAPHY IMAGE PROCESSING — WO - 04.03.2021

Int.Class G06T 7/00 **Appl.No** PCT/GB2020/052013 **Applicant** OXFORD UNIVERSITY INNOVATION LIMITED **Inventor** LEE, Regent

Methods for training an algorithm to identify structural anatomical features, for example of a blood vessel, in a non-contrast computed tomography (NCT) image are described herein. The algorithm may comprise an image segmentation algorithm, a random forest classifier, or a generative adversarial network in examples described herein. In one embodiment, a method comprises receiving a labelled training set for a machine learning image segmentation algorithm. The labelled training set comprising a plurality of NCT images, each NCT image of the plurality of NCT images showing a targeted region of a subject, the targeted region including at least one blood vessel. The labelled training set further comprises a corresponding plurality of segmentation masks, each segmentation mask labelling at least one structural feature of a blood vessel in a corresponding NCT image of the plurality of NCT images. The method further comprises training a machine learning image segmentation algorithm, using the plurality of NCT images and the corresponding plurality of segmentation masks, to learn features of the NCT images that correspond to structural features of the blood vessels labelled in the segmentation masks, and output a trained image segmentation model. The method further comprises outputting the trained image segmentation model usable for identifying structural features of a blood vessel in an NCT image. Further methods are described herein for identifying anatomical features from an NCT image, and for establishing training sets. Computing apparatuses and computer readable media are also described herein.

AiSentia
Improving Patient Journeys

(University Oxford Spinout)

Non-Contrast CT ‘Digital Contrast’ CT Contrast CT

AI algorithm converts non-contrast CT to ‘digital contrast’ CT

IP Position:
Patents published: WO/2021/038202, WO/2021/038203
Scientific research funding: UKRI, HRUK (~£500K)
Software prototyping: Innovate UK Smart Grant (~£500K)

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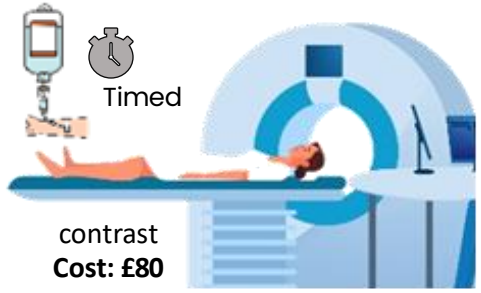


Contrast CT

Patient Journey for a 'CT Digital Contrast'

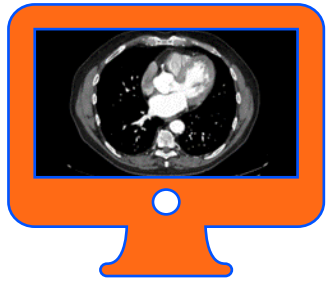
No needle

One scan no injection

Non-Contrast CT

Artificial Intelligence

Digital Contrast CT



CT Digital Contrast enables safer, equitable, faster and sustainable healthcare

Safer Healthcare

-20% moderate-severe adverse events

Equitable Healthcare

+15% access for elderly and vulnerable patients

Faster Healthcare

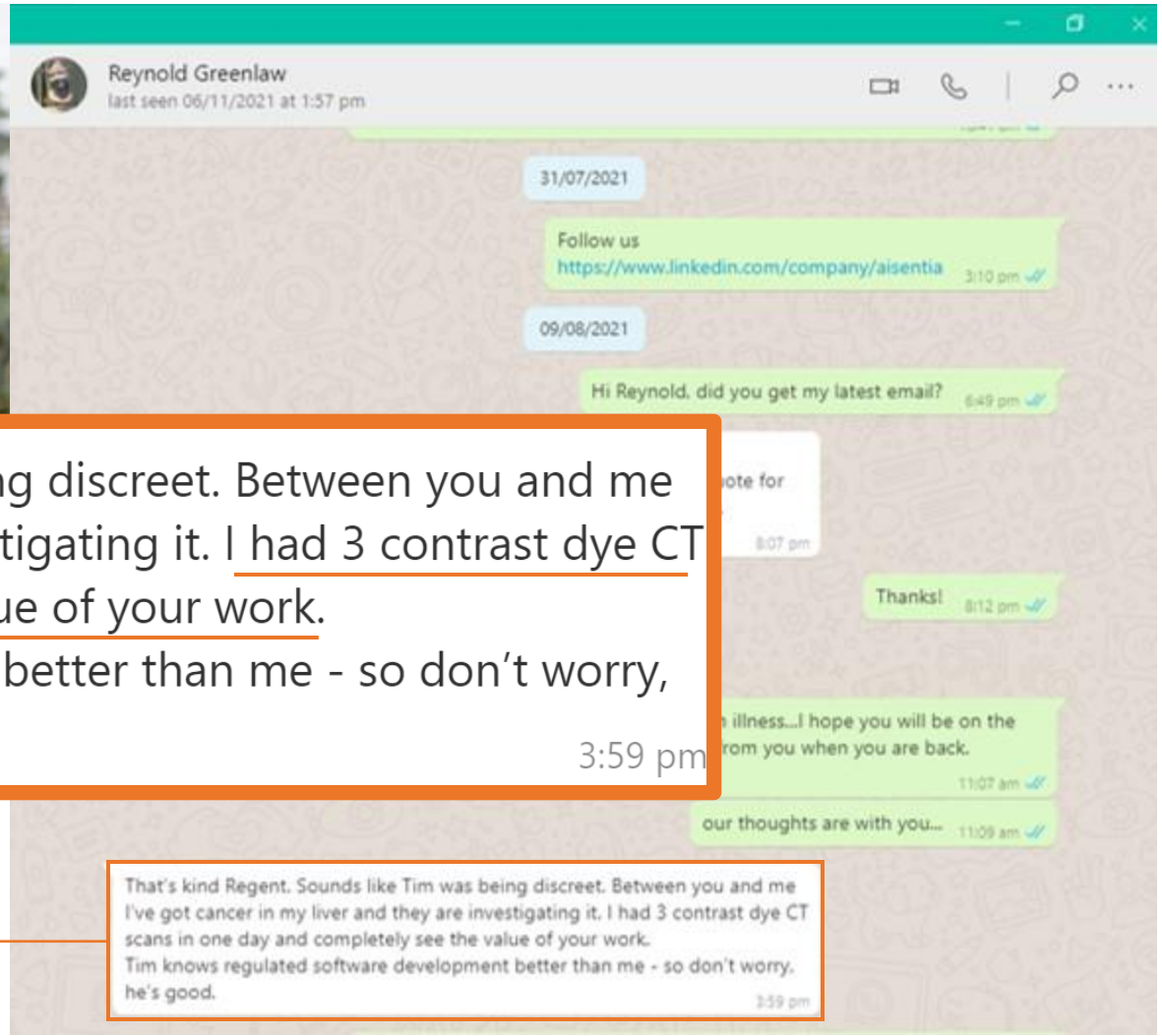
+100% patient throughout

Sustainable Healthcare

-2,700,000 tones of Carbon

-70,000 tones of Iodine

That's kind Regent. Sounds like Tim was being discreet. Between you and me I've got cancer in my liver and they are investigating it. I had 3 contrast dye CT scans in one day and completely see the value of your work.
Tim knows regulated software development better than me - so don't worry, he's good.
3:59 pm



Remembering Reynold Greenlaw
1966 – 2021

We are very sad to announce the death of OCC Director Reynold Greenlaw (1966–2021). On Monday 9th August, he was diagnosed with advanced gastrointestinal cancer. After that, his decline was rapid.