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IndoQCT: A software for comprehensive CT image quality assessment

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IAEA HUMAN HEALTH SERIES

No. 47

Handbook of Basic
Quality Control Tests for
Diagnostic Radiology



<https://www.iaea.org/publications/14890/handbook-of-basic-quality-control-tests-for-diagnostic-radiology>



Quality Control (QC)

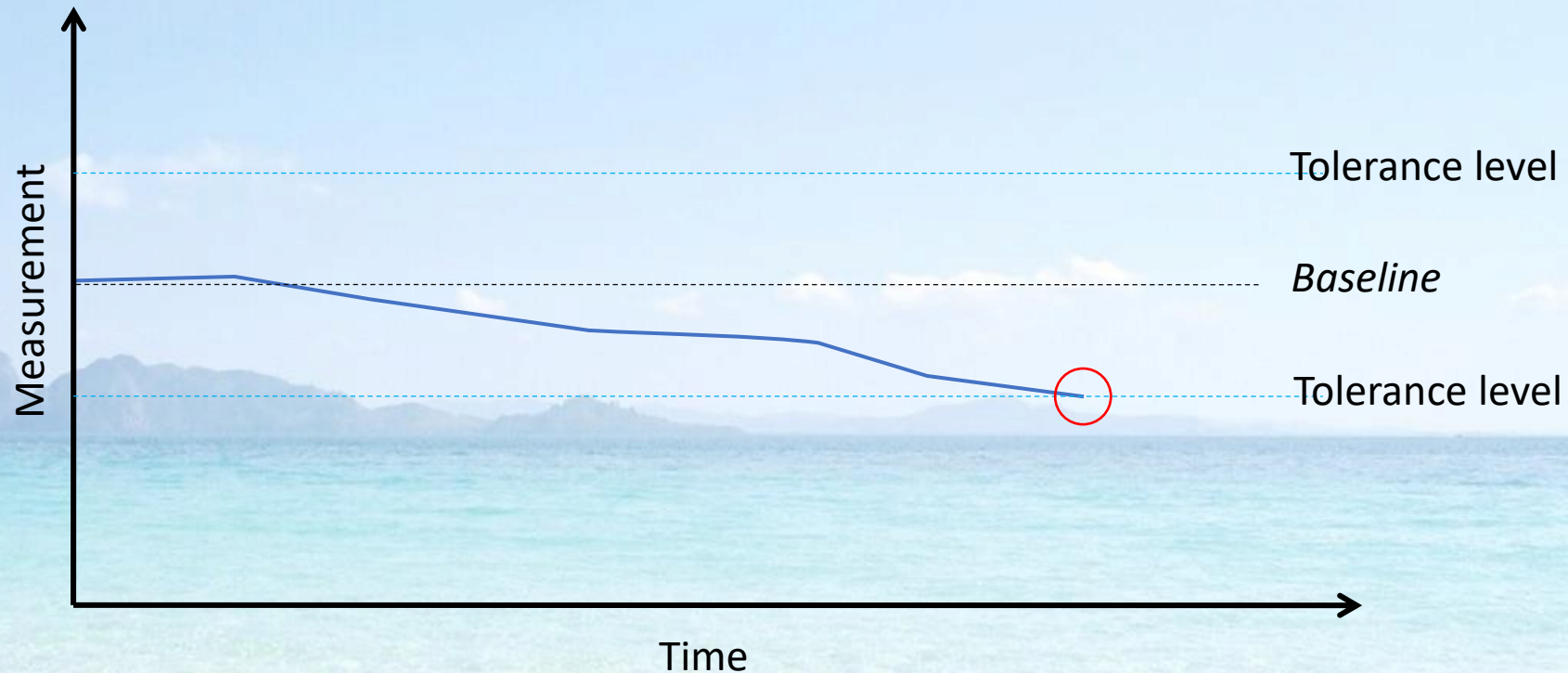
- The performance of ionizing radiation equipment used in medicine **needs to be monitored to ensure its safe and effective use.**
- This process starts **from basic quality control (QC)** and **extends to comprehensive quality management systems** that integrate every aspect of patient care.



QC Test

- QC tests for CT are mainly intended to **verify the operational stability of the equipment**, after acceptance and commissioning tests have been performed.

The graph to analyze the performance of the equipment

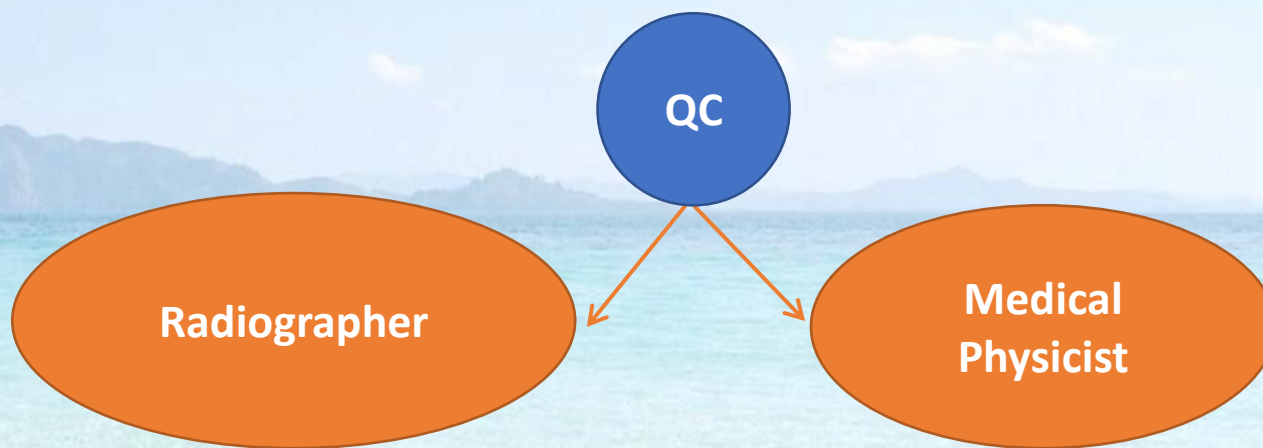


With QC, prevention can be done before the equipment is out of tolerance level

Qualified personnel performing QC



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QC Test for Radiographers

TABLE 8. SUMMARY OF QUALITY CONTROL TESTS (cont.)

Section	Title	Equipment	Tolerance	Frequency	Reference
Computed tomography — QC tests for radiographers					
5.1.1	Daily startup procedure			Daily	[23]
5.1.2	CT alignment laser beams	Test device per Section 5.2.7	± 5 mm	Monthly	[23]
5.1.3	Scan projection radiograph accuracy	Test object	± 2 mm	6 months	[23]
5.1.4	CT number accuracy, image noise, image uniformity and image artefacts	Water phantom	CT number: ± 5 HU of baseline (water) Noise: $\pm 25\%$ of baseline Uniformity: ± 10 HU (water) No artefacts	6 months (CT number accuracy), weekly (other properties)	[23, 24]
5.1.5	Accuracy of measured dimensions	Test object	$\pm 2\%$ of nominal	3 months	[4, 12]

QC Test for Medical Physicists

TABLE 8. SUMMARY OF QUALITY CONTROL TESTS (cont.)

Section	Title	Equipment	Tolerance	Frequency	Reference
Computed tomography — QC tests for medical physicists					
5.2.1	CT number accuracy, image noise, image uniformity and image artefacts	Test object	CT number: ± 5 HU of baseline (water) Noise: $\pm 25\%$ of baseline Uniformity: ± 10 HU (water) No artefacts	6 months	[23, 24]
5.2.2	Linearity	Test object	Water: ± 4 HU of baseline Other materials: ± 10 HU of baseline Radiotherapy, other materials: ± 20 HU of reference	Annual	
5.2.3	Low contrast detail detectability	Test object	See Section 5.2.3.5	Annual and after changes	[23, 24]
5.2.4	X ray beam width	Test object	Greater of ± 3 mm or $\pm 30\%$ of the total nominal collimated beam width	Annual and after changes	[23, 24]
5.2.5	Reconstructed image slice width	Test object	Table 5	Annual and after changes	[23]
5.2.6	Spatial resolution	MTF test object, software, or bar pattern (alternatively)	Manufacturer's specifications	At acceptance and after changes	[23]
5.2.7	CT dosimetry	Pencil ionization chamber, CTDI phantom	C_{vol} : $\pm 20\%$ of baseline C_{air} : $\pm 20\%$ of baseline	Annual and after changes	[23–27]

Phantoms used for image quality assessment



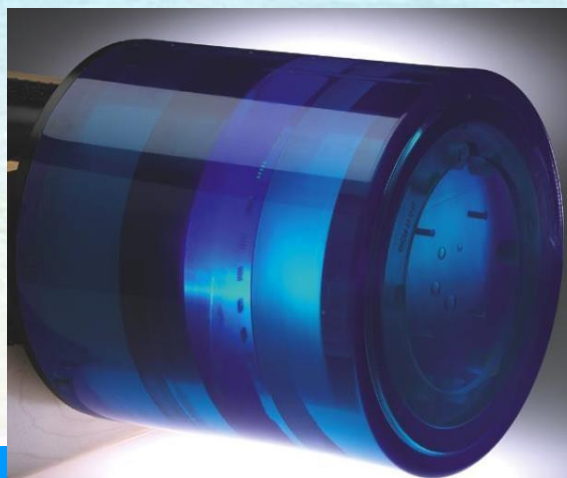
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AAPM CT performance phantom



ACR accreditation phantom



CatPhan phantom

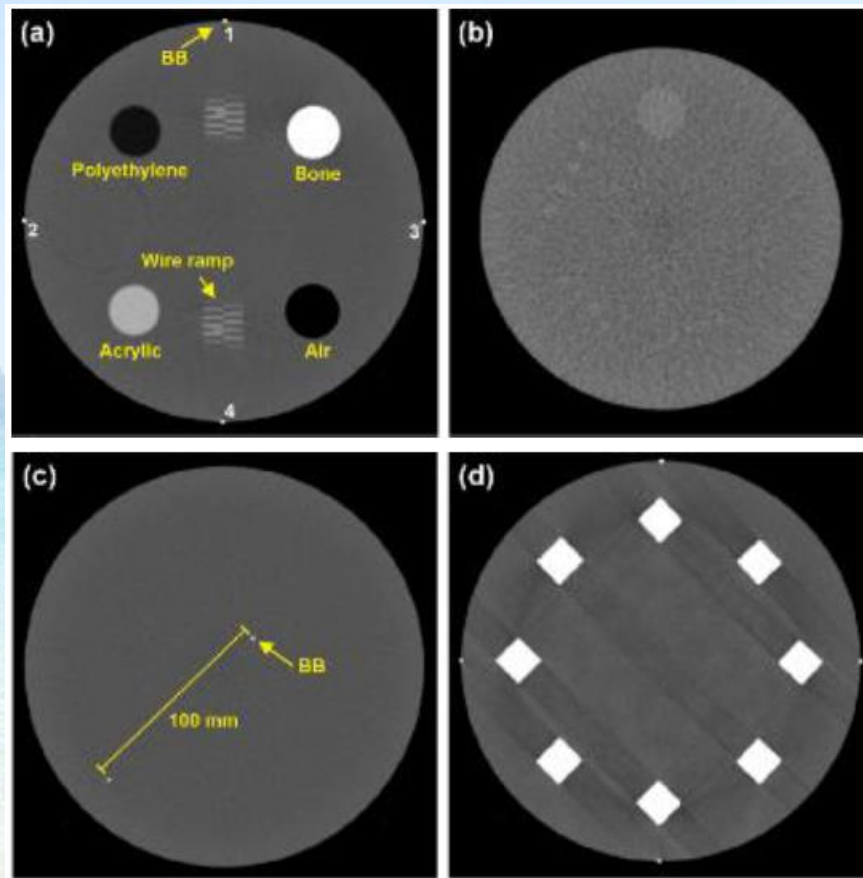
CatPhan phantom

(a) CT number linearity, slice thickness, laser alignment.

(b) Low contrast detectability, contrast to noise ratio

(c) Water CT number accuracy, CT number uniformity, image noise, noise uniformity, NPS, MTF

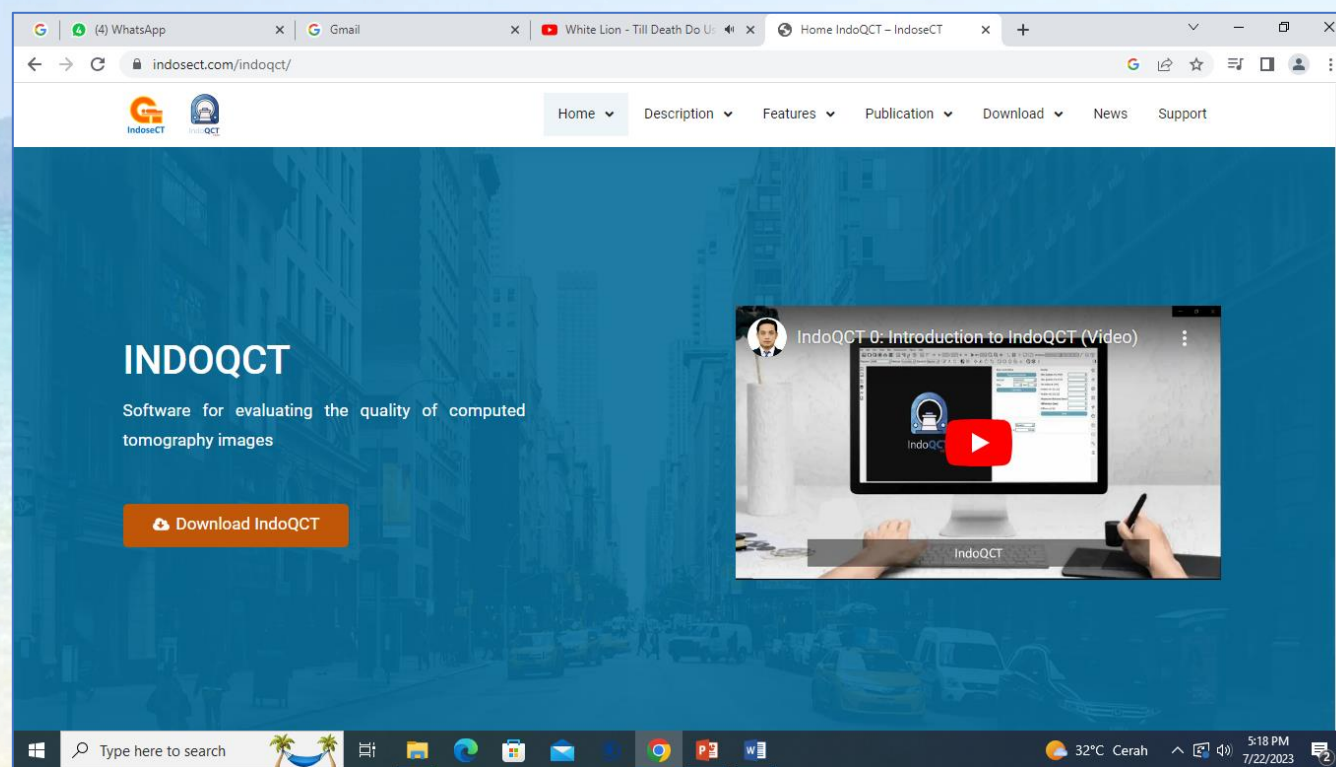
(d) Spatial resolution





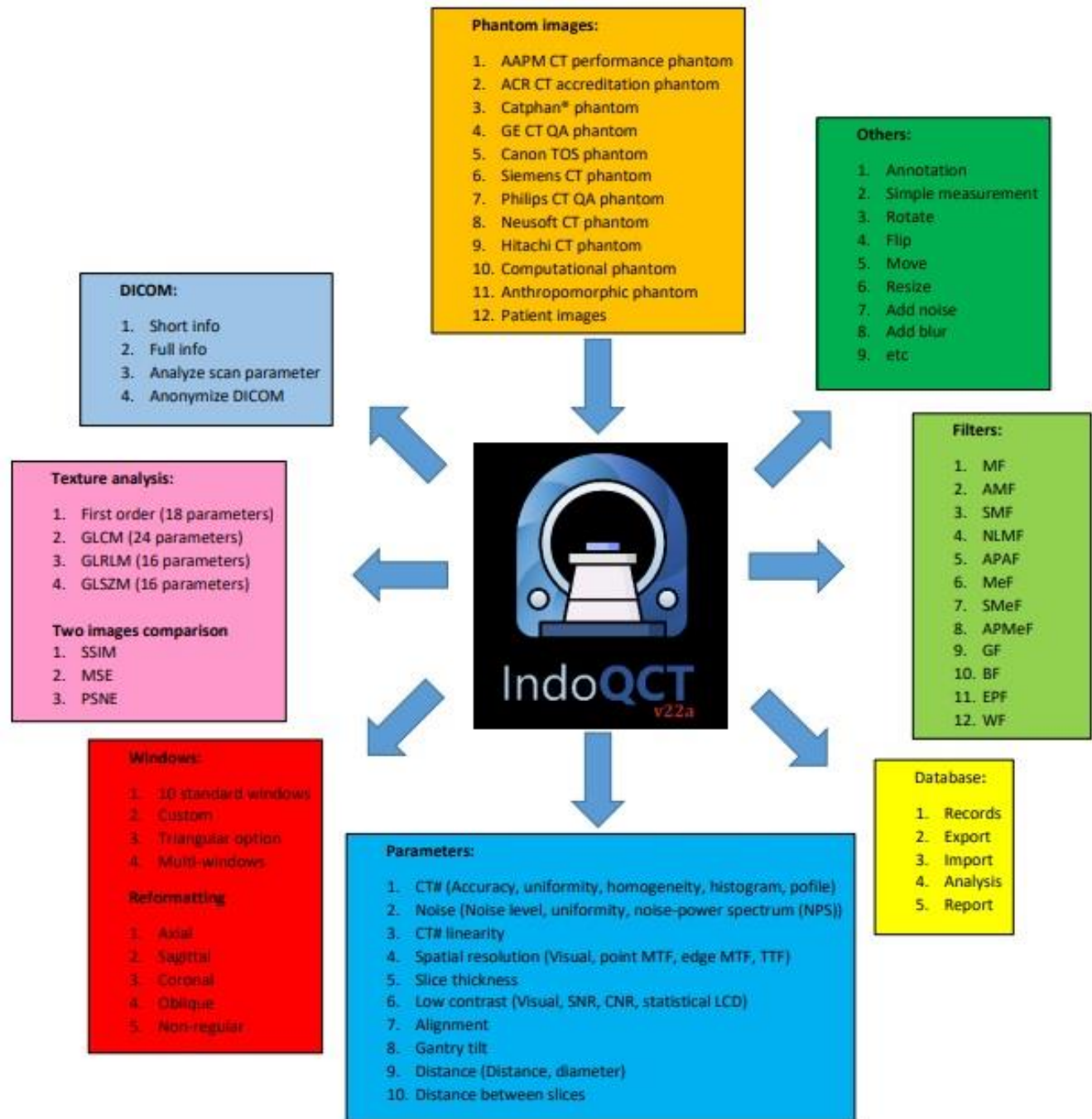
IndoQCT can be used to automatically measure image quality

www.indosect.com/indoqct



IndoQCT:

Software for evaluating
the quality of
computed tomography
images

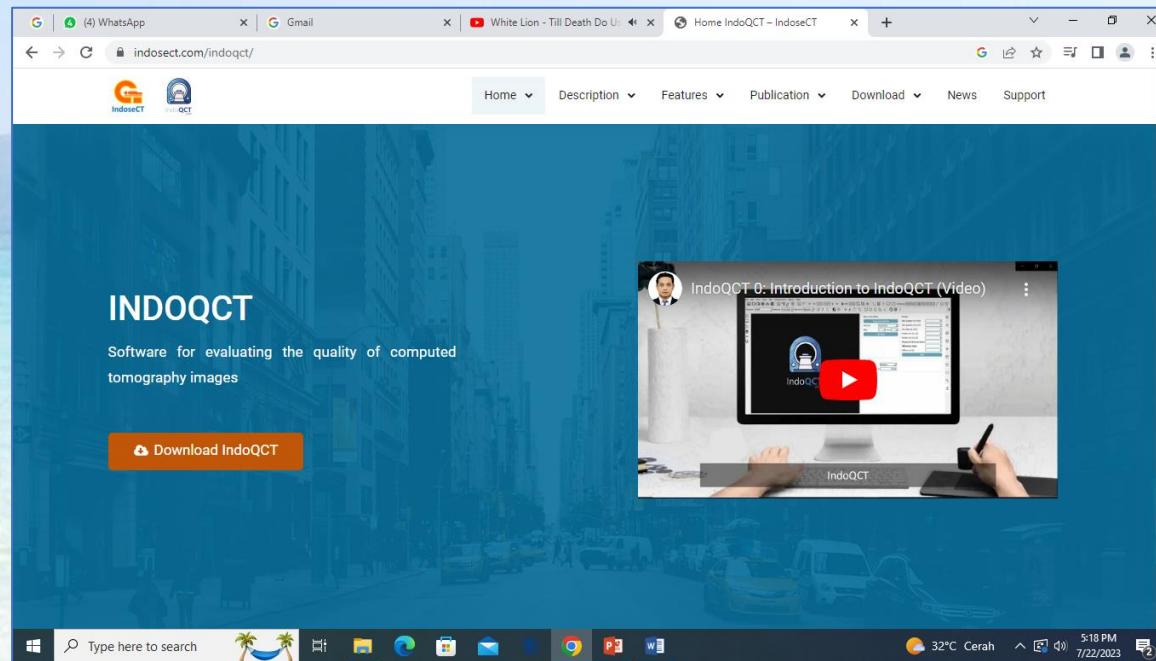




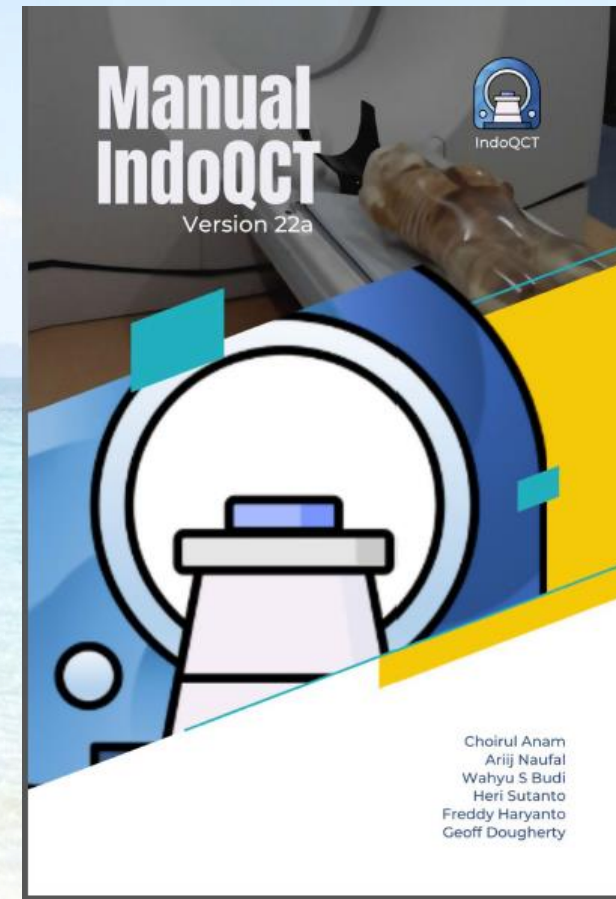
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Materials for further information

www.indosect.com/indoqct



IndoQCT manual book



My Youtube channel



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The screenshot shows a web browser displaying the YouTube channel page for 'Choirul Anam'. The browser's address bar shows 'youtube.com/@choirulanam6277/videos'. The channel name 'Choirul Anam' is prominently displayed, along with the handle '@choirulanam6277', 969 subscribers, and 79 videos. A 'Subscribe' button is visible. Below the channel information, there are tabs for 'Home', 'Videos', 'Playlists', and 'Community'. The 'Videos' tab is selected, showing a grid of four video thumbnails. The first video is 'AUTOMATED QC USING THE ACR PHANTOM' (6:13), the second is 'Early Career in Medical Physics and the Most Recent Trends in...' (1:00:33), the third is 'DIGITAL IMAGE PROCESSING IN RADIOLOGY AND NUCLEAR...' (1:52:52), and the fourth is 'DEMO INDOQCT OLEH DR. CHOIRUL ANAM' (20:56). The left sidebar contains navigation options like Home, Shorts, Subscriptions, You, and History, along with a 'Sign in' button. The bottom of the screen shows a Windows taskbar with the search bar, application icons, and system tray information including the date '1/3/2024' and time '11:29 AM'.

The 15th Annual Scientific Meeting 1-3 March 2024, Trang, Thailand

"Advanced Medical Physics Improves Patient Outcomes"



ID and key for activating IndoQCT

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indosect.com/download-indoqct/

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For activation after installation

ID : trial

Key : gAAAAABkgvFKNtV57dsGx1jz2yYYavzTJEPPr4_tfgn-64cVC1MnVr5IQGAh8LKfp5Z1e4NmpF8BZNkzqUcm2XReN_OzE6-

Name *

Email *

Institution *

Profession *

Country *

Download IndoQCT

Type here to search 34°C Cerah 1:51 PM 8/23/2023

Let's try together.....



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IndoQCT v24b.6

File Edit View Tools Tabs Measurement Option Help

Phantom: AAPM Method: Automatic Standard: Bapeten

Accuracy Uniformity Homogeneity Histogram Profile Patient

Input parameters

Suggested window

Method: Automatic
ROI type: Circle
ROI diameter (px): 40
ROI shifting: Up
Distance (px): 40
Threshold (HU): -100
Slice: Single slice

Calculate

Results

Mean (HU): 0
SD (HU): 0

Save

Standard

Reference: Bapeten
-4 ≤ Mean (HU) ≤ 4

* ROI is region of interest
* SD is standard deviation

Type here to search 30°C Berawan 1:49 PM 1/15/2024



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THANK YOU VERY MUCH FOR YOUR
KIND ATTENTION