Original Article

Journal of Forensic Chemistry and Toxicology
Volume 5 Number 1, January - June 2019
DOI: http://dx.doi.org/10.21088/jfct.2454.9363.5119.3

# Post Mortem CT (PMCT) in Forensic Medicine and Toxicity

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**Received on** 23.04.2019, **Accepted on** 08.06.2019

**Abstract**

*Background:* The Postmortem in Computed tomography (PMCT) had been started from since 1990. PMCT advantages are more relevant in full-body examination (FBE) through scan is quite helpful to assess the whole body scan with clear evidence and computed recorded data.

*Material and methods:* Here trying to justify the PMCT application, analysis and its interpretation in cadaveric, CT examination test before autopsy test to know the causes of death (COD), cause of injury (COI) and other additional information related to image study.

*Inclusion Criteria:* The original contribution selected form (1990 to 2019) is included in study.

*Exclusion Criteria:* An irrelevant study or any case study subject excluded from this study.

*Statistical analysis:* Here simple statistics used from the available database for interpretation.

*Results:* PMCT in analysis given more than (70-90%) better picture than the autopsy test. It clearly analyzed the cause of death (COD), manners of injury (MOI), and personal of identification (POI) through the postmortem examination (PME) and its development in the field of forensic medicine and toxicological research (FMTR).

*Conclusion:* PMCT technology newly added and highly recommendable for correct information through their slice images. So many types of variables (TOVs) may easily compare and predict through the different informative slice images (DISIs) to use the accurate application on forensic medicine and toxicological angle.

**Keywords:** Forensic radiology; PMCT; Post-mortem computed tomography; Virtual autopsy; Research

**How to cite this article:**
Mayadhar Barik. Post Mortem CT (PMCT) in Forensic Medicine and Toxicity. J Forensic Chemistry Toxicol. 2019;5(1):17-.

## Introduction

Currently, Post-mortem CT (PMCT) technology is leading as the best diagnostic imaging techniques and toxicological point of view [1]. PMCT is now advanced diagnostic imaging techniques and gaining popularity in forensic biology, pathology, medicine and toxicology [2]. PMCT scan and their settings are using in post-mortem imaging machine (PMIM) employed as 8/16-slice spiral CT [3]. PMCT also observed with or without contrast to enhancement the CT-guided biopsies, post-mortem ventilation (PMV), and PMCT angiography (PMCTA)[4]. PMCT is able to guide the forensic pathologist, researchers, and clinicians in the Worldwide with respect to evidence in validation for medico legal issues [5].

### Material and methods

*Sample study:* justifying the PMCT application,

analysis and its interpretation in cadaveric, CT examination test before autopsy test to know the causes of death (COD), cause of injury (COI), pattern of death (POD) and other additional information related to the image study.

*Image processing:* The location, shape, size, and essential parameters of different tissues in organs, are directly estimated through the given volume (GV). The SSM-guided expectation-maximization (EM) standardization process with respective large deformation and intensity changes.

*Image analysis:* The authentic segmentation performance (ASP) is measured through Jaccard index (JI) between the segmentation result and within the true label. The relevant findings documented from the obtained reports from and divided into two categories like anatomical location and tissue specific characteristics. The findings of obtained data's are calculated quantitatively in binary fashion analysis (BFA) through the basic simple mathematics.

*Inclusion Criteria:* The original contribution selected form the available database Pubmed/ Medline; SCOPUS/The wave of Sciences, Cochrane review, and EMBASE (1990 to 2019) is included in study.

*Exclusion Criteria:* An irrelevant study or any case study subject excluded from this study.

*Statistical analysis:* Here simple statistics used from the available database for interpretation.

## Results

The majority of PMCT reports (70-90%) noted for the skull fractures (SFs), intraventricular- and subarachnoid hemorrhages (IVSAHs), bullet trajectories (BTs), intracranial shrapnel (ICS) correlation of brain atrophy (COBA) hernia ion, and facial and the soft tissues [6-7]. The sensitivity and specificity in the brain edema (BE), brain atrophy (BA), brain injury (BI), presence of gases (POG) at tissues, cavities are quite better values according to their detection rates (DRs) [8]. The spinal cord, spinal column, spinal canal, joints, lumbar discs, ligaments, coronary atherosclerotic stenosis (CASS) and other additional tissues gives better images with their significant values [9].

PMCT angiography (PMCTA) provides excellent consistency values with immuno histopathological (IHC & IHP) findings in diagnosis of coronary atherosclerotic stenosis degree (CASSD) [10]. Now automated liver segmentation (ALS) from PMCT volume is great challenging in larger deformation and intensity (LDI) changes due to severity in pathophysiology amongst postmortem changes report noticed [11]. Novel segmentation process approach (NSPA) helps in statistical shape model (SSM) in postmortem liver (PML) through an automated liver segmentation (ALS) at their appropriate PMCT volume (PMCTV), intensity, values for calculation and interpretation for the correct observations [12].

## Discussion

The SSM-guided EM suggested that location, shape, size and variable, parameters of liver in given volume (GV), given intensity (GI), effectiveness of actual postmortem CT volumes (APMCTVs) [13]. Postmortem radiology discipline (PMRD) is developing specialty, used as one unique substitute for conventional autopsy (SFCA) [14].

PMCT goal is to find out patterns of death (POD), and its causal factor of death (CFOD), with evidence based approach is more important [15]. PMCT images are light processing of decomposition (LPOD), so that radiologists are presently, unfamiliar within the majority of postmortem (MOPM) changes and there specific regimen still a research question [16].

Ideally, formation of gas (FOG), edema, atrophy should not be any mistaken in pathological processes (PP) in the living and non-living persons [17]. The importance of PMCT and postmortem thoraco-abdominal (PMTA) changes on the FMCT images are differentiating these clinical findings, including with their pathological processes [18].

According to the Detector's eye view (DEV)-based subsets of expectation maximization (SOEM) report is giving an accurate reconstruction on the benchtop x-ray fluorescence computed tomography (XFCT) images [19]. There is at least two data sets obtained from XFCT imaging like gold nanoparticle (GNP)-containing at phantom imaging for the postmortem and others [20].

*Interventions, Outcomes and Lessons:* PMCT contrast-enhances an isolation of the intestinal tract dissection (ITD) of the postmortem body and suggested that the contrast agent flowed out through the ruptures [21]. In autopsy and histological examination Hematoxilin and Eosin (H&E), immune histo chemistry (IHC) reported that perforated crevasse, and confirming their cause of peritonitis (COP) and other additional probabilities [22]. PMCT contrast also one effective

technique for the interpretation in gastrointestinal tract rupture (GITR) and objectively served as a non-invasive tool (NIT) to identify the injury and infections both sides [23].

PMCT and PMCTA is both of the combination technology (CT) and helpful for forensic pathologists to determine the cause of death (COD) and if the cases involving with the traumatic vascular injury (TVI), and traumatic brain injury (TBI) [24]. The multidetector CT (MDCT) represents and used in several forensic departments in different institutes, for there numerous applications for their better diagnostic tool for increasingly benefit in lowering the data acquisition faster (LTDAF) and revalued at the any point of time (POT) [25].

*Limitations*: FMCT angiography examine the pathological changes of blood vessels, might have some limitations on the diagnosis for the cause of death (COD).

## Conclusion

PMCT technology is beneficial and newly added and highly recommendable for correct information through their slice images in different aspects to observe tissues in organs. So many types of variables (TOVs) easily compare through the different informative slices images to use as an evidence for accurate application on forensic medicine and toxicological angle as a standard for decision making in future and present routine practice in laboratory.

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