

**CQ42 In postmortem radiography, what findings are useful to determine death from carbon monoxide intoxication?**

**Grades of recommendations:**

**C2 for evaluating the condition**

**D for determining the cause of death**

In patients who died from carbon monoxide intoxication (poisoning), The value of CT of the lung tends to be low, which is a nonspecific finding. It is impossible to diagnose carbon monoxide intoxication using postmortem radiography including postmortem CT and MRI.

**Explanation-----**

**Background**

In clinical settings, the radiographical findings of brain CT and MRI in patients with carbon monoxide intoxication are widely known among clinicians. In the acute (non-intermittent) type, bilateral deep gray matter lesions predominantly in the globus pallidum are observed. In the delayed (intermittent) type, diffuse cerebral white matter lesions are observed. As for postmortem CT, there are very few studies except for some studies of postmortem CT findings of the lung in carbon monoxide intoxication. No postmortem brain CT study or postmortem MRI study has been published on this topic. Forensically, carbon monoxide intoxication as a cause of death is diagnosed by saturation measurement of serum carboxyhemoglobin.

**Postmortem CT scan findings of the lung characteristic of acute carbon monoxide intoxication**

There were 3 case-control studies of postmortem CT findings of the lung in cases of death due to acute carbon monoxide intoxication. In these cases, the value of CT of the lung parenchyma was lower as well as also for cases of hypothermia when compared to control groups, however this finding was not specific to carbon monoxide intoxication [1]. In cases of fire fatalities due to carbon monoxide intoxication, the volume of the lungs in postmortem CT was smaller than that of drowning cases, which finding was intermediate among other causes of death and was not specific for fire fatalities due to carbon monoxide intoxication. While the value of CT of the lungs on postmortem CT of those cases was the same level as that of alcohol/sedative-hypnotic intoxication and hyperthermia, was lower than that of sudden cardiac death cases and fatal methamphetamine abuse, and was higher than that of mechanical asphyxiation, fire fatalities due to burns, drowning, and hypothermia. However, the value of CT of carbon monoxide intoxication was intermediate among other causes of death and was a nonspecific finding [2, 3]. Otherwise, there was a single case report of a person who died of carbon monoxide intoxication and presented nonspecific pulmonary edema on postmortem CT [4].

Literature search formula and literature selection (2019/2/17)

PubMed

#	Search formula	Number of documents
1	((((((((((postmortem) OR post-mortem) OR "post mortem")) AND imaging)) OR (((postmortem) OR post-mortem) OR "post mortem")) AND CT)) OR (((postmortem) OR post-mortem) OR "post mortem")) AND "computed tomography") OR (((postmortem) OR post-mortem) OR "post mortem")) AND MR)) OR (((postmortem) OR post-mortem) OR "post mortem")) AND "magnetic resonance")) OR (((postmortem) OR post-mortem) OR "post mortem")) AND MDCT)) OR ((MSCT) AND (((postmortem) OR post-mortem) OR "post mortem"))	23340
2	"carbon monoxide"	34192
3	#1 and #2	131

Ichushi (Medical Journal)

#	Search formula	Number of documents
1	((((死亡時画像/AL) and ((FT=Y) and AB=Y))) or ((死後検査/TH or autopsy/AL) and ((FT=Y) and AB=Y))) or ((死後画像/AL) and ((FT=Y) and AB=Y)))	158
2	((一酸化炭素/AL) or (CO 中毒/AL))	94
3	#1 and #2	0

From other than search formula

[4]

**References**

- [1] Schweitzer W, Thali M, Giugni G, et al. Postmortem pulmonary CT in hypothermia. *Forensic Sci Med Pathol.* 2014;10(4):557-69. (Level 4b)
- [2] Sogawa N, Michiue T, Ishikawa et al. Postmortem volumetric CT data analysis of pulmonary air/gas content with regard to the cause of death for investigating terminal respiratory function in forensic autopsy. *Forensic Sci Int.* 2014;241:112-7. (Level 4b)
- [3] Sogawa N, Michiue T, Kawamoto O, et al. Postmortem virtual volumetry of the heart and lung in

situ using CT data for investigating terminal cardiopulmonary pathophysiology in forensic autopsy. *Leg Med (Tokyo)*. 2014;16(4):187-92. (Level 4b)

[4] Makino Y, Iwase H: Pitfalls common in postmortem CT autopsies. *INNERVISION*. 2015;31(1):37-9. (Level 5) (Japanese)