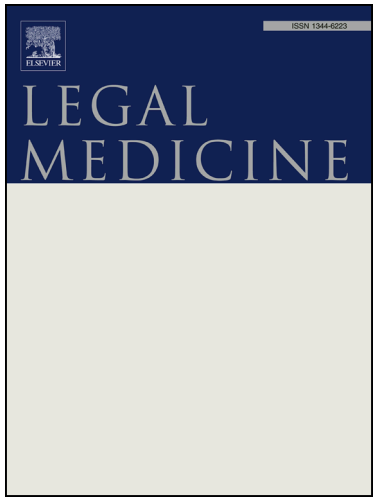

Post mortem CT of intrahepatic gas distribution in twenty-seven victims of a flood: patterns and timing.

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Post mortem CT of intrahepatic gas distribution in twenty-seven victims of a flood: patterns and timing.

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ABSTRACT
We reported the results of post mortem computed tomography of the liver in 27 subjects dead simultaneously during a flood. The aim of our work was to identify the different patterns of post mortem intrahepatic gas distribution and the timing of its appearance. Although post mortem CT is the method of choice for the evaluation of gas distribution, controversies exist about the first site of appearance of intrahepatic gas (portal veins versus hepatic veins) as well as the timing and steps of intrahepatic gas spreading. In each subject we performed thin slice CT scanner (Somatom Definition, Siemens) and post processing of native CT images with Minimum Intensity Projection technique.
Our results show that the first site of appearance of intrahepatic gas is portal veins. Gas in hepatic veins was never seen without the presence of the gas in portal vein. Gaseous cysts in hepatic parenchyma represent a further and usually more tardive pattern of intrahepatic gas distribution.
In addition, we demonstrated that differences in timing of gas spreading was statistically significative for exclusive presence of portal veins gas before 48 hours as well as for complete substitution of hepatic parenchyma by cysts 64 hours after death.
In conclusion, our work shows that the CT study of postmortem intrahepatic gas distribution could be a useful complementary tool both in demonstrating the mechanism of intrahepatic gas spreading and in estimating post mortem interval.
Key words: post mortem CT – liver – putrefaction - intrahepatic gas – post mortem interval

INTRODUCTION
Post-mortem computed tomography (PMCT)[1] is increasingly gaining impact in the field of forensic pathology.
In forensic investigations, CT examination can be useful in detecting the cause of death and in estimating the nature and extent of externally invisible injuries [1].
The presence of intravascular gas in the body and particularly of intrahepatic gas (IHG) was recognized as a common finding in post-mortem CT examinations [2]. The value of this finding for the *forensic purpose* has not yet well established because in the international literature there are few works on this issue. In addition the evaluated cohorts are small and/or inhomogeneous both for material and methods [3-6]. So many controversies remain about the cause, origin and mechanism of post-mortem spreading of gas both in traumatic and non-traumatic death [7-10]. Some authors describe the presumed origin of post-mortem gas through three categories: - alteration-putrefaction, - high magnitude vital gas embolism (e.g., from scuba diving accident), - lower magnitude (e.g., following a traumatic injury) [11]. In blunt trauma, gas in portal and mesenteric veins is considered as translocated gas from gastrointestinal tract, but there aren't informations on the timing beetween death and gas distribution observed by TCPM [9].
One of the controversies on this topic is about the place of first appearance (portal versus hepatic vein) and the timing of post-mortem IHG distribution: Jackowski et al. [3] as well as F. Fischer et al. [4] reported the hepatic veins to be the first site of appearance of IHG. Conversely Yamazaki et al. [5] as well as by Shiotani et al. [6] described that the first site are the portal veins and did not even consider the hepatic veins.
The aim of our work was to define the patterns of distribution of IHG in a cohort of 27 subjects who died simultaneously during a natural disaster (flood) and to assess the timing of the IHG appearance and spreading into the liver. These data could be potentially useful in defining the post-mortem interval.

MATERIAL AND METHODS
Our study was retrospective and obtained the permission of the Ethic Committee of our Institution.
We retrieved from our archives the total body PMCT examinations of 31 subjects dead almost simultaneously (within few minutes) during the dreadful flood occurring in the night between the 1st and the 2nd October 2009 in Giampilieri, a suburb of the city of Messina (Italy) [12].

1 Guy N. Rutty et al. (2013) Terminology used in publications for post mortem cross-sectional imaging Int J Legal Med. Mar;127(2):465-6.