Dear Editors,

Thank you for your coments,

Please find below the response to reviewer comments.

Best Regards,

On behalf of the Authors,

G. Katsanos

Reviewer #1:

Specific Comments to Authors: This study aimed to evaluate the safety, feasibility and accuracy of LIDAR 3D photography in the prediction of whole liver graft volume and mass. The measurement of 3D photography is an accurate methods to estimate the volume of liver graft. But the approach is not that novel, and how the application of this technology can solve the problem of ex-vivo estimation of liver mass and volume in clinical practice should be discussed.

Reply: Our preliminary data tend to validate the concept of the study, however it does not have a valuable clinical application per se, as whole liver mass and volume can be easily calculated by simply weighing the graft or by the water displacement method. However, due to the asymmetric structure of the liver, the calculation of partial liver volumes is more complex, and the existing mathematic formulas cannot accurately predict the segmental hepatic volumes, that can vary considerably between patients,[17] leaving as the most used and valuable option the preoperative imaging studies of the graft in the form of either a CT or MRI scan. LIDAR assisted liver volumetry could add a useful tool for ex-vivo partial liver volume calculation mainly in cases of split liver transplantation for donors that for various reasons did not have a pre-procurement CT or MRI study. Compared to traditional methods for liver volumetry such as CT and MRI, LIDAR volumetric assessment is more cost-effective, less time consuming and less operator dependent. Triple phase liver CT scans or MRI scans can be difficult to obtain even in tertiary hospitals, let alone in the setting of a small rural donor hospital. Moreover the multi-organ donor is not burdened with intravenous contrast media administration, which may affect kidney function. Liver 3D model capture using the LIDAR camera is performed ex-vivo, just after backtable

liver preparation, in less than 3 minutes and under sterile conditions. Actual volume measurement is done utilizing an open, free software package without the need of an expert radiologist. One obvious drawback in comparison to preoperative donor imaging is that the internal anatomy of the liver cannot be assessed and surgical plane planning is not possible. Relevant comments have been added to the discussion section.

The technical advances of this technology should also be discussed, such as the consumed time of obtaining the data, and positive or negative false of successful transplant of liver in animals or in human.

Reply: Liver 3D model capture using the LIDAR camera is performed ex-vivo, just after backtable liver preparation, in less than 3 minutes and under sterile conditions. Actual volume measurement is done utilizing an open, free software package without the need of an expert radiologist. One obvious drawback in comparison to preoperative donor imaging is that the internal anatomy of the liver cannot be assessed and surgical plane planning is not possible**. Relevant comments have been added to the discussion section. In the present study the obtained results did not interfere with clinical decision making in the transplantation process.**

Reviewer #2:
Specific Comments to Authors: Overall this paper presents an interesting and meaningful method of volume calculation for liver grafts by LIDAR (Light Detection and Ranging). I guess it will revolutionize research in liver transplantation and other tissue transplantation, due to the generalizability of this method. But this paper should be submitted as a research paper, not a review article.

Reply: Manuscript submitted as a research paper

Some minor issues are also recommended to be corrected, before being accepted.

1. A flow chart from scanning point cloud data to calculating volumes is recommended to make to clearly illustrate the volumetric assessment.

Reply: A flow chart has been added to the manuscript (Figure 3)

2. Although the measured results are close to the theoretical results, the authors do not discuss the reason for this difference. Can a relatively large amount of point cloud data be extracted while scanning to improve accuracy?

REPLY: The reason for the minor differences between the measurement with the Occipital's Structure in relation to the weight scale device is based on the accuracy and the produced density of the final point cloud, but also on the assumption that the backside of the Graft that rests on the sterile surface, is considered as completely flat in the final 3D model. Newer generation devices will provide even more accurate results. Relevant comments have been added to the discussion section.

3. What are the advantages of this method compared to CT or MRI?

REPLY: As far as the advantages of LIDAR over CT or MRI, the main advantage is that LIDAR can perform volumetric measurements ex-vivo, in cases that the donor was not subjected to a CT or MRI imaging study. However, it is important to keep in mind the preliminary nature of the study, that principally aims in assessing the safety and feasibility of the method, with an ultimate goal being not the measurement of the whole graft per se, but the **prediction of the volume of the left lateral section of the liver, for split liver transplantation**. **Relevant comments have been added to the discussion section.**

4. The authors claim the mean duration of the measurement was 123 seconds. So, if possible, record a video to show the whole process is suggested.

REPLY: Two video files have been added. The first one shows the LIDAR scan procedure and the second the rapid image rendering process. Please note that the videos are real time and unedited for ambient sound