INVITED COMMENTARY

# If it Looks Like a Duck, Swims Like a Duck, and Quacks Like a Duck, Then it Probably is a Duck. What "The Duck Test" Tells us About Systematic Reviews and Meta-Analyses of LEED and Other EVLA Parameters

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Systematic reviews and meta-analyses are often used to collate information from a wide number of published research papers, to try to ascertain a consensus on some point or other. However, researchers must bear in mind the principle of GIGO ("garbage in, garbage out"), thought to have been coined by George Fuechsel, an IBM programmer and instructor. Getting too close to a subject can result in researchers believing their findings without questioning whether their conclusion makes sense.

Such is the case, in my view, of the message given in the recent publication "Commonly used EVLA parameters do not influence efficacy — results of a systematic review and meta-analysis."[1] The authors looked at randomised controlled trials of endovenous laser ablation (EVLA) of the great saphenous vein (GSV). Overall, they quoted a 92% success rate — although the trials were heterogeneous and the authors cannot be certain whether "successful ablation" is fibrotic or merely thrombotic with possible future recanalisation.[2] They analysed: shorter wavelengths vs. longer wavelengths; "low" energy $\leq$50 J/cm *vs.* "high" energy >50 J/cm; "long" or "short" follow up; and definition of outcome comparing "occlusion" with "lack of reflux." They also check on bias.

Their conclusion was, as stated in the title of the paper, that there was no difference in outcome between any of these factors. However, should a venous surgeon in practice accept that as a valid message? Clearly the answer is no. Taking each parameter to the extreme would clearly show differences. So where is the fault between the results being produced in this systematic review and meta-analysis, and what we know to be the case from experience?

In no particular order, although the results used for the analysis might reflect the "real world" success rates of GSV ablation, some of them are frankly abysmal. Modeling the heat distribution for a specific endovenous thermo-ablation device for in vitro models, then ex vivo veins, can lead to 100% ablation at one year.[3] Although this work was done on radiofrequency, the principles of endovenous thermal ablation apply to laser as well.[4]

Low success rates at one year or less (<85—90%) probably represent poor endovenous technique, such as failure to empty the vein during treatment.[5] Furthermore, linear endovenous energy density (LEED) should not be reported unless it is quoted with the power used or the pullback time.[5] One value of LEED can cover a range of different power levels and application times, all with very different biological effects (Fig. S1).

Finally, there is no analysis of the size of vein treated. Whether one considers diameter or mass of tissue in the vein wall, thermal ablation requires transmural cell death, not endothelial damage or protein contraction.[2] This is what leads to long term ablation by fibrosis.[2]

So in summary, using the "Duck Test,"[6] the conclusions of this paper look like a turkey. The methodology has allowed the large number of confounding variables to influence the results, ending up with a conclusion that is dangerous if taken at face value by the venous community.

## APPENDIX A. SUPPLEMENTARY DATA

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ejvs.2019.04.023.

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