1 Introduction: Antagonism of vitamin K pathway by warfarin induces oxidative stress in vascular smooth muscle cells. This contributes to pathological phenotype perpetuating vascular calcification and cardiovascular disease.

2 Hypothesis: Menaquinone-7 (MenaQ7®) can counter induced oxidative stress in vascular smooth muscle cells.

3 Key Findings:
- Interference with vitamin K metabolism by Warfarin results in increased intracellular oxidative stress and EV secretion
- MK7 counteracts intracellular oxidative stress, both under normal conditions as well as warfarin induced
- MK7 counteracts the effect of CoCl2 induced ROS production whereas UQ10 has no such effect
- Warfarin does not affect ATP levels, suggesting that warfarin does not affect mitochondrial function
- MK7 increases ATP production, even in the presence of warfarin.

4 Final Conclusion: Our experiments with human VSMCs demonstrate that MK7 lowers oxidative stress and increases ATP production.

Figure 1. Warfarin exposure (6 h) affects Reactive oxygen species (ROS) production in VSMC in a dose dependent manner.
Figure 2. Warfarin treatment increases extracellular vesicle (EV) secretion.
Figure 3. MK-7 treatment decreases ROS production in VSMCs compared to control and warfarin. The cells in all 3 experiments were pretreated for 24 hrs with 100 µM Warfarin.
Figure 4. MK-7 may counteract effect of Cobalt chloride (CoCl2) on ROS production unlike Ubiquinone-10 (UQ10).
Figure 5. Warfarin does not affect VSMC ATP production; however, MK-7 improves ATP production independent of warfarin action.