Introduction:
There are several different anti platelet drugs that can be used to treat acute cardiac events. Currently there are no effective markers that can assess how these drugs modify coagulation profile and quality. A new functional biomarker that measures Fractal dimension (df) and clot formation time (TGP) has been developed. df quantifies clot microstructure whereas TGP is a real-time measure of clotting time. We aimed to validate df and TGP in ST elevation myocardial infarction (STEMI) and assess the effect of two P2Y12 inhibitors which have different pharmacological mechanisms: clopidogrel and ticagrelor.

Methods:
We prospectively recruited 72 STEMI patients in the emergency setting. Venous blood samples were collected 12 hours after admission, following treatment with either ticagrelor or clopidogrel, in accordance with the local guidelines at the time. The blood samples were tested using the df and TGP biomarker, platelet aggregometry, clot contraction and standard markers of coagulation.

Results:
36 patients received clopidogrel and 36 received ticagrelor. The df for clopidogrel was higher than ticagrelor (1.75±0.05 vs 1.73±0.06, p=0.18 which corresponds to a decrease in clot mass of 20% Figure 1) and the TGP was reduced (205±91sec vs 257±89sec, p=0.06 a 20% reduction in time).

Conclusion:
The results of the study suggest that clopidogrel is less powerful in its effects on clotting characteristics compared to ticagrelor. Blood from patients receiving clopidogrel formed quicker and denser clots. This would suggest the risk of secondary events or stent occlusion is lower in those patients on ticagrelor, highlighting that df and TGP may be important in identifying patients at risk of future thrombotic events, the study is ongoing and will investigate the long term outcome in these patients.

References:
Figure 3: Visual representation of the relationship between clot microstructure and clot mass.