

# Frank's Sign

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Frank's sign is a Diagonal Ear Lobe Crease (DELC) (Figure 1) first described by Dr Sanders.T.Frank in his 1973 "Letter to the Editor" of the New England Journal of Medicine. Frank described a correlation between the existence of DELC amidst 20 patients under 60 with angina, abnormal ECG or angiography. Pre Auricular Creases are also referred to throughout the literature as being a concomitant sign along with the DELC. The image shown is that of a classic diagonal ear lobe and pre auricular creases.



**Figure 1/** (Above Left) Frank's sign is a Diagonal Ear Lobe Crease (DELC)

**Figure 2/** (Above Right) Pre Auricular Creases (PAC) and Ear Lobe Crease (ELC)

Over the years numerous follow up studies have been undertaken with the majority concurring with Frank's original observation and a minority finding no such correlation. More recent studies have found that DELC is "a valuable extravascular physical sign able to distinguish some patients at risk from succumbing to atherosclerosis of the coronary arteries" (Friedlander et al 2011). Other studies using ultrasound have associated DELC with atherosclerosis of the carotid arteries a known risk factor for stroke (Fig 3).



**Figure 3/** Example of coronary artery angiography

There exists an interesting historic connection with Emperor Hadrian and Frank's sign. Apparently early Greek sculpture was renowned for its anatomical accuracy with Hadrian's bust exhibiting a clear Frank's sign (Figure 4). Given that Hadrian was considered to have expired from congestive heart failure we are somewhat indebted to those masterful Greek sculptors for giving us a look back in time to wonder if Frank's sign has indeed been with us for millennia.



**Figure 4/** Emperor Hadrian

Friedlander et al (2011) have reviewed the medical literature and summarized the findings for and against the correlation between DELC and Coronary Artery Atheroma. One supportive study by Kaukola (1979) reported that individuals with confirmed coronary artery atheroma were 72% likely to display a positive DELC whereas only 21% without significant stenosis exhibited the sign, the difference being highly significant. He further reported that the incidence of DELC increased from 51% with only one coronary vessel affected but up to 79% with double or triple vessel disease. A further Danish longitudinal study found those individuals with a right sided DELC had a 1.4 fold increase in the risk of acute myocardial infarction after controlling for age and sex. Another prospective study found a positive predictive value in a cohort of patients followed for 6-8 years who had DELC but free of coronary artery disease. Cardiac events, including death were 10.4 per 100 patient years



whereas those without DELC were 1.4 events per 100 patient years.

On the negative side some postulate that the DELC and the pre auricular crease are a natural part of ageing and heart disease increases with age and hence the correlation. The Friedlander article refers to a small number of negative studies in which the rates of DELC was nearly identical to those with and without coronary artery disease.

Given that as Audiologists we spend considerable time examining ears this is another anatomical marker to look for. It also raises the tricky situation as to whether one should make any remark given the likely sensitivity of the subject. As we are not trained we would be inclined to shy away from remarks not within our jurisdiction. This contrasts with our finding of a suspicious skin lesion on the pinna for which we would not hesitate to recommend investigation. So, on balance, I think it fine if in our reports, where the findings of the OE are noted, that we add a comment that "diagonal ear lobe creases (DELC) are noted" and then leave it to the treating physician to contemplate its significance. The authors would be delighted to hear the views of others on this interesting dilemma. ●

## REFERENCES

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