# Frank's sign – A dermatological link to coronary artery disease?

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## SUMMARY
**Frank's sign, also known as diagonal earlobe crease (DELC), was observed to be an aural sign of coronary artery disease (CAD). Since then, there has been much interest in examining this unique and controversial association. This report describes a patient who has bilateral complete and deep diagonal ear lobe creases, presented with angina and diagnosed to have coronary artery disease on angiography. The characteristics of the sign and its association with atherosclerotic disease were discussed.**

| KEY WORDS: |
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| *Frank's sign, diagonal earlobe crease* |

## CASE REPORT
A 58 year-old male chronic smoker with background history of long-standing hypertension, tophaceous gout and chronic kidney disease stage 4, presented with symptoms suggestive of stable angina. On physical examination, he was noted to have bilateral diagonal earlobe creases extending backward between the tragus and the posteroinferior lobe edge (Figure 1), consistent with Frank's sign. His ECG was unremarkable, however myocardial perfusion scan showed reversible perfusion defects. He underwent an elective coronary angiography which showed 80% stenosis at the left anterior descending artery and was treated with coronary stent. His symptoms improved well after the procedure.

## DISCUSSION
First described in 1973, Frank's sign, also known as diagonal earlobe crease (DELC), was observed to be an aural sign of coronary artery disease (CAD).[1] Since then, there has been much interest in examining this unique association. This may occur as a result of age- or disease-related weakening of dermal and elastic fibers in the ear lobes, making it a dermatological predictor of an underlying coronary vessel insufficiency. Over the years, more insights were gained from studies showing the association of DELC with significantly increased prevalence, extent and severity of CAD, independent of traditional CAD risk factors, with good sensitivity and positive predictive value.[2] Recent studies have also demonstrated DELC's independent association with increased carotid intima-media thickness[3] as well as cardiovascular events (CVE) comprising not only coronary, but ischemic cerebrovascular and peripheral vascular
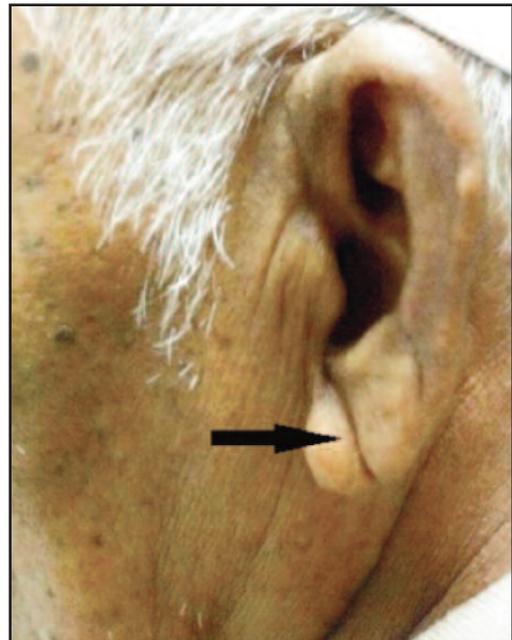


**Fig. 1:** Complete and deep diagonal ear lobe crease, or Frank's sign (arrow).

diseases, suggesting that DELC may be a marker of generalized atherosclerotic disease.[4] Wong et al. in a study of 558 consecutive patients (445 patients had CAD on coronary angiography), found that the presence of DELC is independently associated with 5-fold higher risk of CAD.[5]

Of note, there has been proposed classification of DELC based on the characteristics of length, depth, bilateralism and inclination of the crease.[4] Our patient has bilateral diagonal, complete and severe DELC with base of sulcus cannot be seen. Although bilateralism has been shown to have good specificity for CVE association, the significance of the characteristics needs to be further studied.

## CONCLUSION
Although the exact underlying mechanism of Frank's sign remains unclear, the significance of this easily detectable sign is increasingly being observed and can be a valuable bedside clinical sign which may indicate underlying atherosclerotic disease especially CAD.

## REFERENCES

1. Frank ST. Aural sign of coronary-artery disease. N Engl J Med 1973; 289: 327-8.
2. Shmilovich H, Cheng VY, Rajani R et al. Relation of diagonal ear lobe crease to the presence, extent, and severity of coronary artery disease determined by coronary computed tomography angiography. Am J Cardio 2012; 109: 1283-7.
3. Celik S, Erdogan T, Gedikli O, Kiris A, Erem C. Diagonal ear-lobe crease is associated with carotid intima-media thickness in subjects free of clinical cardiovascular disease. Atherosclerosis 2007; 192: 428-31.
4. Rodríguez-López C, Garlito-Díaz H, Madroñero-Mariscal R et al. Earlobe crease shapes and cardiovascular events. Am J Cardiol 2015; 116:286–93.
5. Wang Y, Mao LH, Jia EZ et al. Relationship between diagonal earlobe creases and coronary artery disease as determined via angiography. BMJ Open 2016; 6:e008558.