The role of inflammation in cardiovascular (CV) risk: media backgrounder

Quick facts

- Inflammation is a natural biological response to infection or injury, which in some cases can act as a harmful driver of disease
- About 40% of people who had a heart attack live with an elevated level of inflammation despite being on optimized lipid-lowering therapy, which puts them at increased risk of cardiovascular (CV) events such as heart attack and stroke – this is called "residual inflammatory risk"
- People with inflammation levels above a certain threshold are said to have "inflammatory atherosclerosis"
- Phase III CANTOS trial demonstrated that targeting inflammation in people with a prior heart attack reduced the risk of CV events occurring

What is inflammation?

- Inflammation is a natural protective biological response to infection, injury or the introduction of pathogens into the body[1]
- A simple example would be that when you cut your finger, the area around the injury may become swollen, red and warm to touch. This is the body signaling to white blood cells, hormones and nutrients to travel to the site of the injury to fight infection
- The pathway that drives this inflammatory response is complex and inflammation can also sometimes work against the body and become a source of harm. This is the case in inflammatory conditions such as rheumatoid arthritis, psoriasis and Crohn's disease

The role of inflammation and cardiovascular risk

- For a long time CV events have been understood to be caused by a build-up of fat on the arterial walls called plaques, driven by high levels of LDL cholesterol in the blood. The plaques can eventually rupture, which blocks blood flow leading to a heart attack or stroke. While this remains true, researchers also discovered that **around half of all people who experienced heart attack or stroke had normal, or even low, levels of cholesterol**[2]
- This suggested that there must be another important factor driving CV risk beyond high levels of LDL cholesterol. Researchers hypothesized that inflammation in the body plays a key role in driving this build-up of fats, making plaques more likely to rupture, and causing subsequent CV events
- Over the course of decades of research, and more than 20 large scale clinical trials, cardiologists have been able to establish that measuring levels of inflammation in the body can accurately identify those patients most at risk of CV events[3]
- Current research is now investigating treatments that directly target this inflammatory component in order to reduce patients' risk of serious CV events

How is inflammation measured?

- Levels of inflammation in the body can be calculated by measuring the level of **C-reactive protein (CRP)** in the blood
- The level of CRP is measured using a high-sensitivity CRP blood test (hsCRP).
- hsCRP is a well-established clinical indicator of elevated CV inflammation in the body, and its presence indicates an increased risk of secondary events following a heart attack
- 2mg/L is a commonly used clinical cut point for hsCRP measuring residual inflammatory risk - patients with hsCRP levels <2mg/L are considered to be at lower risk, whereas those with hsCRP levels >2mg/L are considered to be at increased risk
- hsCRP assays are precise, inexpensive, and readily available

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The key evidence to date:

Clinical trial	Outcome
PROVE-IT (2004) NCT00382460	• The PROVE-IT trial examined if intensive lowering of LDL cholesterol would reduce the risk of CV events in patients who had experienced acute coronary syndrome[4] • Results demonstrated that reduction in both LDL cholesterol and hsCRP levels was predictive of a highly significant reduction in CV events
JUPITER (2008) NCT00239681	• Because around half of all CV events occur in patients who have normal or low levels of LDL cholesterol, the JUPITER study aimed to find out if hsCRP testing could identify the patients who remained at risk, and, if statins could reduce the risk of heart attack and stroke in these patients[5] • The study demonstrated a significant benefit in patients with no CV disease, no diabetes, and 'acceptable' levels of LDL cholesterol, suggesting that lowering levels of inflammation may have a key role to play in reducing the rate of CV events
IMPROVE-IT (2015) NCT00202878	• This trial sought to build on the concept of dual targets (lowering of both LDL cholesterol and hsCRP) demonstrated in the PROVE-IT trial[6] • In IMPROVE-IT, dual LDL cholesterol and hsCRP targets were associated with improved CV outcomes
CANTOS (2017) NCT01327846	• CANTOS is the first and only Phase III study to demonstrate that directly targeting inflammation can reduce CV risk in patients with a prior heart attack • Primary data from CANTOS demonstrated that significantly fewer patients with a prior heart attack and inflammatory atherosclerosis experienced a major adverse cardiovascular event (MACE) on ACZ885 than those given standard of care (SOC) alone • New analysis of the CANTOS trial, designed to further asses the relationship between hsCRP reduction and CV event reduction, provides additional evidence that treating inflammation, without affecting cholesterol, significantly reduces CV risk

Comment [DM1]: Novartis to confirm language

References

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[2] Miedema MD, *et al.* J Am Heart Assoc. 2017. 12;6(4).
[3] Ridker PM, *et al.* JACC. 2007. 49:21:2129-2138.
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[6] Bohula EA, *et al.* Circulation. 2015. 132(13):1224-33.

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