



RESEARCH

INFORMATION

## Protecting the Blood Vessels in Kidney & Cardiovascular Disease



### AIMS

Blood vessels are essential for delivering oxygen and nutrients throughout the body. Damage to blood vessels plays a major role in serious conditions such as high blood pressure, kidney disease, vasculitis, transplant rejection, and complications of pregnancy such as pre-eclampsia.

Inflammation is the body's natural response to injury or infection. One inflammatory protein, called interleukin-1 beta (IL-1 $\beta$ ), is usually thought to contribute to tissue damage. However, emerging evidence suggests that in some situations, IL-1 $\beta$  may also help protect blood vessels.

The aims of this fellowship were:

- To test whether IL-1 $\beta$  can protect blood vessels in experimental models of high blood pressure
- To understand how IL-1 $\beta$  may help maintain healthy blood vessels
- To investigate whether these findings are relevant in patients with vascular diseases, including pre-eclampsia, vasculitis, and kidney disease.



## KEY FINDINGS

- In mice with high blood pressure, IL-1 $\beta$  reduced damage to the heart, kidneys, and blood vessels
- IL-1 $\beta$  increased levels of natural protective growth signals that help maintain healthy blood vessels
- In women with pre-eclampsia, IL-1 $\beta$  levels were lower than in healthy pregnancies, suggesting it may play a protective role
- These findings suggest that IL-1 $\beta$  has both harmful and protective effects, depending on the situation



## WHAT DID THE STUDY INVOLVE?

This project involved laboratory research, animal studies, and analysis of patient samples.

### *Laboratory and animal studies:*

We studied mice with high blood pressure, which is a well-established model used to understand cardiovascular disease in humans. These studies examined how IL-1 $\beta$  affects blood vessels, the heart, and the kidneys. We also performed laboratory experiments using human cells to understand how IL-1 $\beta$  influences blood vessel repair.

### *Patient studies:*

We analysed blood samples from patients with vascular diseases, including women with pre-eclampsia and patients with kidney disease and vasculitis. These samples were collected with ethical approval and patient consent through clinical research studies and biobanks.



*Patient and public involvement:*

Patient representatives from kidney and vasculitis patient groups provided input into the research priorities and helped guide how results should be communicated to the public.



**WHAT WERE THE RESULTS AND WHAT DO THEY MEAN?**

- Traditionally, IL-1 $\beta$  has been viewed only as harmful. However, our findings suggest a more complex picture.
- In experimental models, IL-1 $\beta$  helped protect blood vessels and organs from damage. This protective effect appears to occur through stimulation of natural repair processes in blood vessels.
- In patients, lower IL-1 $\beta$  levels were associated with diseases involving blood vessel injury, suggesting IL-1 $\beta$  may help maintain vascular health.
- These findings improve our understanding of how inflammation affects blood vessels and suggest that completely blocking IL-1 $\beta$  in some patients could potentially remove beneficial protective effects.
- However, further research is needed before any changes to patient care can be recommended.



**WHAT IMPACT COULD THE FINDINGS HAVE?**

*For patients:*

This research may help identify new blood tests to detect patients at risk of blood vessel damage earlier.

*For clinical care:*

These findings highlight the importance of understanding when inflammation is harmful and when it



may be protective. This may help guide the safe use of anti-inflammatory treatments.

*For research and future treatments:*

This work provides a foundation for future studies aimed at developing safer and more targeted treatments to protect blood vessels in kidney and cardiovascular disease.

This is particularly relevant for improving health outcomes in Scotland, where cardiovascular and kidney diseases are major causes of illness.



## HOW WILL THE OUTCOMES BE DISSEMINATED?

The findings from this fellowship have been shared through:

- Scientific publications in peer-reviewed medical journals
- Presentations at national and international scientific conferences
- Engagement with patient organisations including kidney and vasculitis charities
- Public engagement events and patient group discussions

This work has also led to successful applications for further research funding to develop these findings towards clinical studies.



## CONCLUSION

- This fellowship discovered that IL-1 $\beta$ , previously thought only to cause damage, may also help protect blood vessels in certain conditions.
- This improves understanding of vascular disease and opens new opportunities for future



research into diagnosis and treatment.

- The fellowship also supported the development of new research collaborations, trained early-career researchers, and strengthened Scotland's position as a leader in cardiovascular and kidney research.
- Further studies are now underway to determine how these findings can benefit patients.



## RESEARCH TEAM & CONTACT



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