### Introduction

In traditional Māori medicine (rongoā) Kawakawa (*Macleaya cordata*), known as a holistic medicine system which includes both physical (massage) and spiritual (kakariki) healing techniques.

There has been very little previous research into Kawakawa. Previous screening studies have indicated that Kawakawa has little anti-bacterial and anti-viral activity\(^1,2\). Evidence suggests that the extraction methodologies used in these previous studies were not the most suitable, as both used organic solvents\(^1,2\) whereas traditional Māori preparation used water\(^3\). This could account for the disparity between studies and the previous scientific studies. There has been no previous research into Kawakawa’s anti-inflammatory properties.

This study sought to investigate the disparity between the evidence in rongoā and the scientific evidence available. It was hypothesised that Kawakawa will have anti-inflammatory activity, providing scientific support for its use in rongoā.

### Results

A positive result is a reduction in the value compared to the control. A reduction in nitric oxide, TNF-α and IL-6 production would be indicative of anti-inflammatory activity. This was observed in the aqueous extract. * Indicates statistical relevance (P <0.05). Statistical significance calculated using a T-test. 0 µg/mL of Kawakawa extract was the control in all samples. Error bars show the standard error of the mean.

- **Nitric Oxide**
- **IL-6**
- **TNF-α**

**A reduction in any of these markers indicates that the extract has anti-inflammatory properties.**

**Dose dependant reductions were observed in the aqueous extract with regards to:**

- **Nitric Oxide production**
- **IL-6 production**
- **TNF-α production**

### Conclusions

Kawakawa has anti-inflammatory activity:

- Anti-inflammatory activity (a dose-dependent decrease in nitric oxide, TNF-α and IL-6 production) was only observed in the aqueous extract.
- Nitric oxide production (figure 1) was supressed at concentrations of 1000 µg/mL and 500 µg/mL.
- Inhibition of IL-6 production (figure 2) was maximal at extract concentrations of 1000 µg/mL and 500 µg/mL.
- The inhibition of TNF-α production (figure 3) was maximal at extract concentrations of 250 µg/mL and 125 µg/mL.

Many of the traditional uses of Kawakawa could be linked directly to inflammation (e.g. toothache, irritation, serious bruises)\(^9\). The anti-inflammatory actions of Kawakawa could mask the symptoms of ailments not directly associated with inflammation (e.g. viral infections). There been no previous research into the anti-inflammatory properties of Kawakawa, nor has any other research provided a scientific basis that supports the actions of Kawakawa in rongoā. The uses of Kawakawa in rongoā are supported by the anti-inflammatory activity observed.

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**Figure 1:** Nitric oxide produced in a variety of Kawakawa extracts: Reductions in the aqueous extract at the concentrations of 1000 µg/mL, and 500 µg/mL.

**Figure 2:** IL-6 production in cells exposed to the aqueous infusion extract: Reductions in the aqueous extract at the concentrations of 250 µg/mL and 125 µg/mL.

**Figure 3:** TNF-α production in cells exposed to the aqueous infusion extract: Reductions in the aqueous extract at the concentrations of 1000 µg/mL and 500 µg/mL.
Methodology

Extraction of the Kawakawa leaves

- DMW extract
- Aqueous infusion extract

Cell Viability assays
- MTT Cell Viability Assay
- Trypan Blue Assay
- Flow Cytometry

Anti-Inflammatory assays
- Nitric Oxide Assay
- TNF-α, IL-6 Assay

My Journey

Two different methods were used to extract the Kawakawa into a liquid form. The first was an aqueous infusion method (analogous to making a tea) and similar to methods used in rongoā. In the second, leaves were soaked in chloroform-methanol-water (1:2:1 volume to volume). The extract was tested for cytotoxicity in cell viability assays and then the non-toxic concentrations were used in the anti-inflammatory assays.

References & Acknowledgments

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**References:**

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For more information go to: Liggins Institute my Alumni profile address with poster, brochure & report links

Kawakawa Extracts Demonstrate Anti-Inflammatory Activity

Maori used Kawakawa in rongoa.

Māori used Kawakawa in rongoa.

No scientific evidence to support the uses of Kawakawa in rongoa.

Interested in supporting the use of Kawakawa in rongoa with science

Gained support & refined my ideas.

Did the scientific research.

Want science to be part of my future.

Chris Ryan, Howick College & John Taylor, University of Auckland;