Final Report
Summary

Pre-clinical study: Emu oil as a supplementary therapy to treat ulcerative colitis and prevent colitis-associated colorectal cancer

Dr Lauren Chartier
(Adelaide Medical School, University of Adelaide) PhD top-up scholarship
Summary

The Agri Futures Ratite Program supported a top-up scholarship for a PhD study investigating the medicinal properties of emu oil, for the supplementary treatment of ulcerative colitis and prevention of colitis-associated colorectal cancer.

The study, conducted in an experimental mouse model, revealed that emu oil could reduce clinical symptoms of ulcerative colitis and reduced the numbers of tumours that developed as a result of the disease. The findings have been published in peer-reviewed journals and provided the rigorous scientific evidence required to enable clinical trials, which will assess the potential therapeutic benefit of emu oil in ulcerative colitis patients.

Background

Ulcerative colitis is a chronic, inflammatory bowel disease that affects the inner lining of the large intestine. Symptoms include diarrhoea, abdominal pain, weight loss and fatigue. For those affected, numbering 33,000 in Australia alone, the condition can be debilitating and lead to life-threatening complications, including colorectal cancer.

Ulcerative colitis is most frequently first diagnosed in children and adolescents and current treatments, such as immunosuppressants and steroids, have varying degrees of efficacy and serious side effects. Further, the risk of colitis-associated colorectal cancer begins to increase within just a decade after diagnosis. New approaches that help reduce the severity of disease and help prevent the development of cancer are urgently needed.

Emu oil is extracted from the fat tissue of the native Australian Emu (Dromaius novaehollandiae) and has been used traditionally by Australia's Aboriginal people to reduce pain and help heal wounds.

Our research group previously showed that emu oil could reduce inflammation, reduce clinical severity and help repair the intestines of mouse models with gastrointestinal conditions caused by the use of medication. These include chemotherapy-induced mucositis and non-steroidal anti-inflammatory drug-induced enteropathy.

This research project aimed to build on the current data and test emu oil's potential medicinal benefits for ulcerative colitis.

Emu oil was orally administered to mice with severe ulcerative colitis and compared to mice who did not receive the treatment. Body weight, disease severity and tumour development was assessed throughout the trial, and a detailed analysis of the small and large intestines was conducted once the mice were euthanised.

The results showed that emu oil partially prevented bodyweight loss, diarrhoea and improved other clinical indicators of disease, including colonic inflammation and behaviour. Further, mice receiving emu oil presented with fewer colorectal tumours than untreated mice.

It was found that the efficacy of emu oil could be slightly improved with the addition of grape seed extract and Kampo. Emu oil in combination with grape seed extract reduced inflammation and the total number of colorectal tumours, and emu oil in combination with Kampo further reduced weight loss, inflammation and overall tumour development.

A further small-scale study, in collaboration with researchers at the University of Iceland, was conducted to investigate the effects of emu oil on human immune cells called dendritic cells in tissue culture.

Emu oil reduced the levels of certain inflammatory molecules (pro-inflammatory cytokines) that were secreted by the dendritic cells, which suggests that emu oil may be acting to prevent inflammation and induce intestinal repair by acting on these immune cells. The findings of this preliminary study will need to be confirmed in a larger sample size.

Objective

This project investigated the efficacy of emu oil, alone and in combination with grape seed extract and Kampo, a traditional Japanese herbal medicine, to improve clinical symptoms of ulcerative colitis and help prevent colitis-associated colorectal cancers, in a pre-clinical mouse model. While previous studies have revealed grape seed extract to have anti-inflammatory and anti-carcinogen properties, and Kampo has been prescribed to patients in Japan for thousands of years, there has so far been little pre-clinical data for their potential use in ulcerative colitis.

This PhD project was a crucial step for emu oil to be considered for clinical trials in ulcerative colitis patients.

Objectives

This project investigated the efficacy of emu oil, alone and in combination with grape seed extract and Kampo, a traditional Japanese herbal medicine, to improve clinical symptoms of ulcerative colitis and help prevent colitis-associated colorectal cancers, in a pre-clinical mouse model. While previous studies have revealed grape seed extract to have anti-inflammatory and anti-carcinogen properties, and Kampo has been prescribed to patients in Japan for thousands of years, there has so far been little pre-clinical data for their potential use in ulcerative colitis.

This PhD project was a crucial step for emu oil to be considered for clinical trials in ulcerative colitis patients.

Key findings

Emu oil was orally administered to mice with severe ulcerative colitis and compared to mice who did not receive the treatment. Body weight, disease severity and tumour development was assessed throughout the trial, and a detailed analysis of the small and large intestines was conducted once the mice were euthanised.

The results showed that emu oil partially prevented bodyweight loss, diarrhoea and improved other clinical indicators of disease, including colonic inflammation and behaviour. Further, mice receiving emu oil presented with fewer colorectal tumours than untreated mice.

It was found that the efficacy of emu oil could be slightly improved with the addition of grape seed extract and Kampo. Emu oil in combination with grape seed extract reduced inflammation and the total number of colorectal tumours, and emu oil in combination with Kampo further reduced weight loss, inflammation and overall tumour development.

A further small-scale study, in collaboration with researchers at the University of Iceland, was conducted to investigate the effects of emu oil on human immune cells called dendritic cells in tissue culture.

Emu oil reduced the levels of certain inflammatory molecules (pro-inflammatory cytokines) that were secreted by the dendritic cells, which suggests that emu oil may be acting to prevent inflammation and induce intestinal repair by acting on these immune cells. The findings of this preliminary study will need to be confirmed in a larger sample size.

Summary

Ulcerative colitis is a chronic, inflammatory bowel disease that affects the inner lining of the large intestine. Symptoms include diarrhoea, abdominal pain, weight loss and fatigue. For those affected, numbering 33,000 in Australia alone, the condition can be debilitating and lead to life-threatening complications, including colorectal cancer.

Ulcerative colitis is most frequently first diagnosed in children and adolescents and current treatments, such as immunosuppressants and steroids, have varying degrees of efficacy and serious side effects. Further, the risk of colitis-associated colorectal cancer begins to increase within just a decade after diagnosis. New approaches that help reduce the severity of disease and help prevent the development of cancer are urgently needed.

Emu oil is extracted from the fat tissue of the native Australian Emu (Dromaius novaehollandiae) and has been used traditionally by Australia’s Aboriginal people to reduce pain and help heal wounds.

Our research group previously showed that emu oil could reduce inflammation, reduce clinical severity and help repair the intestines of mouse models with gastrointestinal conditions caused by the use of medication. These include chemotherapy-induced mucositis and non-steroidal anti-inflammatory drug-induced enteropathy.

This research project aimed to build on the current data and test emu oil’s potential medicinal benefits for ulcerative colitis.

Emu oil was orally administered to mice with severe ulcerative colitis and compared to mice who did not receive the treatment. Body weight, disease severity and tumour development was assessed throughout the trial, and a detailed analysis of the small and large intestines was conducted once the mice were euthanised.

The results showed that emu oil partially prevented bodyweight loss, diarrhoea and improved other clinical indicators of disease, including colonic inflammation and behaviour. Further, mice receiving emu oil presented with fewer colorectal tumours than untreated mice.

It was found that the efficacy of emu oil could be slightly improved with the addition of grape seed extract and Kampo. Emu oil in combination with grape seed extract reduced inflammation and the total number of colorectal tumours, and emu oil in combination with Kampo further reduced weight loss, inflammation and overall tumour development.

A further small-scale study, in collaboration with researchers at the University of Iceland, was conducted to investigate the effects of emu oil on human immune cells called dendritic cells in tissue culture.

Emu oil reduced the levels of certain inflammatory molecules (pro-inflammatory cytokines) that were secreted by the dendritic cells, which suggests that emu oil may be acting to prevent inflammation and induce intestinal repair by acting on these immune cells. The findings of this preliminary study will need to be confirmed in a larger sample size.

Research impact

Over recent years, there has been increased evidence of the efficacy of emu oil for the treatment of gastrointestinal conditions. The findings of this research project have added to this growing field of knowledge and promote the use of emu oil as a potential supplementary treatment for ulcerative colitis.

The pre-clinical results obtained in this study are described in eight manuscripts, published or under review in peer-reviewed scientific journals. They have provided the evidence required for a subsequent clinical trial, for which funding approval has been received. This trial will investigate the effect of emu oil as a supplementary treatment for children and adolescents with ulcerative colitis.

A further research direction arising from this work will be to pinpoint and refine the active constituents within emu oil, which could be concentrated to potentially enhance clinical effects for patients. Together, these findings support the emu farming industry as the demand for medical grade emu oil will likely continue to increase.

Peer-reviewed publications arising from work
