Ewing Sarcoma

What is Ewing Sarcoma?

- Ewing Sarcoma (ES) is a cancer of the bone and soft tissue which surrounds the bone.\(^1\)
- ES is most commonly diagnosed in children and young adults.\(^1\)
- There are approximately 3 cases of ES per 1 million people worldwide.\(^1\)

Current treatment regime:\(^2\)

1. Patients first receive a combination of chemotherapy drugs

2. Patients then have surgery, to remove the tumour (or limb) and/or radiation therapy

3. Followed by further rounds of chemotherapy

Survival rates:\(^1\)

- Approximately 7 out of 10 patients diagnosed with localised ES survive more than 5 years
- The 5 year survival rate declines to approximately 2 in 10 patients in those diagnosed with ES which has spread to other areas

Oncolytic viruses

What is an oncolytic virus?

- An oncolytic or ‘cancer bursting’ virus directly kills cancer cells while leaving healthy cells unharmed.\(^3\)

- The ‘bursting’ of cancer cells also leads to activation of the patients immune system, which can then go on to kill cancer cells.\(^3\)

- Oncolytic viruses have shown promising results in other cancers, but are yet to be investigated for the treatment of ES.\(^4\)

Plan of work

1. Assess the direct killing effects of oncolytic viruses on ES cells.
   - Treat ES cells with a range of oncolytic viruses and assess the percentage of dead cells after treatment.

2. Assess the ability of oncolytic viruses to activate ‘killer’ immune cells, to kill ES cells.
   - Treat ‘killer’ immune cells with oncolytic viruses.
   - Determine if treatment with oncolytic virus leads to immune killing of ES cells.

Results

1. Oncolytic viruses directly kill ES cells

   - Figure 1: Percentage of dead ES cells following treatment with oncolytic virus 1 (A), 2 (B) and 3 (C) for 48 hours. Results normalised to untreated control, presented as mean \(\pm\) SEM (N=2).

2. Oncolytic virus treatment of ‘killer’ immune cells leads to ES cell killing

   - Figure 2: Fold change in percentage dead ES cells following co-culture with ‘killer’ immune cells pre treated with oncolytic virus 1 (A), 2 (B) and 3 (C). Results normalised to untreated control, presented as mean \(\pm\) SEM (N=2).

Conclusions

- The oncolytic viruses investigated kill ES cells via two mechanisms; direct killing and activation of ‘killer’ immune cells.
- Virus 2 presented as the most promising oncolytic virus to take forward, further work will be carried out using patient derived samples.
- The ultimate goal is for this research to be translated into the clinical setting, leading to new treatments for Ewing Sarcoma patients.

References: