Growing ‘Mini Hearts’: The bid to find a Hypertrophy Cure

What is the problem?

Hypertrophic Cardiomyopathy (HCM) is a pathological condition that causes the heart’s muscle wall (known as the myocardium) to thicken due to an increase in size of the muscle cells. As a result, the heart cannot function correctly, through a lack of contractibility, ultimately causing cardiac arrest, which is frequently fatal (see Figure 1). There is currently no pharmaceutical therapy for HCM, although current management techniques include drugs which reduce blood pressure.

What are we interested in?

Recent research has suggested the role of an enzyme called CDK9 as the cause of the abnormal increase in size (hypertrophy) of the heart muscle cells (known as cardiomyocytes) in HCM. We wanted to see if inhibiting CDK9 in an in vitro (in a vessel in the lab) model of the disease would reduce the heart muscle cells’ size, indicating that the enzyme is involved in the hypertrophic change. This might allow us to stop disease progression and evaluate the potential of the CDK9 inhibitor as a therapeutic treatment.

What did we find?

Our research showed that CYC202 prevented hypertrophy in our ‘mini hearts’ model of the disease as measured by ‘mini heart’ volume (see Figure 2). In some dosages of CYC202 we were able to reduce the volume of the ‘mini heart’ (see Figure 3).

What does this mean?

We have identified a compound that has stopped an in vitro model of HCM from progressing and provided evidence that CDK9 is involved in disease progression. We can use these findings as the basis for further investigating a possible therapy for the condition.

Who am I?

I am in my final year of the BSc (Hons) Biomedical Science programme at Abertay University. Dundee and am interested in pathology. Thanks to Medical Research Scotland I have been able to gain invaluable experience in pathological research which has helped me appreciate the research process. The results of this study were presented as a poster to the Industrial Biotechnology Congress 2015 in Birmingham, and won the best poster award, and published in Lewis K, Reynolds L, Kuzmanova E, Zhelev N. ‘Evaluation of the therapeutic potential of a CDK9-inhibiting compound in human hypertrophic cardiomyopathy using HESC-derived cardiomyocytes’. J Biotechnol Biomater 2015; Vol 5(2) p 64. I am now applying for a postgraduate research degree. I fully encourage others to consider a career in research as it enables you to realise advances within science as well as experience creative freedom and utilise techniques and knowledge you have accumulated over the years.

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