

Using VR tumor for cancer treat

Introduction

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My goal is to become a researcher who develops medicine for cancer treatment. IMAXT laboratory at Cancer Research UK Cambridge Institute has been trying to make a virtual reality tumor. This project is innovative in terms of creating VR tumor to the level of DNA. I met with a researcher of IMAXT laboratory to ask some questions.

Fundamentals

To fully understand cancer, scientists need to know everything about a tumor –the types, the number, and the location of cells. VR tumor shows them. By destroying cancer cells with laser, proteins are detected. When analyzing these proteins, we can characterize each cancer cell, and then can see how cells with different properties are distributed by using VR tumor. For example, “Immune cells are distributed in lower parts of the tumor.” “Cancer cells are concentrated in this part”

Methods

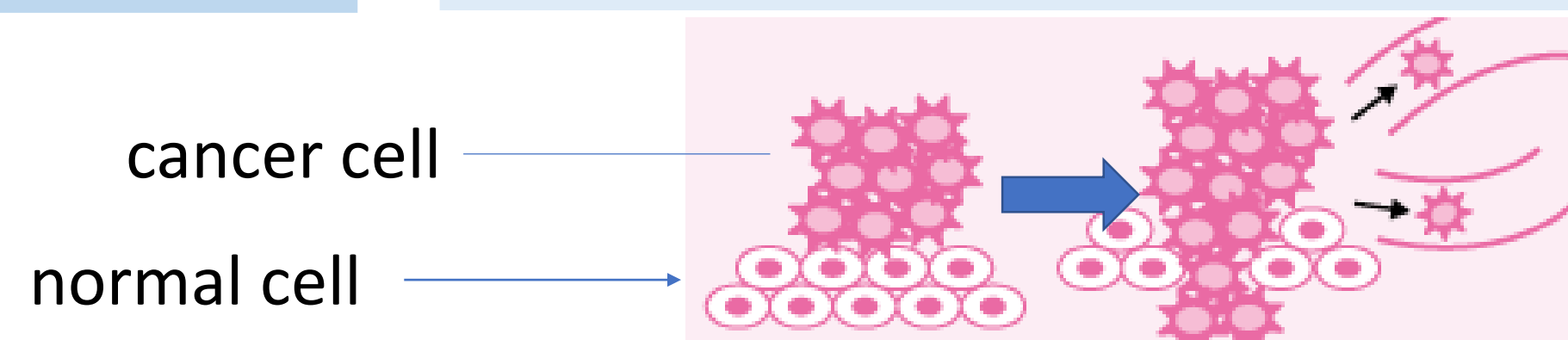
I interviewed Dr Dario Bressan at Cancer Research UK Cambridge Institute. My hypothesis: if we can use VR model to test the efficacy and safety of drugs, might be able to develop new medicine more easily?

My questions:

1.Can you use the VR model to test the efficacy of drugs?

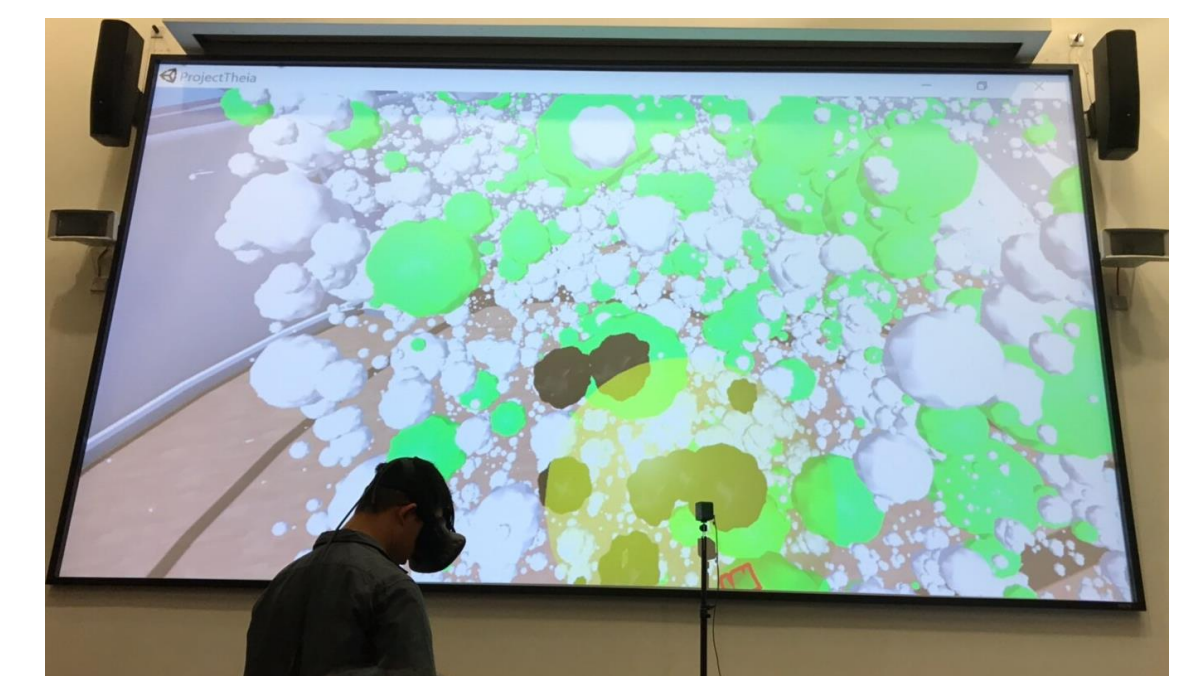
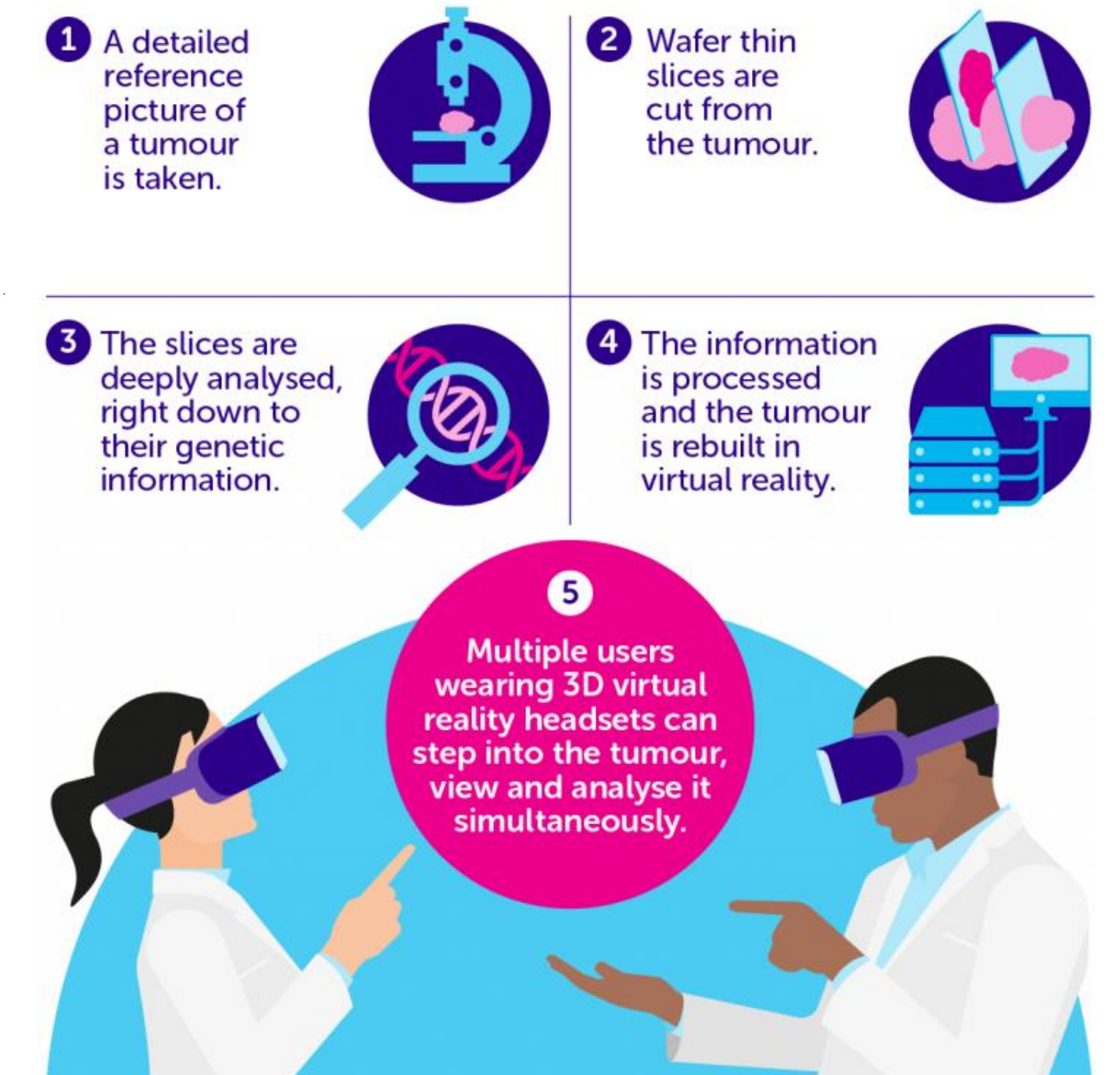
2.Can VR model verify the relationship(※) between cancer cells and other normal cells?

3.Can we increase drug safety by using VR tumor?



※Example of relationship between cancer cells and normal cells. When cancer cells are gathered and form cancer tumor, cancer cells become easy to move and cancer spread to other organ.

CREATING A VIRTUAL REALITY TUMOUR



What VR tumor looks like

Results

Answer:

1.VR model is just a method to analyze the tissue and visualize it. However, you can use this to know how each drugs acting. For instance, there are two or three different types of cell in the tumor, drug is affecting one ,but it is NOT affecting the other.

2.This idea is our goal. We can measure how normal cells and cancer call surrounding them look like. We don't see them interacting real time because this is the sample taken off from the patient.

3.Drugs that attack cancer cells often attacks normal cells, too. VR tumor allow us to narrow the target which should be attacked.

Discussion

It's difficult to use VR model for drug discovery, but we can learn many things such as effects of drugs on tumors. Also, Dr Dario said, “ If we figure out which proteins we should target new drugs to, we can collaborate with drug making companies to design drugs.” I think if we know the relationship between cancer cells and other normal cells, it will be useful to develop a method which cut off the nutritional source of cancer cells to stop cancer progression. Also, if we can target the cell which should be attacked, we can create effective and less side effects drugs . If these two aspects are combined, a new drug delivery system will be developed. Since the drugs are carried in the nano-capsule, that system allows drugs to act only on the disease site . Currently, it is impossible to see VR model varying over time. However, this will allow us to observe the process of cancer progression and cancer death. Also, there are problems of safety and applicability to use the data from VR model because it's just a sample and does not correspond to each patient. I hope that this technology will be improved to deal with these problems and used widely.

Conclusion

VR tumor can be applied to various research to develop new drugs since it allows us to get important information about cancer. To have a wide perspective about cancer research, I shouldn't excessively concentrate on drug discovery and I should visit another laboratory . This is improvement of my research.

Acknowledgement

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Meeting with Dr Dario



Cancer Research UK's Cambridge Institute, Copyright: Charles D N Thomson

References

- <https://www.cruk.cam.ac.uk/research-groups/imaxt-laboratory>
- <https://www.cpl.co.uk/sites/default/files/uploads/CRUKCI-homepage-image.jpg>
- https://ganjoho.jp/public/dia_tre/diagnosis/flow.html