

## Investigation on cancer and cancer therapy

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As we formed our project in the inspiration of cancer therapy, we felt that further investigation on cancer and cancer therapy will help us improve our project. We developed our investigation in three stages.

In the first stage, we collected some data on the Internet and conducted a survey about public cognition on cancer and cancer therapy.

In the second stage, we visited some hospitals and deepened our investigation by doing survey focusing on real clinical application of cancer therapies and interviewed Doctor Xianming Li in Shenzhen Renmin hospital in addition.

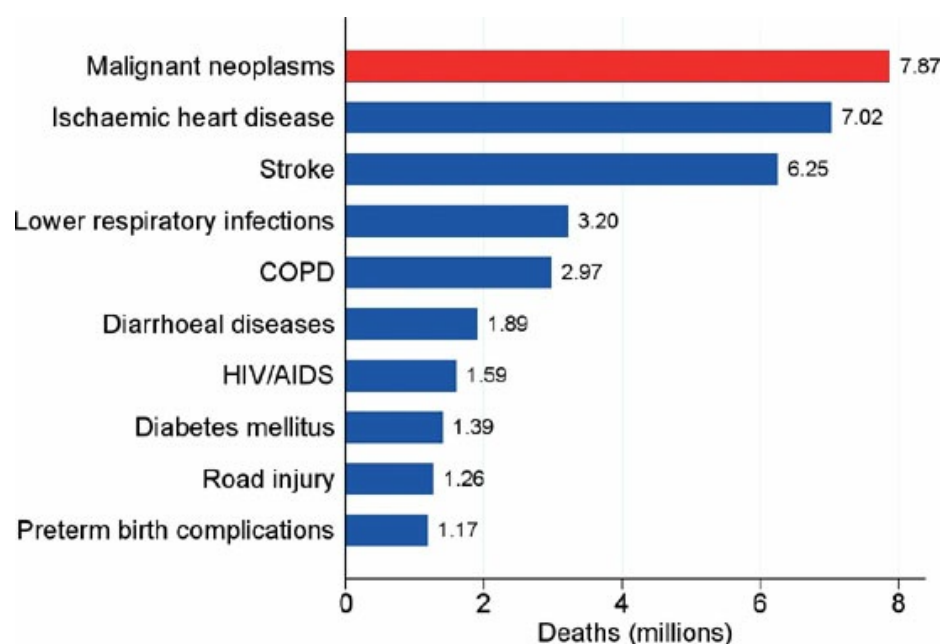
In the third stage, we improved our detailed application blueprints according to the results of hospital survey and the aim of solving the existing problems in applying ADCs.

Additionally, we documented several articles on our We-chat Public Platform, aiming at popularizing the knowledge we gained about cancer and cancer therapy.

### **About cancer**

#### *-----Stage 1*

Cancer has been one of the most formidable enemies human faces. 8 million deaths were related to cancer in 2012 worldwide, together with approximately 14 million new cases diagnosed. <sup>i</sup>Although China isn't the most affected country by cancer, according to the world incidence rates, its large population and developing public medical services still lead to considerable mortality. In China, cancer accounted for 23.92% of overall deaths in 2010.<sup>ii</sup> And the incidence rate is still growing.



*Fig.1 The 10 leading causes of death worldwide in 2011. COPD, chronic obstructive pulmonary disease.*

Generations of scientists devoted their efforts to fighting with cancer. However, besides continuously developing treatment technology, people's well cognition on the disease is also required for fighting against the disease.

To observe public cognition on cancer and cancer therapy, We documented our survey on our Wechat Public Platform, an online public platform, and received feedback of an amount of over 600 . The results analyzed are printed below.

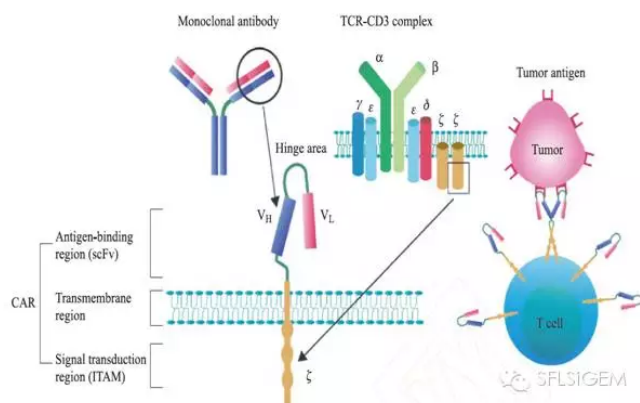
### 【有奖调查】癌症，知乎？（一）

2015-08-01 MooliWu SFLSiGEM

首先郑重的说声：多谢你戳开了这份调查！

我们是深圳外国语学校2015年iGEM团队~如果了解更多关于我们或者iGEM竞赛的内容，请戳右上角蓝字关注~

偷偷透露一下，今年深外的参赛项目，涉及到一个高大上的概念：癌症！（具体内容如图）



今后我们将会推送一系列小调查，主题是围绕我们今年的项目和iGEM竞赛~希望各位能不吝流量帅气地点开！

一段时间后我们将会随机从参与调查的人中抽取一部分并附赠神秘奖励！届时获奖

1.关于癌症，你了解多少？（单选）

这东西对我太简单了（非常了解）

曾经自己了解过至少一类癌症（比较了解）

我能说出七八种癌症的名字（不太了解）

癌症得了是会死人的吧...(不了解)

2.你的亲人和朋友之中，有多少人曾有过恶性肿瘤病史？（单选）

5人以上

3-5人

1-2人

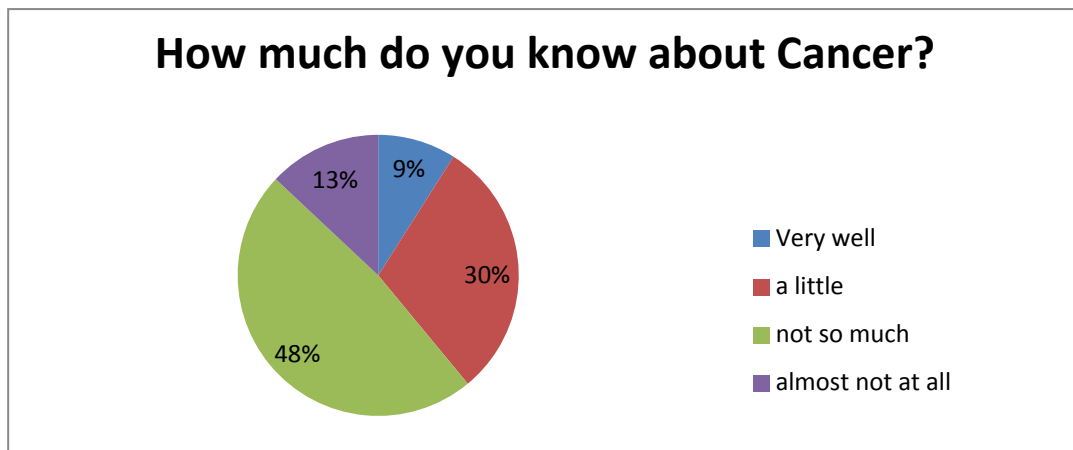
全家人身体都很棒！（0人）

3.以下哪些癌症治疗手段你曾经听说过？（多选）

外科手术治疗（切除病灶等）

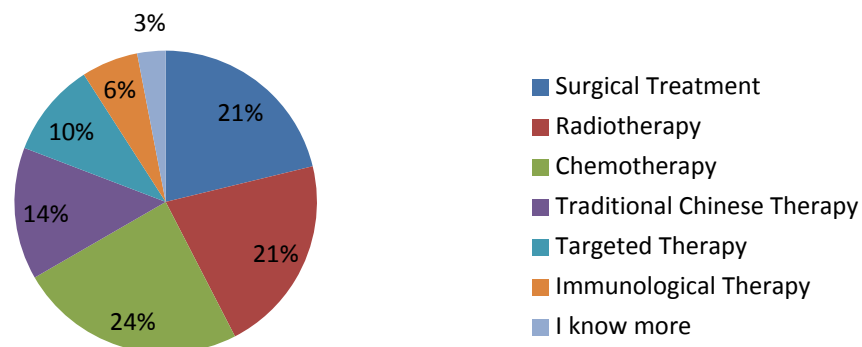
放疗（放射疗法）

*Fig. 2 & Fig.3 our survey conducted among public via: We-chat Public Platform*



*Fig. 4 The feedback of public cognition on cancer*

## What kind of cancer therapy do you know well about?



*Fig.5 The feedback of public cognition on cancer therapy*

As the results shown, when asked about cancer, most people remain knowing “not so much” or “almost nothing at all”. And only 19% of the people surveyed know about technologies beside the three main treatment methods (Chemotherapy, Radiotherapy, Surgical Treatment), such as targeted therapy and immunological therapy which may perform more promisingly in future application.

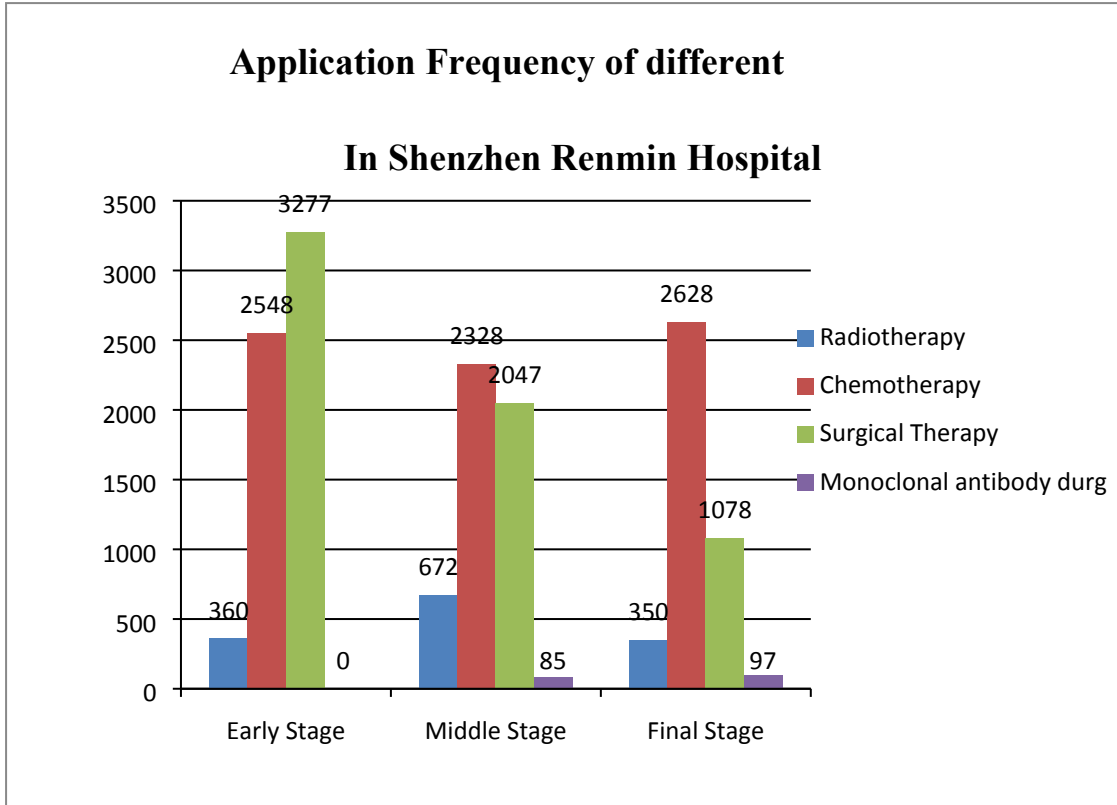
*P.S. Therefore, we developed [Stage 3](#), introducing the frontier technologies in cancer treatment field to popularize knowledge of cancer and cancer to the public.*

### **Clinical Application of immunological cancer therapies**

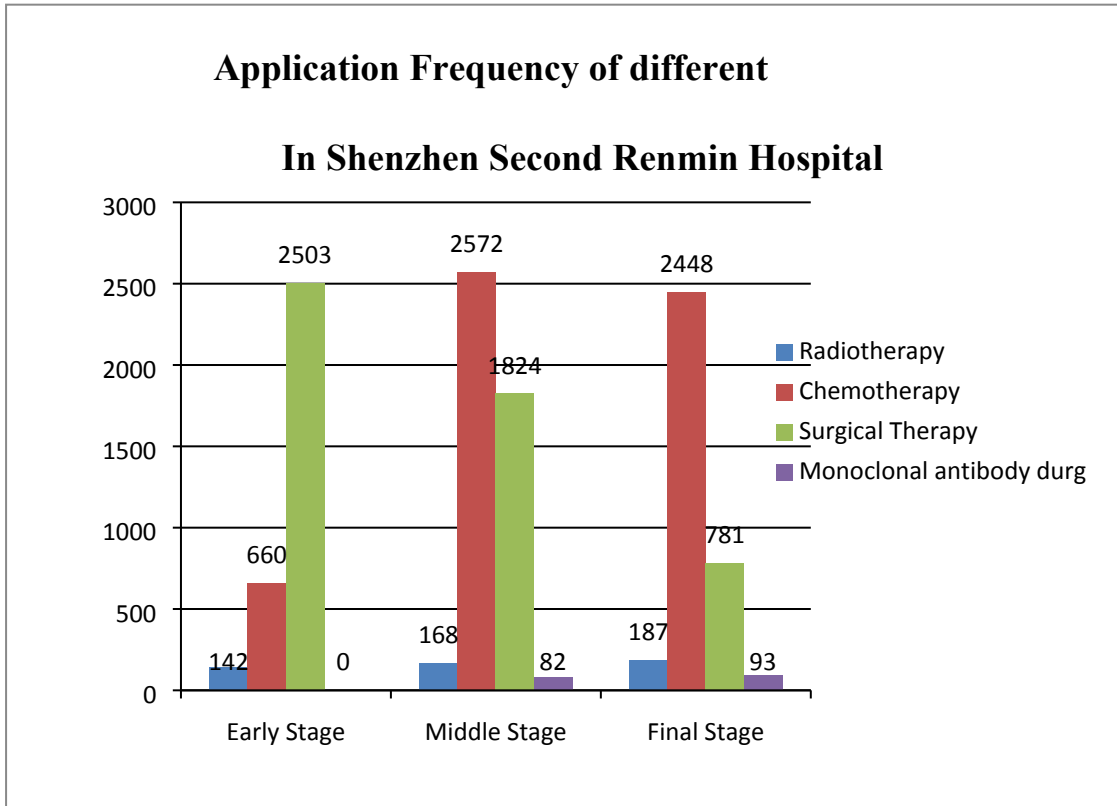
#### *-----Stage 2*

Aiming at looking into the application landscape of cancer therapies, especially the immunological therapies which is related closely to our project, we conduct a survey in two hospitals.

By conducting the survey, we collected information about the application frequency of different therapies in treating patients in different stages.



*Fig.6 Application Frequency of different therapies in different stages in 2014 In Shenzhen Renmin Hospital*



*Fig.7 Application Frequency of different therapies in different stages in 2014 In Shenzhen Second Renmin Hospital*

As shown in Fig.4 and Fig.5, Surgical treatment and Chemotherapy are most frequently used methods in cancer therapy. The former is applied in early stage primarily and the latter is primarily applied in Middle Stage and Final Stage, while immunological treatment methods, which we take Monoclonal Antibody Drug as an example of, are mostly used as helpers to the two therapies mentioned above.

We interviewed Doctor Xianming Li who is the Chief of Tumor Radiotherapy Department in Shenzhen Renmin Hospital. Together, we discussed about the major factors which decide the current status of the application of immunological therapies and the view on cancer therapy development.

Doctor Li suggested that the immunological therapies currently developed perform well in accuracy. But most of them kill tumor cells less directly compared with surgical treatment and sometimes less aggressive compared with chemotherapy. As a result, immunological methods are mostly used before or after surgical treatments or chemotherapy to enhance the effect.

Talking about ADCs, he also shared with us the experience of applying ADCs like drugs to treating a kind of as clinical trails. The treatment turned out to be a failure however due to the uncontrolled high toxicity of the drugs conjugated. Accordingly, Doctor Li pointed out that how to control the toxicity of drugs during drug delivering process and how to reduce undesirable immune system responses are the two cure problems remained to be solved.

When asked about his view on the future prospects of biological cancer therapy, Doctor Li used "absolutely promising" to express his opinion and he also gave suggestions on us choosing effector molecule in our project.



*Fig.8 Doctor Xianming Li--- the Chief of Tumor Radiotherapy Department in Shenzhen Renmin Hospital*



Fig.9 Shenzhen Renmin Hospital

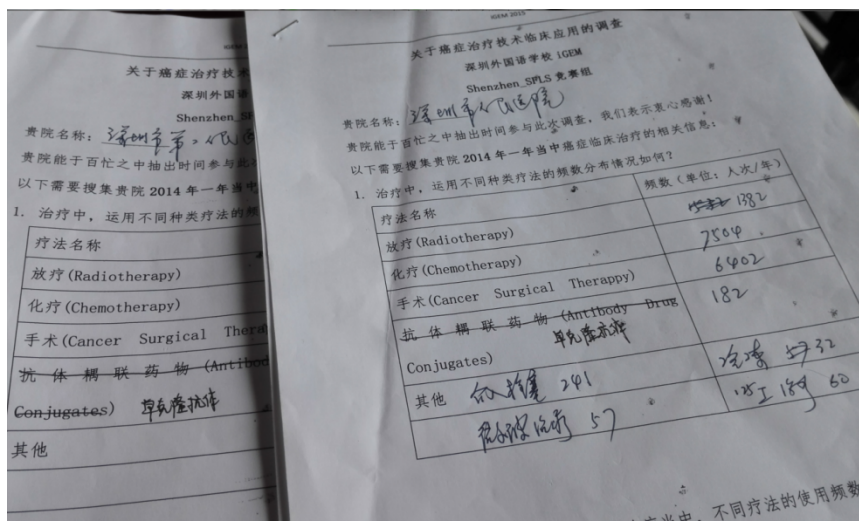


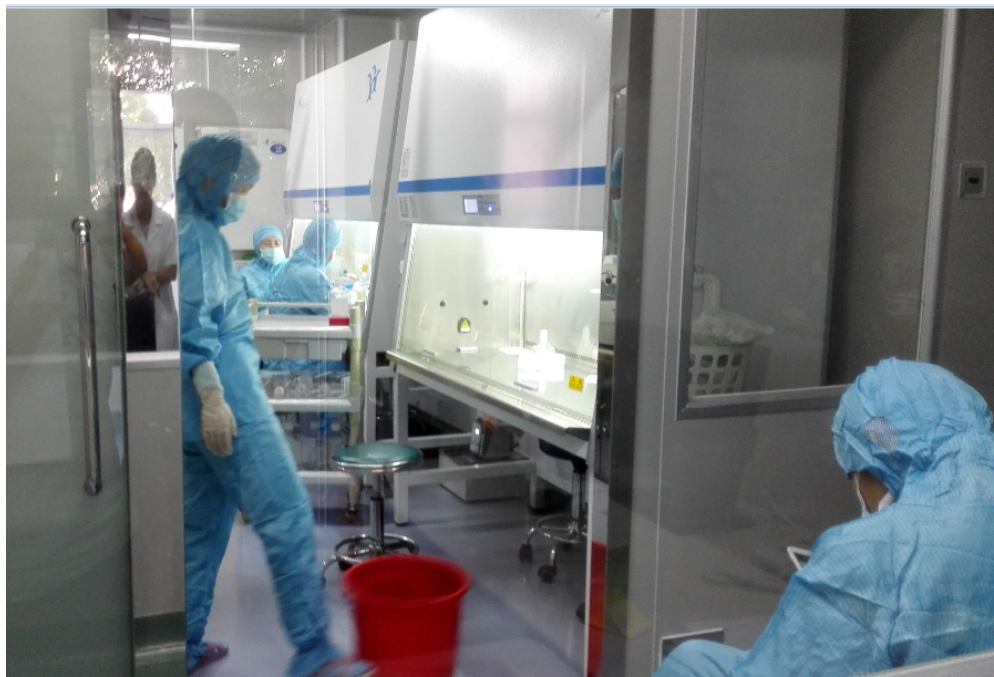
Fig.10 Our Survey designed for Hospitals and the results we received

We finally ended up our investigation in hospitals in visiting the Biological treatment Building in Renmin Hospital which is devoting force in demonstrating the applying possibility of some newly invented cellular immunological therapy.





*Fig.11 In front of the Biotherapy Room in Shenzhen Renmin Hospital*



*Fig. 12 Researchers in Biotherapy Room doing cell culture*

### **Further Improvement Blueprints**

#### *-----Stage 3*

The investigation gave us food of thoughts about our project design and project application. Basing on the results, we improved our application blueprints to solve problems we investigated well. The improvements can be viewed at [Application](#).



### **Popularization in public**

With the gains of knowledge and practical experience in our investigation, we feel like having the responsibility to share all we learned with the public. Therefore, we documented few articles about cancer and cancer therapy to help people learn more about the disease and how to defend it. The articles can be viewed after following our We-chat Public Platform.

“Better the devil you know than the devil you don’t. “We genuinely hope that with our efforts, more people can be willing to face the disease, thus to fight against it together.

*Especially acknowledge to Shenzhen Renmin Hospital and Shenzhen Second Renmin Hospital for offering data in application survey.*

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<sup>i</sup>Edited by B. Stewart and C. Wild, WHO, World Cancer Report, 2014

<sup>ii</sup> 中国居民营养与慢性病报告，2015