

What does the next 100 years hold? The perspective of a patient with T1DM

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Br J Diabetes 2022;**22**(Supp1):S99

Key words: Future, speculation, imagination, making research real is hard

Introduction

Though we have come a long way in the treatment of type 1 diabetes (T1DM) since 1922, in many senses we have not come far at all. In 1922, we had the very first insulin, and now we are on the verge of wider access to automated insulin delivery systems that can detect glucose levels and adjust insulin delivery, and automated therapies in combination. However, we have not come far enough.

A multitude of insulins are available now but there remains a significant problem since many people are unable to access them. This may be because the insulins are not available in the country in which they live, but perhaps even more so because of their cost. I would hope that the next 100 years brings much greater and easier access to treatments for T1DM.

Other than improved access to life-saving treatments, what else might we expect over the next 100 years? I'm going to look at the near term, mid-term and long term, and discuss what we might see.

The near term – making life easier

The near term is all about the technologies available now and the delivery of today's research projects into the hands of end users. It's also about improvements to interoperability in technology, instead of the "walled gardens" that we users currently face. We will see the continued development of fast-acting, and maybe targeted, insulins plus adjunct therapies that making living with T1DM easier. Automated insulin delivery systems and algorithms will continue to be developed and made available to aid end-user decision-making and reduce the amount of effort required to live with T1DM. I'm not sure how long this period will last, but I imagine that it will be about 10 to 20 years.

The medium term – making life much easier

The key to managing T1DM does not lie in technology, however. It would be far more efficient to use biological means to manage the condition. I believe that this is the direction of travel for treatments in the medium term.

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<https://doi.org/10.15277/bjd.2022.380>

Biotechnologies that are currently in development include provision of a gluco-responsive insulin (Smart insulin by another name) that can be injected once per month, or embedded capsules containing insulin-producing cells that are protected against the immune system. We can expect to see more of biotechnologies such as these in the medium term. We may also see broader rollout of vaccinations that extend the period before which susceptible individuals develop T1DM, and perhaps more ways of stopping the body attacking the beta cells. None of this, however, is a cure.

The longer term – "curing" type 1 diabetes?

Here, we are really gazing into the future. But let's speculate.

Extrapolating from the use of vaccines to prevent the immune system attacking the beta cells, might be possible to look at replacing or regrowing beta cells? Maybe techniques like Crispr gene editing, gene therapy and stem cell therapy could be brought into play to rebuild the missing hormone production typical of T1DM.

A cure would not be limited to stopping the autoimmune attack and replacing lost functions. It would also potentially require reversing damage done over the lifetime of someone with T1DM. It is not clear whether restoring beta cell function would enable this.

Ultimately, only stopping type 1 and repairing the damage done could be called a cure.

Final thoughts

If we have learned one thing from the journey of the past 100 years, it is that everything takes longer than we expect to arrive. Research progresses slowly and advances are hard to achieve.

Treatments come and go, but they are only of value if those who need them are able to access them and know how to use them. Those are the critical aspects of technological solutions to biological problems.



Key messages

Ultimately, a cure is:

- Hard, when we don't yet know the cause
- Not just replacing beta cells
- Not just prevention
- More than 10 years away...

Conflict of interest None.

Funding None.