Made in Japan,

the hidden champion that

became a world standard.

Something out of the public eye but known by almost everyone working in the dental industry—the GC <Fuji II LC>, one of the most popular glass ionomer cements made in Japan.
The developers had trouble at times, but they never gave up as they experienced major hurdles whilst developing the product.

The following story is based on true events; however, the characters and setting are partly fictional.

What is a job often done by dentists

Filling or treating the tooth with a cavity.

The first oral problem that comes to mind is dental cavities (dental caries). They are caused by bacteria in the mouth that consume sugar and produce acid that dissolves teeth, and sometimes dental decay cannot be kept from progressing unless treated. A tooth with a cavity is drilled and pending the size either filled or covered with a crown.

Inlay

Crown

Dental cement is often used to treat cavities.

Main applications of dental cement

Filling material

To fill and restore the loss of hard dental tissues (enamel, dentine).

Glass ionomer is a popular dental cement.

The oldest still available dental cement is based on zinc phosphate and introduced in 1878. Glass in the 1970s after years of effort to develop materials that were easier for dentists to use and more

What makes glass ionomer cements great!

They adhere firmly to the teeth!

Glass ionomer cements are very intelligent materials that react with calcium in the tooth to chemically adhere to the tooth structure. Which means they reliably stay attached even for a long period of use.

Safe for the human body!

When a foreign substance enters the human body, the body tries to get rid of it. The materials used in dental treatments are also foreign for the body. Glass ionomer cements are less irritating to the pulp and are biocompatible, so these cements are nicely accepted.

or often dentists have to restore a cavity.

Dental cement is a very versatile material that can be used to restore cavities, to cement crowns or as sealants to protect children's teeth from caries. The oral environment is very challenging for dental materials. Saliva keeps the mouth moist and the temperature 37℃. In addition, teeth experience repetitive loads during mastication. Because dental cement must continue to function for a long time in such an environment, it needs to be very reliable.

Luting/bonding material

To place and secure laboratory made restorations (inlays, crowns) on the teeth.

Lining material (base)

To form a dentine substitute after the decayed dentine is removed.

Sealant

To prevent caries by sealing any fine fissures in the back teeth with a thin cement coating.

ionomer cements were developed reliable and safer for patients.

Even coat the teeth with fluoride?

Glass ionomer cements gradually release fluoride ions during the setting reaction. The cements have also the potential to take up fluoride. Interestingly, they serve consequently as a fluoride supply tank, similar to a battery, in the mouth.

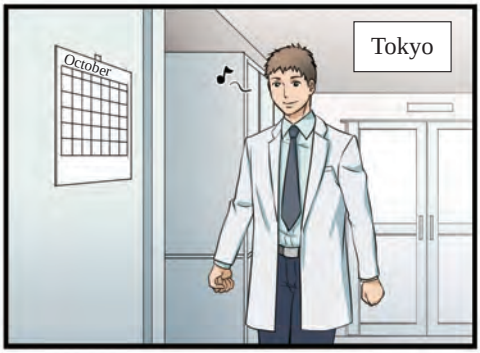
►►►

However, there is also a disadvantage …

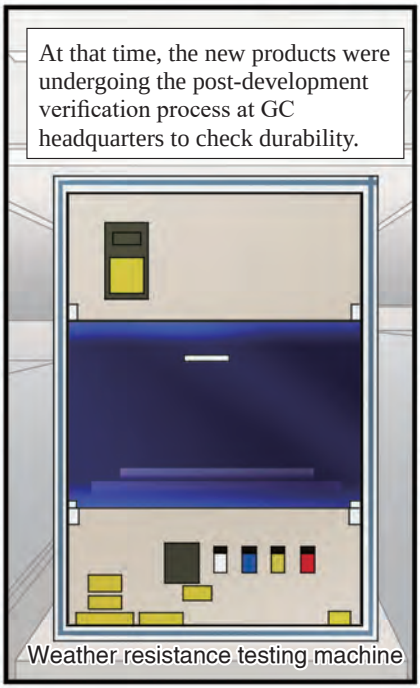
If original glass ionomer cements come in contact with the saliva or other liquids during the chemical reaction, they will not fully harden. Consequently, the mouth has to be kept dry for 15–20 minutes for a glass ionomer cement to set. This was very uncomfortable for patients.

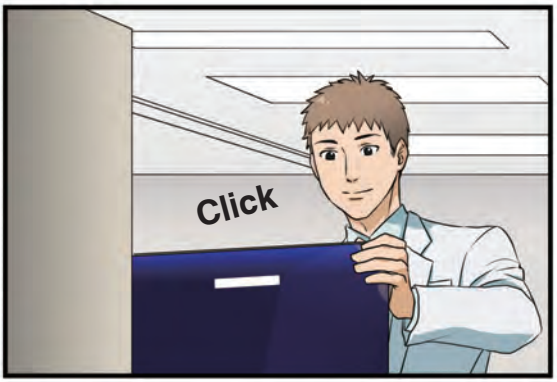
Beginning on the next page is the little-known story of a Japanese company's efforts to develop a product that had no such drawback.

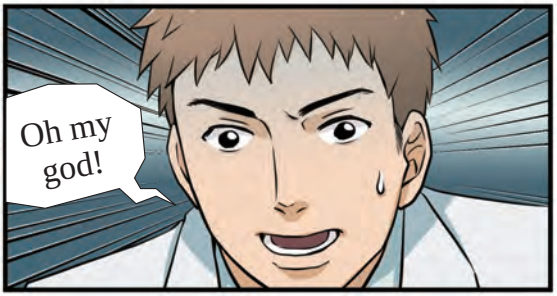

In October 1991
A containership carrying new GC products was heading toward Europe.

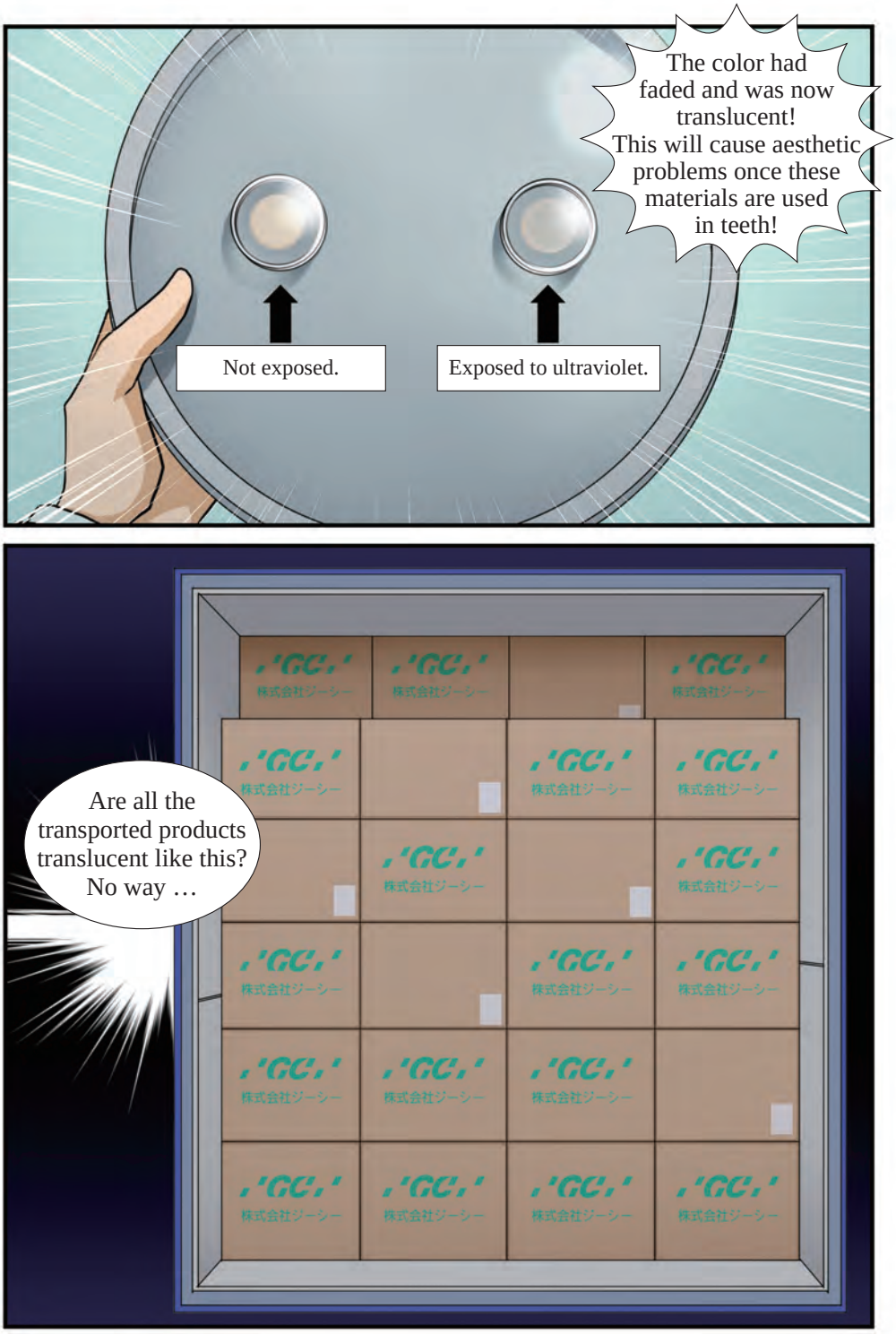

October
Tokyo


27
28
29
Ship arrives in Europe
I wonder where the ship is traveling right now….


At that time, the new products were undergoing the post-development verification process at GC headquarters to check durability.
Weather resistance testing machine

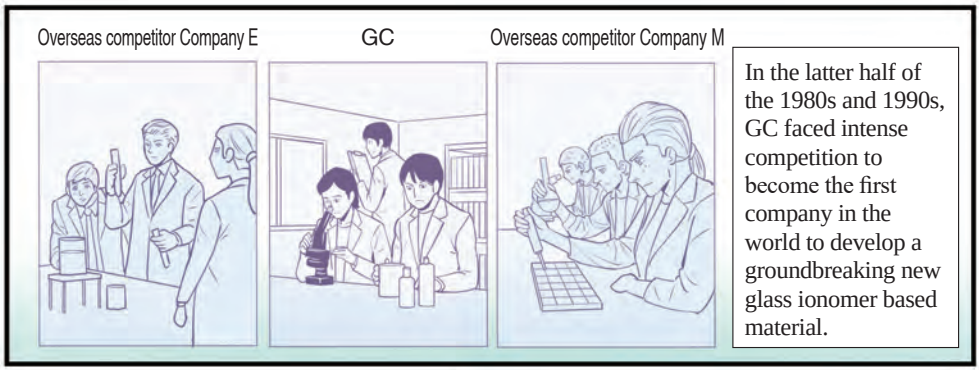

Click


Oh my god!

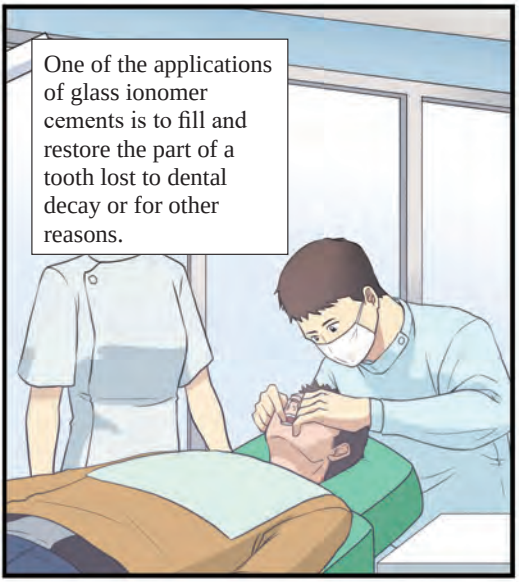

The color had faded and was now translucent! This will cause aesthetic problems once these materials are used in teeth!
Not exposed.
Exposed to ultraviolet.
Are all the transported products translucent like this? No way …

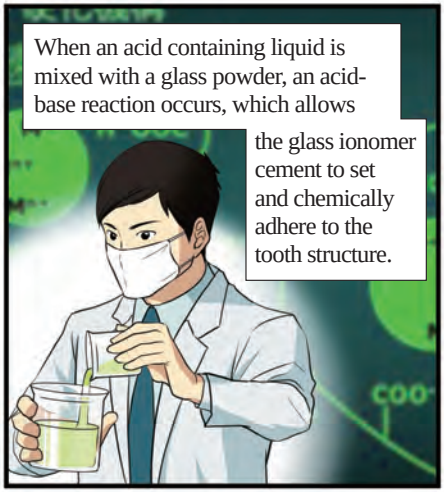

In 1876.
Do you know Elisha Gray?
It would not surprise me if you don't.
11:00
Alexander Graham Bell invented the telephone.
He applied for a patent around 11 a.m. on February 14, 1876.
Two hours later on the same day
Another man also filed a patent application for a telephone.
13:00
The man was Elisha Gray.
Being too late, the telephone patent was granted to Bell, and Gray lost his rights to the invention by a slim margin.
Despite the invention being one of the greatest of the century, Gray's achievement was lost to history.

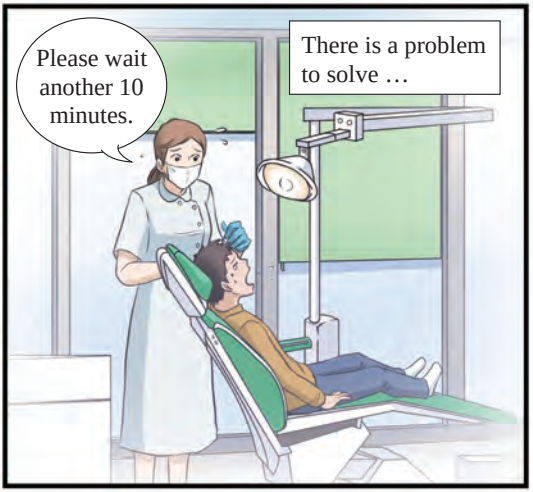

In 1986.
… Being in second place is not enough.
Monology
What? Were you in your own world? But you had a point.
There comes a time when we must be the best and take first place. That also applies to product development.


Overseas competitor Company E
GC
Overseas competitor Company M
In the latter half of the 1980s and 1990s, GC faced intense competition to become the first company in the world to develop a groundbreaking new glass ionomer based material.


The main products exported by GC were glass ionomer cements under the Fuji Ionomer brandname.


One of the applications of glass ionomer cements is to fill and restore the part of a tooth lost to dental decay or for other reasons.


When an acid containing liquid is mixed with a glass powder, an acid-base reaction occurs, which allows
the glass ionomer cement to set and chemically adhere to the tooth structure.


Please wait another 10 minutes.
There is a problem to solve …


I don't like to wait so long with my mouth open.
Can't we do something about how long it takes for the glass ionomer cement to set?
The dentist can do nothing but waiting.
Let's develop a product that is easier to use for treatment and more comfortable for patients.
Theme
Reduction of setting time
Please report the results of the experiments to reduce setting times.
Yes.
8'45"
8'30"
7'30"
7'15"
Only with such small time gains, we can't say it's more comfortable for patients and better for the dentist.


If the mouth remains open, the patient gets tired, and it's hard to endure because the mouth gets dry. What can we do about that?
Why don't we strengthen the muscles around the jaw?
Hahaha
Like this …
Aw …?
We must dramatically change the formulation or the materials.…
How about curing on demand, without having to wait anymore?

… It's worth a try.

At that time, significant advances were made in dental resins.

They are white resin-based restorative materials. The soft clay-like paste hardens quickly when exposed to light from coming from a special device.

Oh, already? That was fast.

Okay it's done.

Dentists in those days recognized the usefulness of light-cured resins, making these materials very popular.

Visible light curing units were introduced to each clinic, and we began to receive requests for light-cured glass ionomer cements from clinicians!

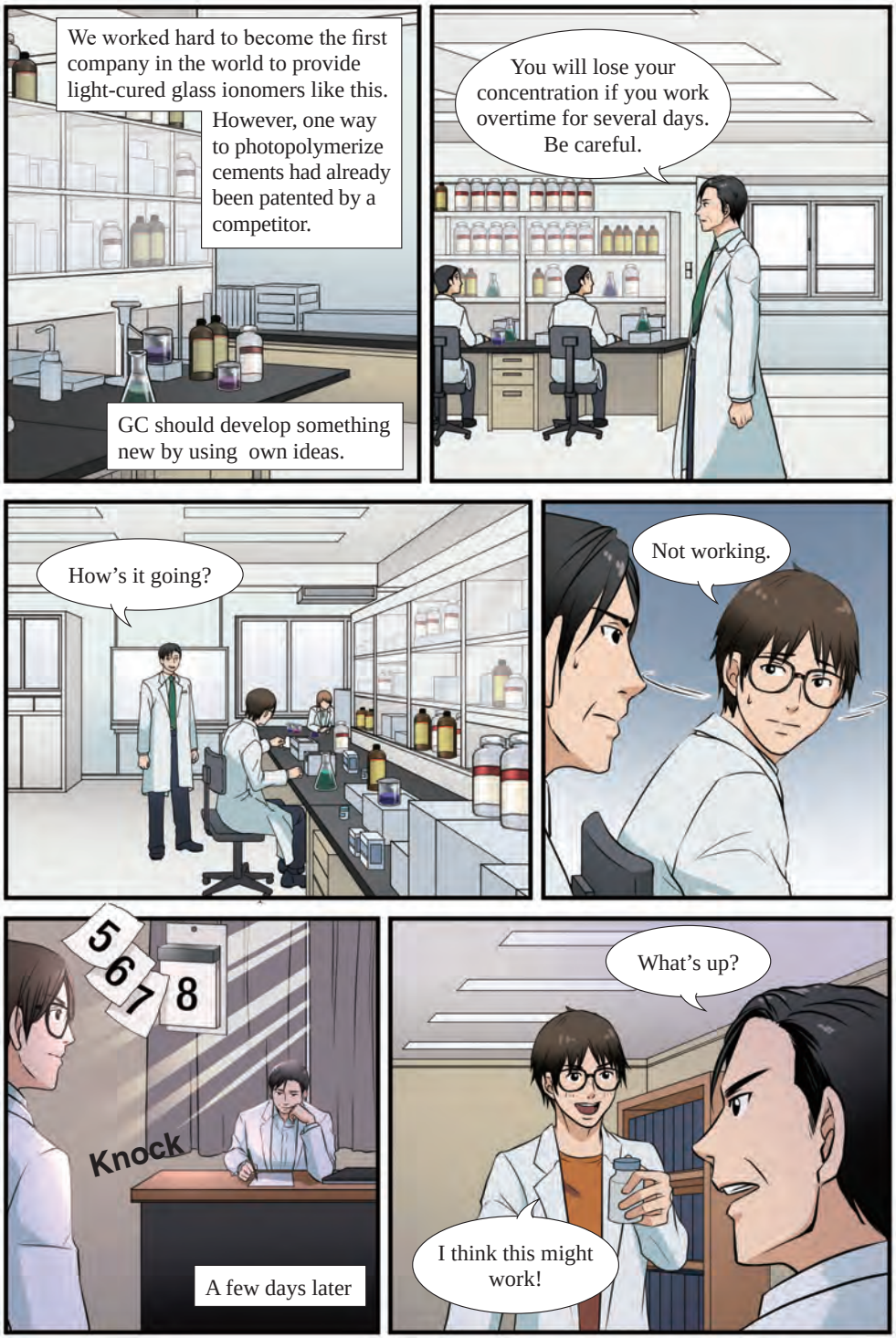
Mr.Yoshinosuke Enjo

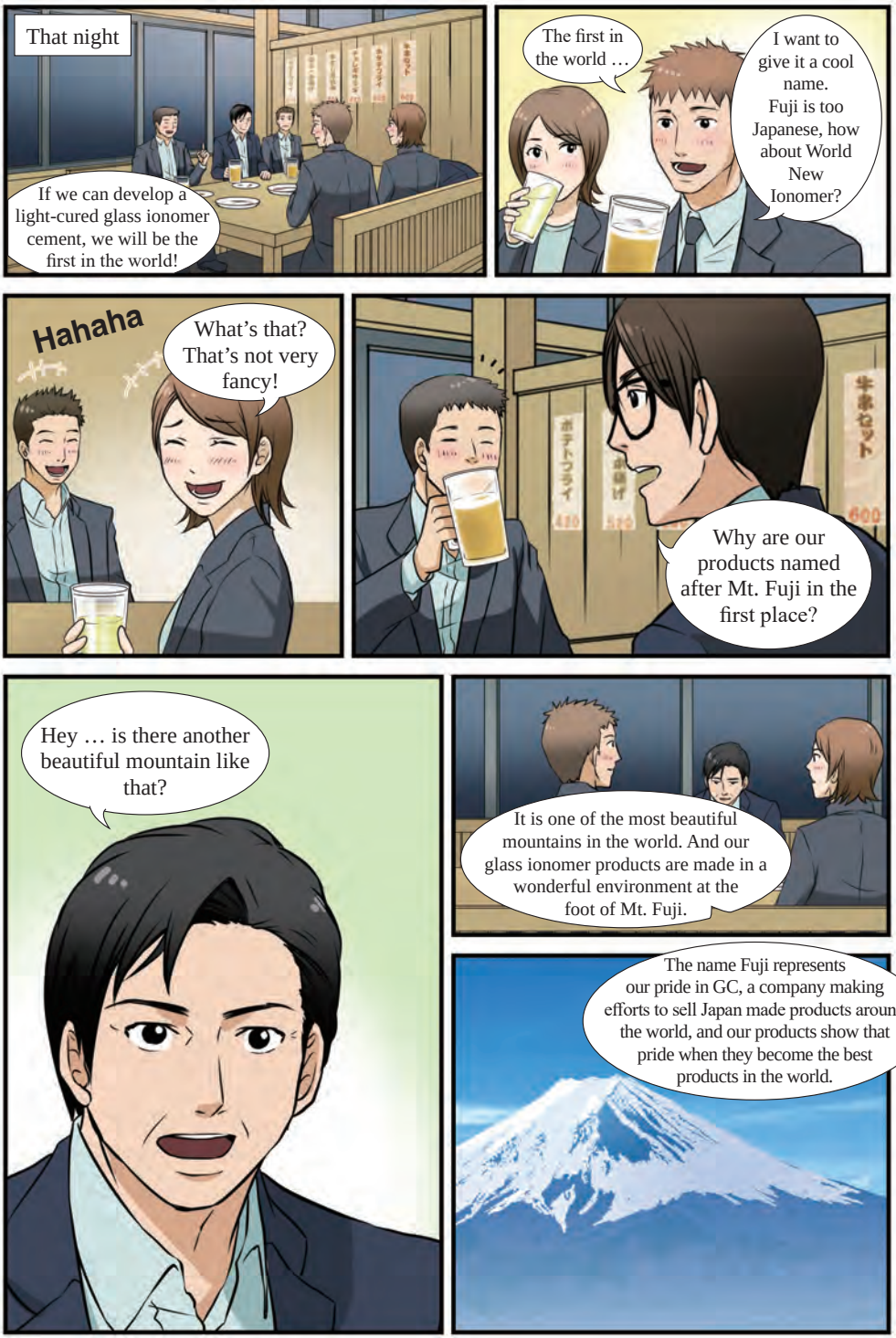
Mr.Tokuemon Mizuno

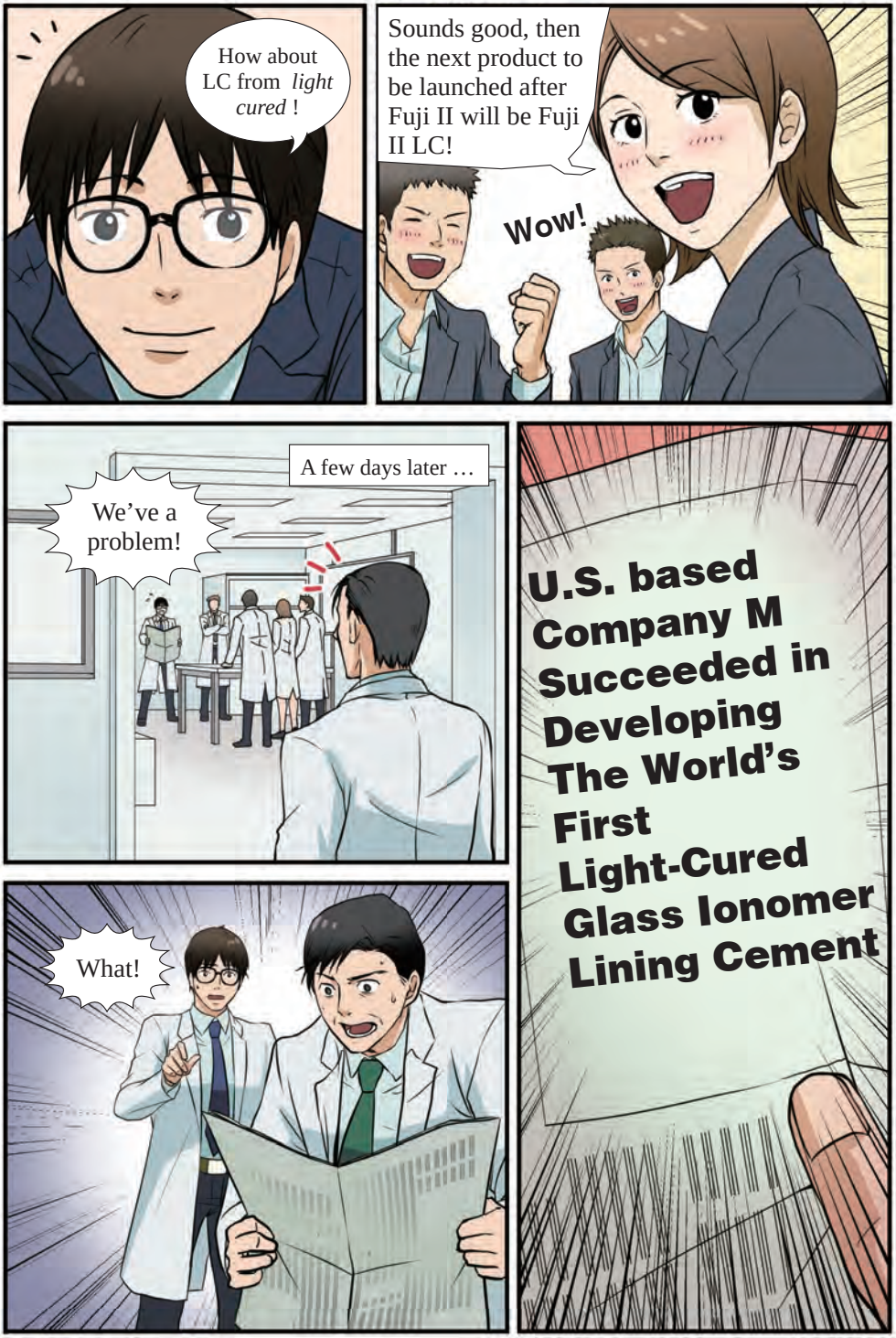
Mr.Kiyoshi Nakao

The three founders of GC Corporation

The world's first light-cured cements … Our company started with cements. Let's do this.


We worked hard to become the first company in the world to provide light-cured glass ionomers like this.
However, one way to photopolymerize cements had already been patented by a competitor.
GC should develop something new by using own ideas.
You will lose your concentration if you work overtime for several days. Be careful.
How's it going?
Not working.
5
6
7
8
Knock
A few days later
What's up?
I think this might work!

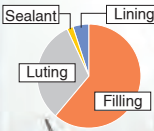

That night
If we can develop a light-cured glass ionomer cement, we will be the first in the world!
The first in the world …
I want to give it a cool name. Fuji is too Japanese, how about World New Ionomer?
Hahaha
What's that? That's not very fancy!
Why are our products named after Mt. Fuji in the first place?
Hey … is there another beautiful mountain like that?
It is one of the most beautiful mountains in the world. And our glass ionomer products are made in a wonderful environment at the foot of Mt. Fuji.
The name Fuji represents our pride in GC, a company making efforts to sell Japan made products around the world, and our products show that pride when they become the best products in the world.


How about LC from *light cured* !
Sounds good, then the next product to be launched after Fuji II will be Fuji II LC!
Wow!
A few days later …
We've a problem!
U.S. based Company M Succeeded in Developing The World's First Light-Cured Glass Ionomer Lining Cement
What!

Let us explain.
There are four main applications of glass ionomer cements.

I : Luting material to lute crowns and inlays
II : Filling material to fill cavities
III : Sealant to prevent decay by sealing the pits and fissures of teeth, including primary teeth
IV : Filling material to protect the pulp from irritation when treating cavities

Breakdown of glass ionomer cement sales by application



Falling behind, GC launched Fuji Lining LC, a glass ionomer cement for lining after M Company.

We will strive to be the first in the world launching a Light cured glass ionomer for restorations because the number of application is by far the largest. We must accelerate our development!

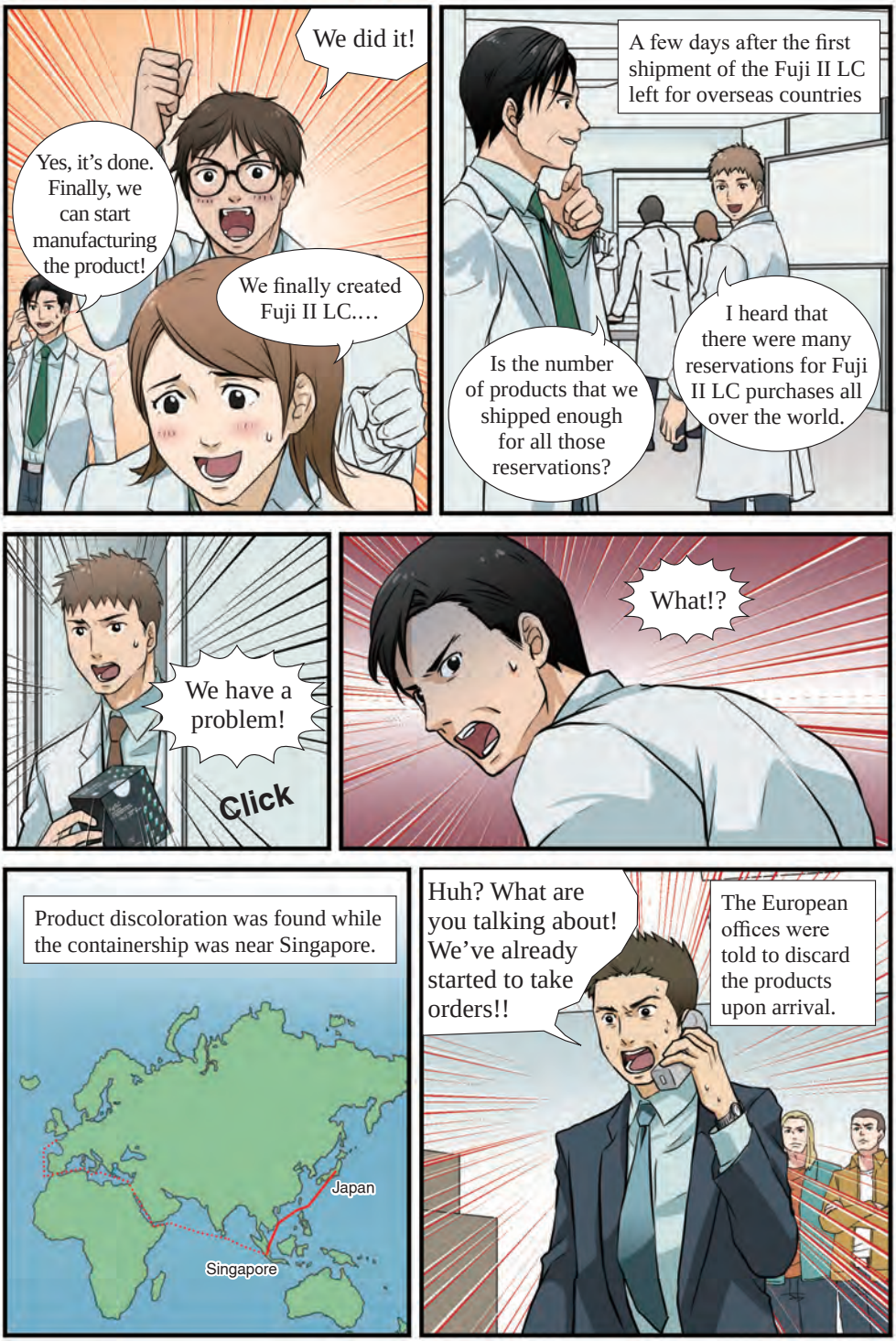
Filling

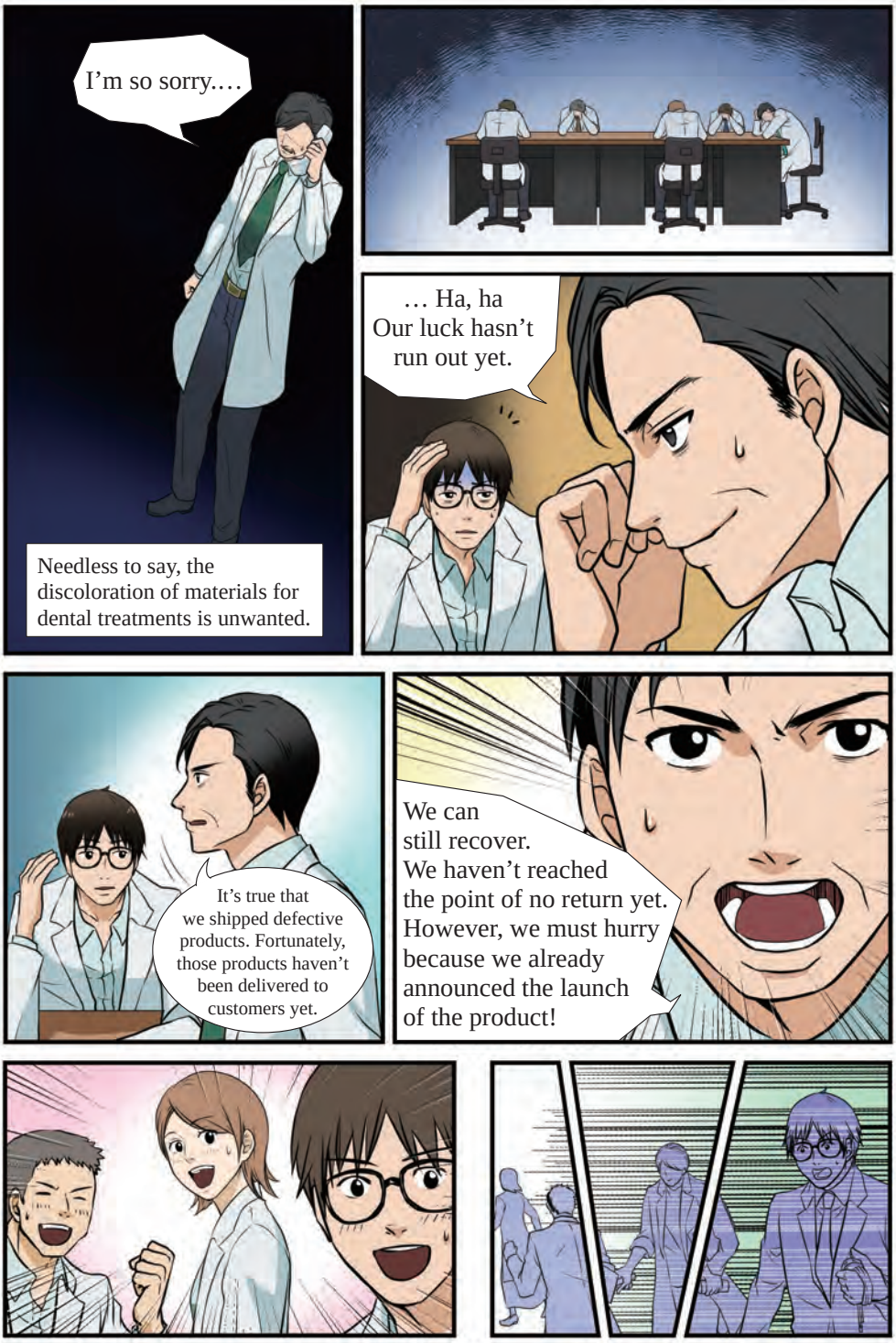
Our competitors are working too to develop products! Guys! I know it's hard, but hang in there!

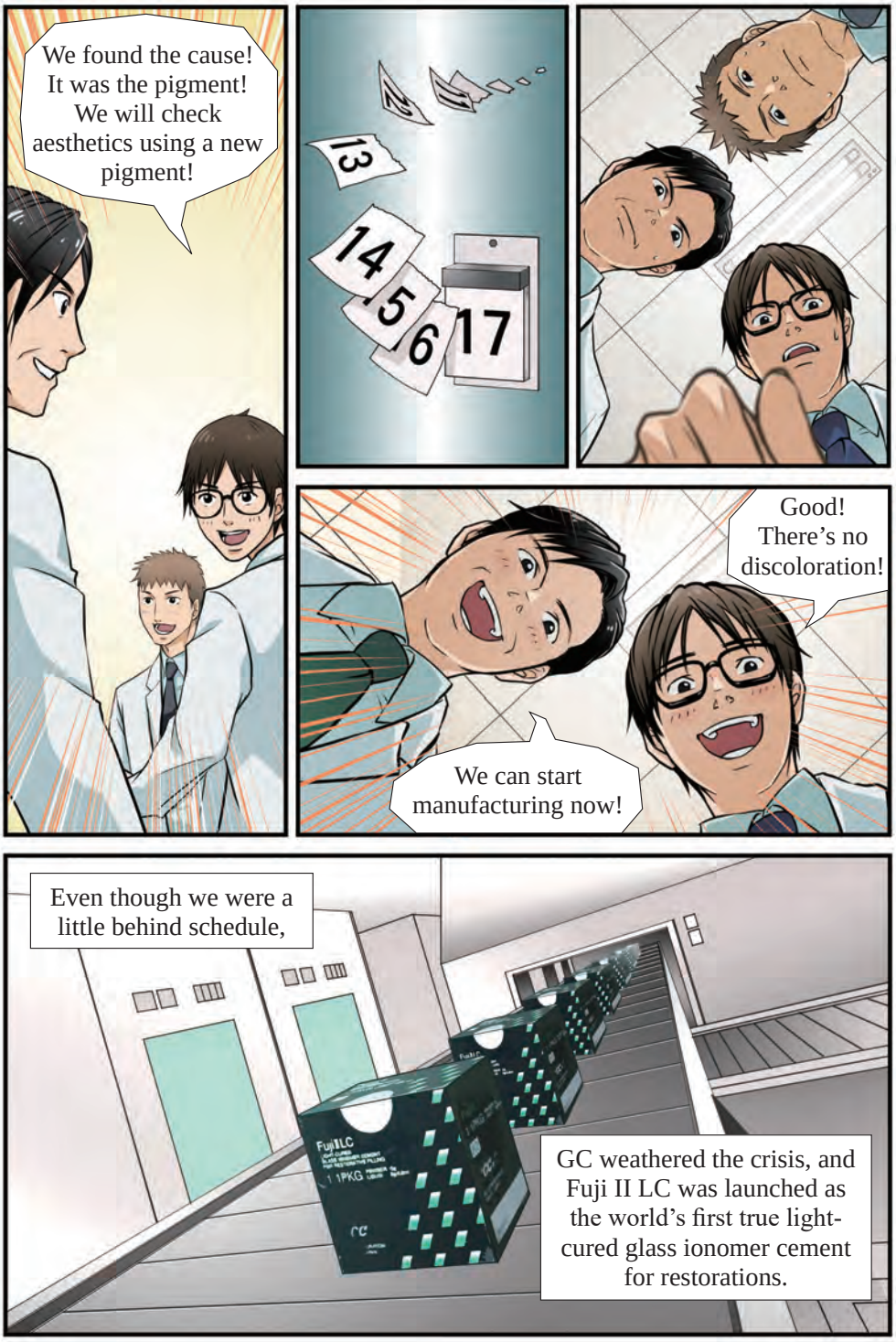
The setting time is just 20 seconds!

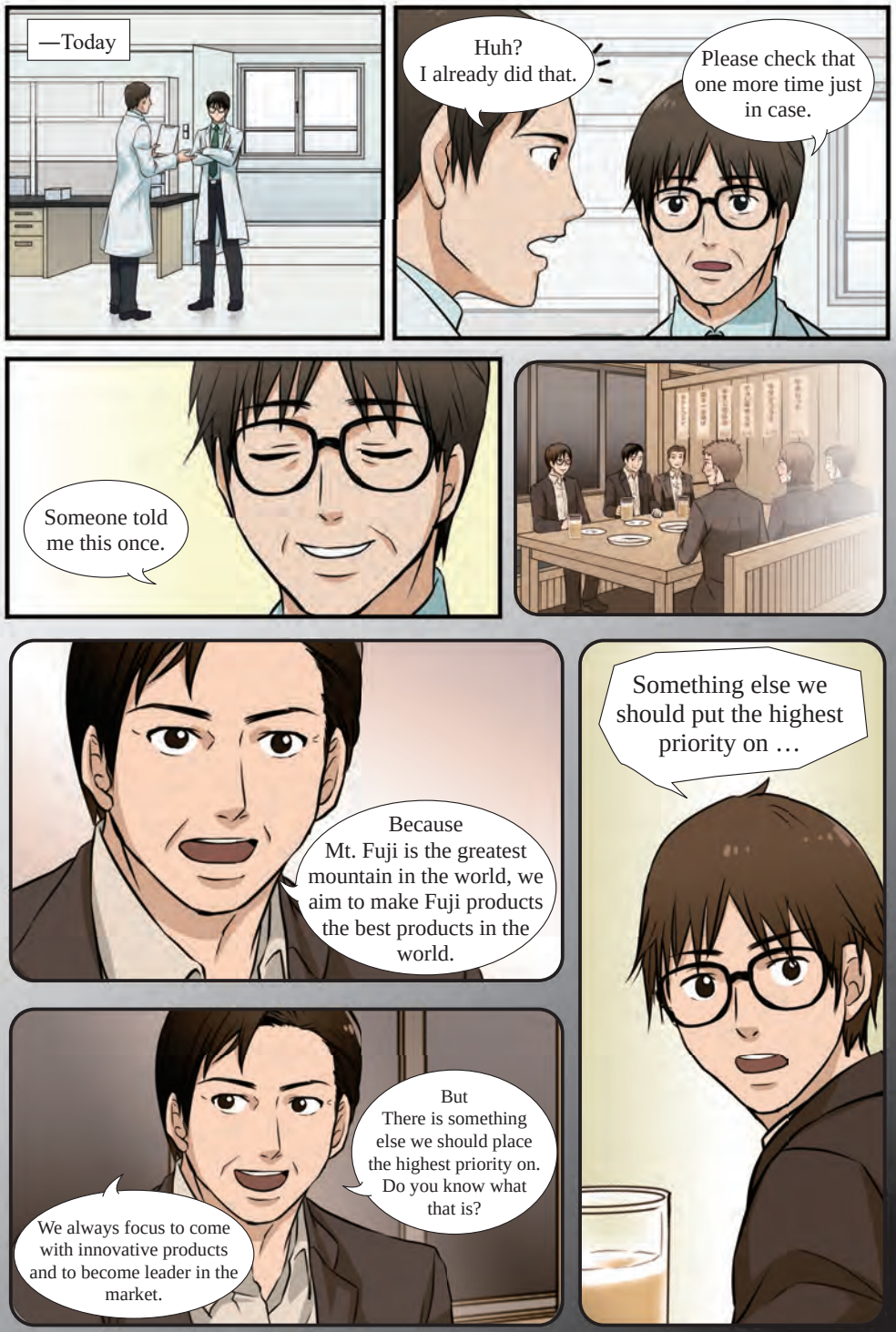
Final test

Tap, tap

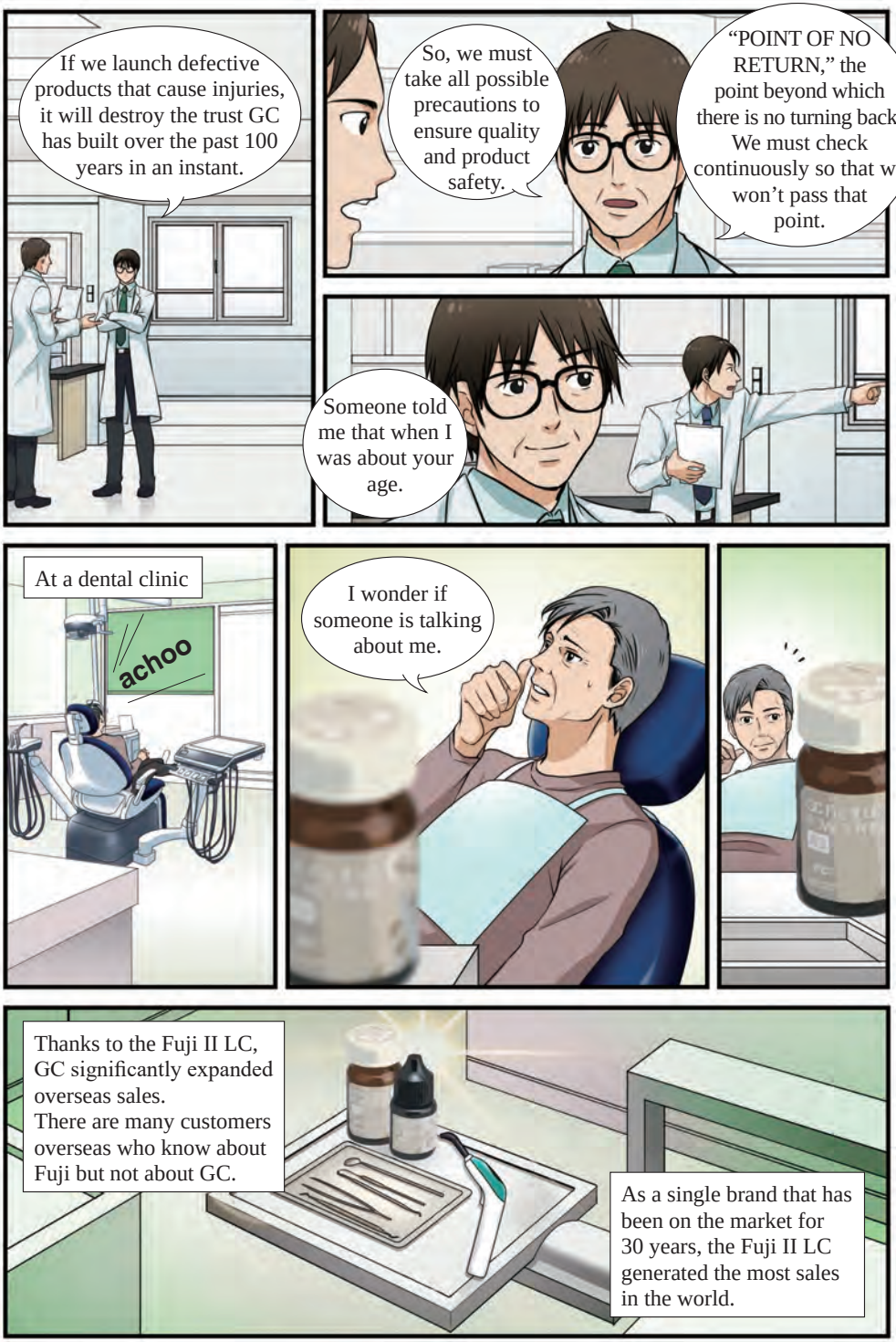

We did it!
Yes, it's done. Finally, we can start manufacturing the product!
We finally created Fuji II LC.…
A few days after the first shipment of the Fuji II LC left for overseas countries
I heard that there were many reservations for Fuji II LC purchases all over the world.
Is the number of products that we shipped enough for all those reservations?
We have a problem!
Click
What!?
Product discoloration was found while the containership was near Singapore.
Japan
Singapore
Huh? What are you talking about! We've already started to take orders!!
The European offices were told to discard the products upon arrival.


I’m so sorry.…
Needless to say, the discoloration of materials for dental treatments is unwanted.
… Ha, ha
Our luck hasn’t run out yet.
It’s true that we shipped defective products. Fortunately, those products haven’t been delivered to customers yet.
We can still recover.
We haven’t reached the point of no return yet.
However, we must hurry because we already announced the launch of the product!


We found the cause! It was the pigment! We will check aesthetics using a new pigment!
13
14
5
6
17
Good! There's no discoloration!
We can start manufacturing now!
Even though we were a little behind schedule,
Fuji II LC
1 PKG
GC weathered the crisis, and Fuji II LC was launched as the world's first true light-cured glass ionomer cement for restorations.

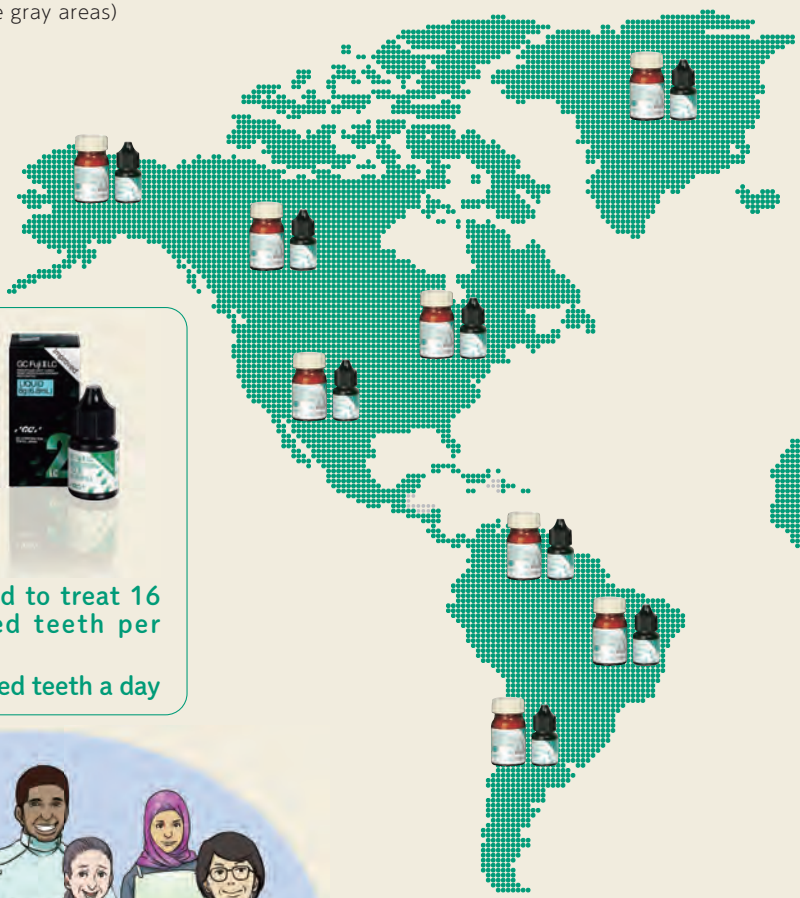

—Today
Huh?
I already did that.
Please check that one more time just in case.
Someone told me this once.
Because
Mt. Fuji is the greatest mountain in the world, we aim to make Fuji products the best products in the world.
Something else we should put the highest priority on …
But
There is something else we should place the highest priority on. Do you know what that is?
We always focus to come with innovative products and to become leader in the market.


To put customers and patients first.
There are not only products but even more also people who use them, even though it is easy to forget about that when working in the lab looking at experimental results every day only.
We must also not forget the patient.
Our mission is only succeeded until dentists use our products conveniently and safely in the patient's mouth.
So, we need to take all possible precautions to ensure user friendliness and safety.
Do you know the phrase "POINT OF NO RETURN?"
It means the point where you can no longer go back.
"POINT OF NO RETURN" … There's no turning back once we pass that point.
It is critical to keep that in mind when manufacturing products.
We almost forgot what was most important because we were desperate to become the first company in the world. I learned so much from this case. Let's make it a rule to repeatedly verify quality and safety of our products. Shall we?


If we launch defective products that cause injuries, it will destroy the trust GC has built over the past 100 years in an instant.
So, we must take all possible precautions to ensure quality and product safety.
"POINT OF NO RETURN," the point beyond which there is no turning back. We must check continuously so that we won't pass that point.
Someone told me that when I was about your age.
At a dental clinic
achoo
I wonder if someone is talking about me.
Thanks to the Fuji II LC, GC significantly expanded overseas sales.
There are many customers overseas who know about Fuji but not about GC.
As a single brand that has been on the market for 30 years, the Fuji II LC generated the most sales in the world.

It has been about 30 years since its launch. At this moment, Fuji II LC is being used somewhere in the world.

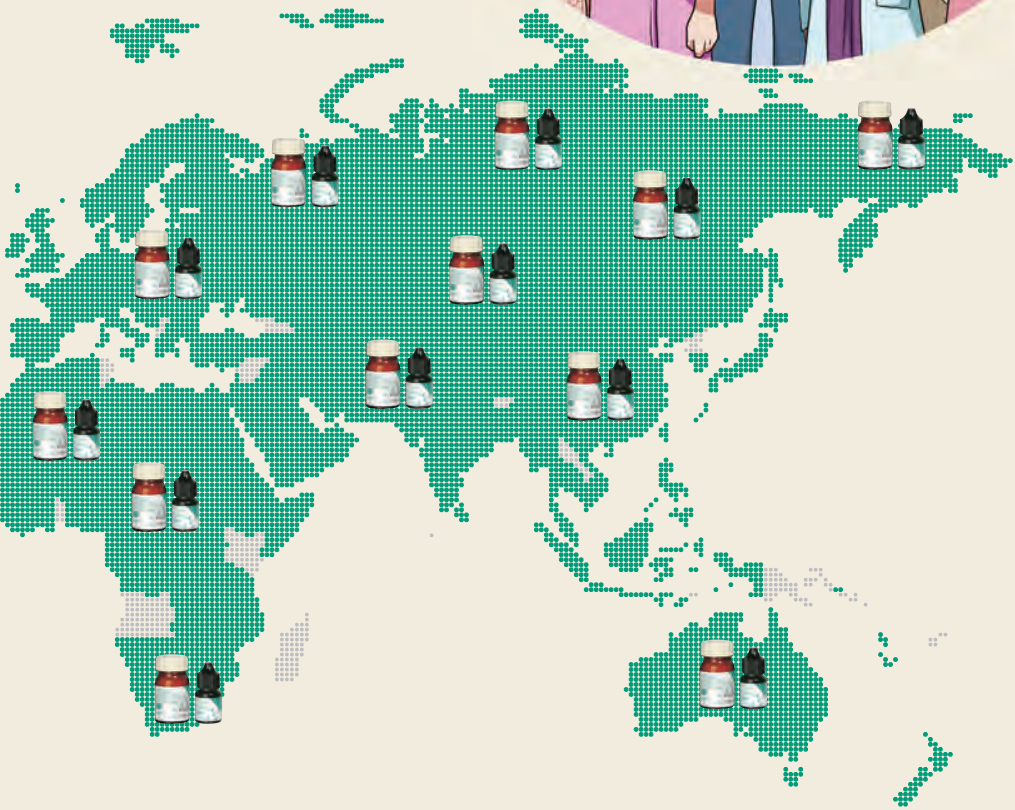
Fuji II LC sales area
(Not available in the gray areas)



Fuji II LC is used to treat 16 million decayed teeth per year.*

*44,000 decayed teeth a day

GC Fuji II LC



GC Fuji II LC Capsule

GC Fuji II LC CORE Material

GC Gold Label 2 LC

GC Gold Label II LC Capsule

May 31, 2021

GC Corporation

3-2-14 Hongo, Bunkyo-ku, Tokyo 113-0033 Japan
TEL (03) 3815-1815
http://www.gcdental.co.jp