

# TREATING IT SKIN DEEP

Inspired by her son's eczema, a local scientist and her students develop a moisturising cream filled with natural anti-inflammatory ingredients.

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WELCOMING your first child is a time of great joy, but also a time of great anxiety. Worries about whether you're feeding him right, carrying her correctly, bathing him properly and interpreting her heart-rending cries accurately, are common emotional companions for first-time parents.

So, it's hard enough coping with a healthy baby, but what if he or she also has a health problem?

Universiti Putra Malaysia (UPM) Department of Bioprocess Technology professor Dr Lai Oi Ming had her first, and only, child in 2013.

But her joy in welcoming her firstborn was marred by his unexpected skin condition.

"My son had very severe eczema when he was born. And I come from a family that does not have asthma, eczema or other allergic conditions, so I didn't know how to deal with my son.

"And I think I went into a depression. I didn't eat a lot of food because I was worried it was going to trigger his eczema (as I was breastfeeding him). I didn't get enough sleep – I was like a zombie," she shares.

Her son's condition was so bad that his bedsheets would be stained with blood, and her lack of sleep was due to having to stay up at night holding his hands so that he would not scratch himself.

For nine months, she was moping and crying every night until her husband finally told her to snap out of it.

"One day, he just couldn't take it anymore and told me that I really had to snap out of it because it wasn't helping the situation," she says.

At that time, the lipid and enzyme technology expert was working on a tocotrienol clinical trial with one of her Masters students.

Tocotrienols are one of the two forms of vitamin E, with the other being tocopherols.

They are differentiated by the type of chemical bonds they have in their side chain; tocotrienols have three double bonds, while tocopherols have single bonds.

Both forms have four members, or isomers, each, namely, alpha, beta, gamma and delta.

Says Prof Lai: "From that trial, I knew that tocotrienols had very good anti-inflammatory properties, but it has always been used for cardiovascular diseases, cancer, etc, but there wasn't any study for eczema or atopic dermatitis (the most common form of eczema).

"So I decided to have a look at all the (eczema) creams that were out there, and it was very frustrating to find out that most of the creams do not have anti-inflammatory properties – I just couldn't wrap my head around that.

"And when I go and see the doctor, they will always tell me there is no cure for eczema, and that was even harder to accept, because in this 21st century, you would think that a skin condition would have a treatment.

"So, I decided to work on it."

## No active ingredient

Eczema is a chronic condition of the skin that manifests in red, scaly, dry and itchy rashes on the body.

"For many eczema patients, studies have shown that in many cases, they don't have a protein, which is known as filaggrin, in the skin," says Prof Lai.

"This particular protein is supposed to protect the skin barrier so that the moisture below the skin doesn't evaporate off, and at the



Prof Lai (left) and her colleagues Lipidware operation and finance head Leow Min Min and Hishamuddin, with their eczema cream, baby shampoo and body wash. — Photos: ROHAIZAT MD DARUS/The Star

same time, allergens and microbes from the outside are unable to penetrate the skin."

Without a properly-functioning barrier, the skin is unable to maintain its moisture, leading to the dry and scaly skin of eczema, and foreign substances are able to penetrate into the skin, causing the inflammation that results in red and itchy rashes, and in severe cases, infection.

Eczema can occur at any age, although it more commonly begins in childhood, and even infancy.

While some children will outgrow this condition by the age of two, around half will continue to suffer from it throughout their lives.

According to Prof Lai, around a quarter of Malaysians have eczema based on the latest data from 2005.

For treatment, she says: "If you go see a doctor, there is a two-prong approach: when there is a flare-up, they'll always give you a steroid to reduce the inflammation, and at the same time, they'll tell you to continuously moisturise."

She explains: "We are

not creating something in the steroidal market, it is actually an emollient that we are interested in.

"When we did a survey of all the creams in the market, we found that 90% of those creams don't even have an active ingredient.

"So, considering that eczema is an inflammatory skin condition, you would think that there should be some bioactive ingredient to reduce inflammation – an anti-inflammatory bioactive – but most of the creams do not have any.

"And out of the 10% that do have, some are synthetic ones, and most of the time, they only act on the surface (of the skin).

"But actually, inflammation happens in the dermal layer of the skin, so that's when we realised that there's something that doesn't match here."

The dermal layer of the skin lies beneath the epidermal layer, which is the outermost part of our skin.

## To fight inflammation

With her Masters student's work fresh in her mind, Prof Lai wanted to see if they could develop an emollient for eczema with the anti-inflammatory properties of tocotrienols.

They eventually ended up with a cream that had three anti-inflammatory ingredients: tocotrienols, tocopherols and carotenoids.

"The main one is tocotrienol. We have the full spectrum of tocotrienols, which are the alpha-, beta-, gamma- and delta-tocotrienols.

"These isomers work together to reduce inflammation," she explains.

While many other skincare products also contain vitamin E in the form of tocopherols, Prof Lai notes that tocotrienols are 60 times more potent as an anti-inflammatory agent, compared to

tocopherols.

She adds that most tocopherols in creams come in its synthetic form of tocopherol acetate, which requires the body to do additional work in breaking it down into its active component.

"The enzymes in your body need to break it down. And in most cases, in most people, our enzymes are not that efficient, so that's why some forms of vitamin E are not so effective, like tocopherol acetate," she says.

"In our case, our tocotrienols, our tocopherols and our carotenoids, which are a pro-vitamin A, are basically from a natural source, and that natural source is red palm oil.

"Red palm oil has the second highest natural amount of tocotrienols in the world, so that's why we don't separate and extract the tocotrienols, but use it in its natural form," she explains.

In addition to the three anti-inflammatory ingredients, the cream Prof Lai and her team developed also contains vitamin C.

"The reason why vitamin C was added is because we found that there is a synergistic effect – when vitamin C is added together with vitamin E, it enhances the properties of vitamin E by four times, so that it becomes four times more effective," she says, adding that vitamin C is also good for wound-healing.

The process was not as simple as adding all the ingredients together though.

While the natural form of vitamin E is more potent and works better, it is also heat and light sensitive.

"Our technology is to stabilise them – we made them stable, able to withstand high temperature and light so that it can last up to three years.

"At the same time, we can turn them into a water-soluble form. So that's what's so interesting, it's an oil-soluble compound made to be water-soluble," she says.

"The reason why is because we

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Eczema is a term for a group of medical conditions that cause the skin to become inflamed or irritated, as seen in this filepic.





# Two-prong approach

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realise that for eczema patients, for adults especially, you don't want to be slapping yourself with creams that are really greasy, so we want a cream that works, but at the same time, is non-greasy," she adds.

Another important aspect for Prof Lai and her team was that the cream – in particular, the anti-inflammatory ingredients – should penetrate to the dermal layer of the skin as that is where the inflammation is occurring.

"We made, or bioengineered, our bioactives – the tocotrienols, tocopherols, carotenoids and vitamin C – so that they are nano-size in order to penetrate to the dermal layer of the skin.

"So when you apply the cream, the bioactives get absorbed to the dermal layer where they reduce inflammation and try to repair the skin from underneath.

"And at the top layer, they try to protect it to prevent moisture loss.

"So it is a two-prong approach," she says, adding that they were also careful to control the size of the bioactive compounds so that they would not unnecessarily penetrate into the bloodstream.

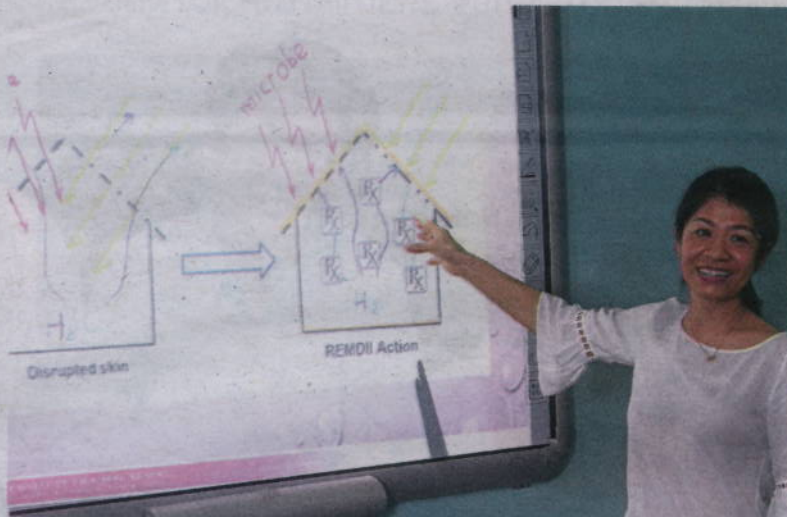
The various technologies are unique and covered by five patents – two of which have already been granted – owned by Lipidware Sdn Bhd, a biotechnology start-up based in UPM that was founded by Prof Lai, two of her postgraduate students and two of her friends from the business sector to develop and market the cream.

## In the works

Launched in June, the cream has been used not only by eczema patients, but also by those suffering from psoriasis, burns and chemotherapy side effects on the skin.

And in fact, Lipidware Business Development director Hishamuddin Mohamed shares that they have already had inquiries from other countries about exporting the cream.

With that though, comes the need to tweak the formulation to



Using the analogy of a house, Prof Lai explains the problems eczema causes to the skin, and how the cream she and her students developed helps to solve those problems.



With its ingredients of tocotrienols, tocopherols, carotenoids and vitamin C, the cream is able to help reduce inflammation, as well as keep the skin moisturised.

suit other climates.

"Whenever we go into a different climate, we need to redesign it slightly. In some countries, where it is colder and drier, the cream needs to be greasier.

"Our current cream is climatized for the Malaysian market at the moment," he explains, adding that they already have prototypes for these potentially exportable versions.

Prof Lai adds that they also hope to launch a new ultra-sensitive version of their cream next month, which will contain ceramides.

"Basically, it's a skin-mimic technology, so even our seal on the upper layer of the skin will mimic the skin – the ceramides are identical to the skin structure," she says.

This means that the cream will stay effective for 72 hours, even if you wash the area you have applied the cream on.

Due to numerous requests, the team has also developed baby shampoo and body wash gels that are suitable for eczema patients.

In addition, they started the Malaysian Eczema Support Group, which consists of patients and

their families, as well as doctors who would normally treat eczema patients, i.e. dermatologists, immunologists and general practitioners, and nutritionists.

"What we do is provide a platform where the general public is allowed to interact with each other and get better ideas for treatment.

"We don't claim to be the cure for everything, but we offer access to professionals, a lot of information about nutrition, which clinics to go to, and how to identify and manage eczema," says Hishamuddin.

He adds that while there are many support groups out there, the Malaysian Eczema Support

Group's mandate is strictly science- or evidence-based.

And despite the name, the group is really for anyone who suffers from a dry skin condition.

Prof Lai herself is very active on the group as a scientist and mother of a patient, and is frequently sought after for tips and advice by other parents of children with eczema.

The cream is currently sold in 20 clinics throughout Peninsula Malaysia and Labuan.

Prof Lai says that they hope to expand this number, but in the meantime, some families also buy the cream via post from the clinics.



Red palm oil is the source of the anti-inflammatory ingredients in the cream.