3M Science. Applied to Life.™

Do you make retail products that "stick to the skin?"

Here's how using medical adhesives from 3M can give you a competitive advantage.

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The potential for retail stick-to-skin products is only limited by the imagination! Here are just a few examples of common application areas:

Fashion & Glamour
- Fashion/Garment Tape
- Jewelry Affixation
- Artificial Nails
- Actor's Tape
- Temporary Bras
- Costumes
- Double-Eyelid Tape

Personal Care
- Acne Patches
- Footcare Cushioning
- Sanitary Products
- Wigs
- Dress Shields
- First Aid Products
- Over-the-counter Healthcare Products

Athletics/Sports
- Concussion/Physical Condition Sensors
- Kinesiology Applications
- Sports Tapes

Miscellaneous
- Homeopathic Care
- Traditional Chinese Medicine

You see them almost everywhere: temporary tattoos spreading smiles at a child's birthday party. Bandages guarding small scrapes from infection. Sports tape ensuring athletes' safety during intense competition. With low barriers to entry and virtually limitless applications, the retail stick-to-skin market is a good choice for companies looking to expand.

Why use medical adhesives?

Whether you're already selling stick-to-skin products, or are just considering getting into this market, one of the most crucial questions you face is, what adhesives will you use to put the "stick" in your stick-to-skin applications?

Skin can have an allergic reaction to many things that come in contact with it, such as adhesives. That's why, in healthcare and medical device applications, any adhesive used for skin contact must be tested for biocompatibility. This reduces the risk of the adhesive causing a major skin irritation.

3M has been a pioneer in adhesives technology since we started business back in 1902. And, for over 50 years we have been applying that experience to the medical device industry through our Medical Materials and Technologies group, offering customers a wide range of medical-grade tape, adhesive and film components—and the knowledge needed to make these components work for you.

Tested for safety & comfort

There are clear advantages to using medical adhesives for retail stick-to-skin applications. In any brand-focused market, trust is essential. Adhesives that cause allergic reactions can erode that trust, and damage your brand's reputation.

Medical adhesives from 3M undergo testing for biocompatibility and sensitivity. This greatly reduces the possibility that consumers will suffer skin irritation. You get the same data-verified safety and comfort guaranteed to products used in medical markets, to help you protect your customers—and your brand reputation.

Putting Medical Adhesives to the Test

Here are some of the tests medical adhesives commonly undergo during development:

- **Biocompatibility and Safety Testing** All medical products must undergo comprehensive safety and efficacy evaluations as recommended in the International Standard ISO-10993, Biological Evaluation of Medical Devices, Part 1: Evaluation Testing.
- **Cytotoxicity Screening Test** Uses cell culture techniques to assess level of toxic effect on cells caused by test materials and/or extracts from the material.
- **Primary Skin Irritation (PSI)** Assesses irritation potential caused by the chemical composition and/or mechanical trauma of removing a test material from animal (usually rabbits).
- **Guinea Pig Sensitization** Assesses sensitization potential of chemicals in the product by repeat exposure of the animal to test product.

Choosing the right adhesive for the retail application: a balancing act

Once you've decided to use a medical-grade adhesive, the next question is: which adhesive technology is the best fit for a given application and location on the body?

Customer expectations for retail stick-to-skin applications require a difficult balancing act. For example, here are some common performance characteristics requested by consumers:

- Good adhesion during use—but also gentle to the skin when removed.
- Breathable—but also waterproof.
- Resistant to friction—but also soft and conformable with every movement.

As these examples demonstrate, there is no one-size-fits-all adhesive solution. That's where we can help. 3M has the medical and technical expertise to determine what adhesive best fits your application, helping to ensure that your products strike just the right balance to meet—and even exceed—customer expectations.

With this in mind, here are a few of the key factors that are important to consider during the design phase of your product:

- Shape of the device
- Use/application
- Demographic
- Processing
- Handling (Human factors)
- Component materials
- Body location

Let's take a closer look at the way we apply body mapping to an often overlooked design consideration—body location—to select the right adhesive for your stick-to-skin applications.

Applied science: body mapping

Achieving the right balance of adhesive properties for your retail application

Retail uses and applications span the entire body, and each location has specific needs to ensure proper adhesion. 3M's decades-long experience applying scientific principles to medical adhesive design can help you develop products that function better for their intended application. For example, we'll use the science of body mapping to advise you during the design phase. Body mapping means using an understanding of skin anatomy to identify the right adhesive and backing combination for a given retail application.

Through thick and thin

Skin—the body's largest organ—is made up of three layers: the epidermis, dermis and subcutis. The thickness of each layer varies over different parts of the body. For example, the epidermis and dermis are thickest on the palms and feet and thinnest on the eyelid. The thickness of the skin determines, in part, its sensitivity to stimuli.

Body part	Discrimination sensitivity
Fingers Upper lip Cheek Nose Palm Forehead Foot Belly Forearm Upper arm Shoulder Thigh Calf	Increased nerve density Increased sensitivity

Body part	Epidermis/ dermis thickness
Fingers Foot Palm Forehead Shoulder Thigh Calf Belly Upper arm Nose Forearm Cheek Upper lip Eye lid	Increased layer thickness Increased sensitivity

Getting on your nerves

All over our bodies, sense organs in our skin contain specialized neurons called receptors. Each receptor is adapted to receive a particular type of stimulus, such as heat or pressure. These receptors—and, in fact, all neurons—follow the "All-or-None" principle. This means that there is a minimum level of stimulation necessary to activate the receptor. If a stimulus is below this threshold, the receptor is not activated.

The receptors for the sense of touch are scattered over the entire surface of the body. Some areas have many receptors, while others have relatively few. The more receptors there are grouped together in a certain area, the greater the skin's sensitivity.

3M will use this knowledge of skin thickness and sensitivity in different areas of the body as part of the process to identify the right adhesive and backing combination for your retail product. Our understanding of human anatomy equips us to select the best adhesive for your application. See Appendix 1 on page 4 for examples of other factors to consider for specific body areas.

Beyond Body Mapping

Other questions to consider during the design stage of your product include:

Who is wearing the device?

- Baby—Thin, sensitive skin
- Elderly person—Potentially very fragile skin
- Active/inactive—Sweat, movement, dirt

How long is the device going to be worn?

- Does the backing have to be breathable?
- Adhesive for long wear time?

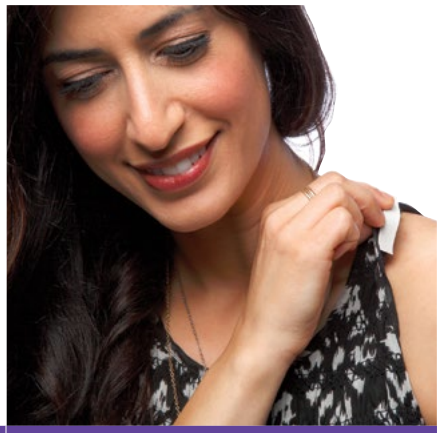
What outside stresses will the device be exposed to?

- Friction?
- Water?
- Sweat?

Is there any requirement to sterilize the device?

- ETO
- Gamma
- Steam

Putting 3M Science to work



For companies looking to branch out into the retail stick-to-skin market, 3M Medical Materials and Technologies can provide the tools and expertise needed to make your products stand out. Our adhesives are tested to the rigorous standards of the medical industry for customer safety and satisfaction to protect your customers and your brand. Our decades of experience and extensive scientific knowledge uniquely situate us to help you choose the adhesives and backings that make the most sense for your applications. Let us demonstrate how 3M Science can be an important competitive advantage for you.

Appendix 1: Adhesive-related considerations for various body areas

Location	Characteristics	Tape characteristics	Common retail applications	Product examples
Eye area	Thin skin Sensitive, low stimulus threshold	Gentle adhesion Highly conformable backing	Eye patch Double eye lid tape Fashion face decorations	Soft silicone adhesive Gentle acrylate adhesive Non-woven backing PU backing Thin polyolefin backing
Face	Thin skin Sensitive, low stimulus threshold	Gentle adhesion Conformable backing	Costumes Mustache Face mask	Soft silicone adhesive Gentle acrylate adhesive Thin polyolefin backing
Scalp	Thick skin Many sebaceous glands ⇔ oily skin	More aggressive adhesive Conformable backing	Wigs Hair pieces	Double coated soft silicone/acrylate adhesive Double coated tape with differential adhesive Gentle acrylate (to skin) Aggressive adhesive (to wig)
Nails	Not stretching or moving Thick Not as sensitive	Aggressive acrylate adhesive Synthetic rubber adhesive Thin polyolefin backing or carrier Only limited conformability required	False nails Nail art Nail cushioning	Double coated tape with aggressive adhesive Transfer adhesive
Hands	Sweat Movement High friction area Very thick skin High nerve density	Conformable backing Strong backing Breathable Strong adhesive when bonding to own backing Gentle skin adhesive	First aid dressings Sports tape Blister prevention	Single coated tape with gentle adhesive When used during exercise ⇔ strong adhesive Woven backing Non-woven backing
Arms, legs, back, abdomen	Sweat Moving skin Relatively thick but often smooth skin	Medium to aggressive adhesive Conformability required Breathable Gentle on removal	Sports tape Cadence sensor Impact sensor Heel or forefoot cushioning	Strong adhesive Non-woven PU or polyester PU film Sport tape and shapes
Feet	Sweat Movement High friction area Very thick skin	Aggressive adhesive Limited conformability required Breathable	Blister plasters Heel or forefoot cushioning	Strong adhesive Cushioning HC adhesive Highly friction resistant backing None woven polyester backing Woven tape backing
Sensitive areas	Sweat Movement Thin skin, high nerve density	Gentle adhesive Conformable backing or carrier Soft/cushioning backing Breathable Repositionability of advantage	Fashion tape Disposable bra Runner's nipple Sports tape	Gentle adhesive Foam backing Thin film backing or carrier

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