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SEPTEMBER/OCTOBER 2009

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# Managing dry skin

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## Learning Objectives:

Upon completion of this continuing education lesson, the reader should be better able to:

- Discuss the design and function of skin
- Understand dry skin prevention and the risk factors for this condition
- Educate patients regarding the different moisturizer ingredients and bases to treat dry skin

## Introduction

Dry skin is a common condition affecting a large portion of the patients that a technician interacts with daily. This condition can vary from a minor nuisance to a severe condition with unrelenting itch and cracking of the skin. This lesson will describe the causes, symptoms, prevention and treatment of dry skin.

## The function and design of skin

The skin is the largest organ covering most areas of the body.<sup>1</sup> The skin serves many functions for the body (see Table 1), including acting as a primary defence, an excretory organ and a regulator of body temperature.<sup>2</sup>

One of the main functions of the skin is to prevent water loss. This is accomplished as the outermost layer of skin is essentially impermeable to water.<sup>2</sup> This function is crucial to maintain adequate hydration of the internal organs. Under most circumstances, the skin acts as a highly efficient barrier against water loss. This keeps the skin soft, supple and flexible, and is crucial for maintaining the normal enzyme activity required to shed the outermost layer of skin.<sup>4</sup> These enzymes

include  $\beta$ -glucocerebrosidase, acid phosphatase, phospholipase A2 and the serine proteases, trypsin and chymotrypsin.<sup>5</sup>

The skin is composed of three distinct layers. The subcutaneous tissue layer is the innermost layer. It is composed of connective and fat tissue.<sup>6</sup> It facilitates thermal control, acts as a food reserve and provides cushioning and padding.<sup>6</sup> The middle layer is called the dermis. It contains collagen, nerves and blood supply required to support the epidermis layer.<sup>6</sup> The dermis also contains sweat glands, lymph vesicles and hair follicles. The outermost layer is the epidermis. This thin layer is constantly exposed to the environment.<sup>6</sup> Skin cells start at the base layer of the epidermis and slowly flatten, lose water and travel to the outermost layer of the epidermis, called the stratum corneum.

The stratum corneum looks very similar to a brick wall with skin cells (the bricks) held together with lipids (the mortar). The outermost skin cells (the bricks) contain a large number of water-binding compounds to help the skin retain water (also called its natural moisturization factor). The dead cells on the surface of the skin are constantly

TABLE 1 – Functions of skin<sup>3</sup>

<b>Protection</b>	<ul style="list-style-type: none"> <li>• Barrier to chemicals, microorganisms and toxic agents</li> </ul>
<b>Temperature control</b>	<ul style="list-style-type: none"> <li>• Helps to exchange heat with the environment to keep the body's internal temperature stable</li> </ul>
<b>Sensation</b>	<ul style="list-style-type: none"> <li>• The skin is the largest sensation organ of the body. It can detect:             <ol style="list-style-type: none"> <li>a. Pain</li> <li>b. Pressure</li> <li>c. Touch</li> <li>d. Heat and cold</li> </ol> </li> </ul>
<b>Vitamin D synthesis</b>	<ul style="list-style-type: none"> <li>• When in contact with ultraviolet radiation the skin produces vitamin D</li> </ul>
<b>Elimination</b>	<ul style="list-style-type: none"> <li>• Helps to remove excess salt and toxins through sweating</li> </ul>

TABLE 2 – Risk factors for dry skin<sup>1,6,8</sup>

<b>Age</b>	<ul style="list-style-type: none"> <li>• Older patients are at higher risk</li> </ul>
<b>Genetic factors</b>	<ul style="list-style-type: none"> <li>• Inherited conditions such as eczema and ichthyosis</li> </ul>
<b>Environmental factors</b>	<ul style="list-style-type: none"> <li>• Low humidity (forced air heating, air in airplane, air conditioned air), winter months, high wind, excessive sunlight exposure</li> </ul>
<b>Behavioural factors</b>	<ul style="list-style-type: none"> <li>• Exposure to solvents, surfactants (soaps, detergents), acid and alkali chemicals, excessive drying of the skin and tight-fitting clothes</li> </ul>
<b>Medical conditions</b>	<ul style="list-style-type: none"> <li>• HIV infection, end-stage kidney disease, diabetes, hypothyroidism and various types of cancer</li> </ul>
<b>Medications</b>	<ul style="list-style-type: none"> <li>• Diuretics, topical products containing alcohol, cholesterol drugs (statins), anticholinergic drugs (e.g., oxybutynin), prostate treatments (e.g., bicalutamide, cyproterone) and oral contraceptives</li> </ul>

shed (desquamated) and are replaced as new cells travel to the surface, maintaining the stratum corneum at a constant thickness.<sup>6</sup>

### Dry skin

Moisture in the stratum corneum is required to keep the skin soft and flexible. Water originates from the base of the epidermis, travels up to the stratum corneum and is eventually lost to evaporation.<sup>7</sup> When the water content of the stratum corneum falls below 10%, the enzymes responsible for shedding dead cells cannot function and symptoms of dry skin start to appear.<sup>7</sup> Microscopically, dry skin causes the outermost skin cells ("the bricks") to shrink, leading to a further breakdown in the skin barrier and further moisture loss due to evaporation.<sup>3</sup>

Dry skin presents as dry, white and flaky patches on the skin. It feels uncomfortable, painful and can sting. If the dryness continues, the skin will appear red, dull and

rough, and will exhibit a loss of elasticity.<sup>8</sup> When it becomes excessively dry, the skin may start to crack. The cracks will commonly occur along natural skin lines.<sup>1</sup> As the condition deteriorates, the cracks may worsen, become deeper and may start to bleed.<sup>1</sup> The cracking of the skin allows for easy entry of irritants and bacteria.<sup>9</sup> Itchiness commonly appears with dry skin and this can be especially distressful and distracting for some patients.<sup>10</sup> Scratching of these areas can lead to the breakdown of the skin and increases the risk of infection.<sup>1</sup>

Dry skin will normally appear on the lower legs of patients who are middle aged or older, but it is also common on the trunk, forearms and hands.<sup>10</sup> It can occasionally appear on the face.<sup>10</sup> The feet are less prone to dryness if the person wears socks and shoes, as they keep in moisture.<sup>1</sup> Patients who walk barefoot, in sandals or in open footwear are more prone to dryness of the feet.

Dry skin is exceptionally common in older patients. It is estimated to affect about 75% of patients who are 64 years of age or older and is one of the most common conditions in nursing homes.<sup>1</sup> This is primarily due to the fact that seniors have lower sweat gland and sebaceous gland (a gland in the skin that secretes an oily substance called sebum) activity.<sup>9</sup> There is also a gender difference in sebaceous gland activity. Males have good sebaceous gland activity until the eighth decade of life, while this activity decreases much sooner in women.<sup>1</sup> Older patients also have a decrease in skin cell turnover, tissue repair and nail and hair growth.<sup>10</sup>

There are a variety of risk factors for the development of dry skin (see Table 2). Dry cold winter air is a common contributor.

### Prevention and nonpharmacological treatment of dry skin

Small interventions and tips can help prevent the development of dry skin. The primary ways to prevent dry skin involve providing more moisture to the skin, minimizing irritation and preventing the loss of water from the skin by applying topical products.

For many people, bathing is part of their daily routine. Skin is normally cleansed with soap to remove dirt, debris, odour and other contaminants.<sup>3</sup> Soap will emulsify oils (make the oil particles on the skin smaller and soluble in water).<sup>3</sup> When the skin is rinsed off, the soap is removed carrying the debris with it.<sup>3</sup> Soaps can remove skin oils and adversely affect skin protein.<sup>1</sup>

Small changes to the bathing routine may have a dramatic effect on the management of dry skin. Table 3 lists some of the common bathing recommendations for people with dry skin.

Bath oils are commonly used to help people with dry skin. These oils are added to a bath and are used to add a protective layer of oil on the skin. Although these oils can help some patients, other people find they leave irritating chemicals on the skin and this may worsen dry skin instead of improving it.<sup>1</sup> All people using bath oils should be cautioned as they can make the tub surface very slippery and may increase the risk of falling.<sup>1</sup>

Increasing the available moisture in the air and in the body is commonly

**TABLE 3 – Bathing suggestions for people with dry skin<sup>1,3</sup>**

- Patients should bathe or shower for a short period of time (less than 10 minutes every 24 hours)
- Avoid bathing in hot water
- Avoid using highly irritating or heavily fragranced soap
- Consider using moisturizing soaps (e.g. Dove®, Aveeno®) or soapless cleansers (e.g. Cetaphil®)
- Avoid harsh or excessive towelling
- Pat dry after bathing
- May wish to limit the use of soap to the axillae (under arms), groin and face most showers
- Apply a moisturizer (preferably an occlusive) within 3 minutes after bathing to seal the water in the skin.

**TABLE 4 – Key functions of moisturizers<sup>11,13</sup>**

- Repair the skin barrier
- Prevent water loss from the skin through evaporation
- Restore the lipid barrier's ability to hold and redistribute water
- Maintain skin integrity and appearance
- Fill the spaces between skin flakes
- Reduce skin friction
- Provide moisture directly to the skin

recommended. Patients are encouraged to increase the humidity in the home to approximately 50%.<sup>1</sup> This can be accomplished by the use of vaporizers or humidifiers. Most pharmacies sell these products and when recommending them it is important to remind patients to follow the manufacturer's cleaning instructions. Patients with dry skin should also be encouraged to drink adequate amounts of water.

People with dry skin should be careful of all products that come in contact with their skin. Perfumes in many commercial products, as well as topical products such as rubbing alcohol, can lead to irritation and may further contribute to dry skin. Also, patients should be careful of the clothing that touches their skin. Rough or irritating clothing (e.g., wool) should not be placed next to the skin.<sup>9, 10</sup>

### Moisturizers for the treatment of dry skin

Moisturizers are central to the management of dry skin.<sup>8</sup> They are the third most commonly recommended over-the-counter (OTC) skincare product, next to topical

hydrocortisone and antibiotics.<sup>11</sup> Moisturizers are defined as topical products that smooth the surface of the skin and make the surface look smoother to the eye.<sup>12</sup> These products make the skin more elastic, almost impermeable and immediately increase the skin's water content after application.<sup>13</sup> Moisturizers are a key treatment component in any skin condition where there is an alteration of the skin's barrier function and when there is reduced water content in the skin.<sup>11</sup>

Moisturizers are believed to restore the barrier function of the epidermis, provide a soothing protective layer and increase the water content of the epidermis.<sup>11</sup> They cover small tiny fissures in the skin and help to relieve itch caused by dry skin.<sup>8</sup> Table 4 lists many of the functions of moisturizers.

Moisturizers are commonly divided into three categories:

- Occlusives
- Humectants
- Emollients

Most commercially available moisturizers contain a combination of these main categories.

#### Occlusives

Petrolatum is a classic example of an occlusive

moisturizer.<sup>4</sup> It reduces water loss through evaporation by over 98%. Other occlusive agents (beeswax, lanolin, mineral oil, dimethicone) only reduce water loss by 20-30%.<sup>11</sup> This ability makes petrolatum one of the most effective moisturizers.<sup>4</sup> Occlusives are also believed to penetrate into the lipid layer of the stratum corneum.<sup>11</sup> Petrolatum may help to accelerate lipid biosynthesis, leading to repair of the skin barrier.<sup>4</sup>

#### Humectants

Humectants are water-attracting materials that are added to a moisturizing base.<sup>6</sup> They are able to draw moisture from the dermis into the epidermis and under humid conditions can attract moisture from the air.<sup>11</sup> This is quite different from occlusive agents that focus on preventing loss of water already present in the skin. One major problem with humectants is they may promote water loss from the skin. This occurs by a humectant pulling water from the dermis to the epidermis where it can be lost to the environment.<sup>11</sup> Some of the most common humectants are glycerin, propylene glycol, urea and lactic acid (a source of alpha hydroxyl acid).

Urea in concentrations of 10-30% is mildly keratolytic (promotes shedding and peeling of the stratum corneum); it also increases water uptake in the stratum corneum due to its high water-binding capabilities.<sup>6</sup> Concentrations of 10% are used for mildly dry skin, while 20-30% concentrations are used for more severe dry skin.<sup>6</sup> The problem with these formulations is they may cause stinging, burning and irritation.<sup>6</sup>

Alpha-hydroxy acids (e.g., lactic acid) are beneficial in patients with persistent dry and scaly skin.<sup>13</sup> These products not only act as humectants, but also stimulate the production of lipids in the stratum corneum resulting in a superior lipid barrier.<sup>11</sup>

#### Emollients

Emollients are normally produced by a combination of lipids and oils. These products will fill in spaces between skin scales and flatten them against the underlying skin.<sup>6</sup> This contributes to skin softness, smoothness and increased flexibility.<sup>11</sup> Consumers commonly select these products as they lead to smooth skin following application.<sup>11</sup> Long-chain fatty acids (castor oil, jojoba oil, coconut oil, palm oil) and fatty alcohols (isopropyl palmitate, isopropyl

**TABLE 5 – Moisturizer properties to consider before recommending a particular product**<sup>3,8,11</sup>**Optimal base**

- Ointment
  - Mixture of waxes, oils and petrolatum
  - Provide artificial lipid layer, which traps water that would normally be lost to evaporation
  - Requires fewer applications than creams or lotions, but less cosmetically appealing
  - Better choice than creams or lotions for dry skin in the winter
  - Products with high oil content such as occlusives are more effective for dry skin
- Cream
  - Mixture of water and oil
  - Water rehydrates epidermis, while the oil provides an artificial lipid layer
  - The higher the oil content, the greasier it feels and the less cosmetically appealing it becomes.
  - Easy to apply, quickly absorbed and high patient acceptance
  - Better choice than ointments for dry skin in summer
  - If the skin is weeping, a cream is a better choice than an ointment
- Lotions
  - Mixture of water and oil
  - Thinner than creams due to higher water content
  - Much less occlusive than other bases
  - Easy to apply to large area and high patient acceptance
  - Require frequent application

**Potential adverse effects**

- Moisturizers are considered very safe
- Some patients will have transient stinging, burning or smarting
- Select hypoallergenic, fragrance-free and non-sensitizing moisturizers
- Normally free of irritating substances, but repeated exposure to even mildly irritating substances can cause an allergic reaction

**Cosmetically appealing to the patient****Long-lasting hydration****Absorbed rapidly to provide rapid skin hydration****Affordable****Area of Application**

- Hairy Areas
  - Lotions
- Skin Folds
  - Creams or lotions
- Hands
  - Non-greasy cream
- Face
  - Cream
- Extremities
  - Ointment

isostearate) exert their benefit through improved stratum corneum repair.

**Selecting the Right Moisturizer**

Many commercially available moisturizers contain a combination of all three classes of moisturizers. Selecting the best moisturizer is usually done by evaluating several key characteristics and working with the patient to determine which moisturizer will best fit their needs. For any moisturizing treatment

to be successful, patients have to be compliant with their regimen. Patients are more likely to use their moisturizer if it is elegant and cosmetically appealing.<sup>11</sup> Table 5 lists some of the key properties to consider when evaluating various moisturizers.

**Role of the technician**

Pharmacy technicians can play a vital role in the initial screening and evaluation of the needs of people presenting at the pharmacy

counter. For example, when seniors come into the pharmacy to pick up a prescription, the technician could initiate dialog about the 'cold weather and dry skin' and when appropriate refer the patient to the pharmacist. The technician can ask patients purchasing moisturizers if they have had it before and if it is effective. If not they can refer the patient to the pharmacist. They can create 'shelf-talkers' that state 'if you are having difficulty choosing the correct moisturizer please speak to the pharmacist.'

Once technicians have a good understanding of this very common but treatable disorder, they can play an active role in ensuring that each patient gains relief from their dry skin.

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## ▶ QUESTIONS

Please select the best answer for each question or answer online at [www.pharmacygateway.ca](http://www.pharmacygateway.ca) for instant results.

### 1. Which one of the following is a key function of skin?

- a) Uses ultraviolet radiation to make vitamin C
- b) Allows easy entry to different chemicals applied to the skin
- c) Facilitates simple entry of water into the body
- d) Regulatory organ for body temperature

### 2. Which of these statements regarding the epidermis is TRUE?

- a) The stratum corneum is the inner most layer of the epidermis
- b) Dead cells are kept on the outer surface for nutrients for new skin cells
- c) It contains water-binding chemicals called natural moisturizing factor
- d) The thickness of the stratum corneum constantly changes depending on humidity and external temperature

### 3. Which of the following statements is TRUE?

- a) The dermis is responsible for maintaining thermal control
- b) The subcutaneous tissue acts as a food reserve and provides cushioning and padding
- c) Skin cells start at the base of the dermis and travel to the surface of the skin
- d) The subcutaneous tissue layer contains all of the nerve endings and blood supply necessary for supporting the epidermis

### 4. Symptoms of dry skin begin to appear when the water content in the stratum corneum falls below

- a) 10%
- b) 20%
- c) 30%
- d) 40%

### 5. Which of the following symptoms is NOT common for patients with dry skin?

- a) Itch
- b) Flaky skin
- c) Smooth skin
- d) All of the above are symptoms of dry skin

### 6. Which of the following locations is a common site for dry skin?

- a) Forearms
- b) Upper legs
- c) Feet
- d) Back

### 7. Which of the following statements regarding dry skin in seniors is TRUE?

- a) Dry skin is more common in elderly men than women
- b) Dry skin is one of the most common conditions in nursing homes
- c) Dry skin is common in elderly patients due to increased activity of sweat and sebaceous glands
- d) Dry skin occurs in about 50% of seniors

### 8. Which of the following is a risk factor for dry skin?

- a) Loose fitting clothes
- b) Use of soaps and detergents
- c) High environmental humidity
- d) Hyperthyroidism

### 9. When discussing bathing with a person with dry skin, which of the following would be a good recommendation?

- a) Make sure the bath water is hot to help improve the itch from the condition
- b) Dry the skin aggressively to help remove dead skin cells
- c) Apply a moisturizer within 3 minutes of bathing to seal in some water into the skin
- d) Recommend baths of 20-30 minutes to help water absorption in the skin

### 10. Which of the following would be a good recommendation for a person with dry skin?

- a) Rough or irritating clothing (e.g. wool) should not be placed next to the skin
- b) Avoid wearing socks and shoes to help air out dry feet
- c) Keep air humidity in their home to above 70%
- d) Avoid using humidifiers as vaporizers are better for dry skin

### 11. Key functions of a moisturizer include each of the following EXCEPT?

- a) Reduce skin friction
- b) Increase the space between skin flakes
- c) Provide moisture directly to the skin
- d) Prevent water loss through evaporation

### 12. Which of the following is an example of a humectant?

- a) Beeswax
- b) Jojoba oil
- c) Dimethicone
- d) Lactic acid

### 13. When selecting a base for a patient, which of the following statements is appropriate?

- a) Ointments are more appropriate for hairy areas
- b) Creams are the most appropriate for the face
- c) Lotions are more occlusive than other bases due to their high water content
- d) Ointments are the best choice for dry skin in the summer

### 14. A patient asks you about adverse effect from moisturizers. Which of the following is the most appropriate response?

- a) Moisturizers commonly cause adverse effects in people with dry skin
- b) Only fragrances cause allergic reactions so fragrance-free formulations do not cause any adverse effects
- c) If the patient does not react after the first application of moisturizer then they will never react to it
- d) The most common reaction is stinging, burning or smarting

### 15. Pharmacy technicians can help people with dry skin by:

- a) Screening people at risk
- b) Providing advice to prevent dry skin
- c) Referring people with skin conditions to the pharmacist
- d) All of the above

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