a guide to

ACIDS IN SKINCARE

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COSMETIC CLINIC

Hydroxy Acids

Hydroxy acids are chemical exfoliants that are often used in skincare products to treat acne, sun damage, and a variety of other skin conditions. They are mainly split into two groups; Alpha-Hydroxy Acids (AHAs) and Beta-Hydroxy Acids (BHAs). However, more recently, Poly-Hydroxy Acids (PHAs) and AldoBionic Acids (BAs) have been added to the list. So what is the difference between these acids?

AHAs

AHAs are water-soluble carboxylic acids made from sugars and fruits that help exfoliate the skin. They do this by removing calcium ions from the bonds that hold skin cells together which weakens the bonds and allows exfoliation to take place.

AHAs are commonly used to treat the signs of sun-damage (photoageing), such as pigmentation, fine lines and wrinkles, enlarged pores, and uneven skin tone. They are generally suitable for all skin types although those with sensitive skin may need to gradually build up tolerance to AHAs in order to avoid irritation.

Skin Tip: If irritation is a concern for you, opt for AHAs with a higher molecular weight as this means that the ingredient is slower to penetrate the skin.

AHAs include (from lowest to highest molecular weight):

- **Glycolic Acid** (72 g/mol)
- **Lactic Acid** (90 g/mol)
- **Malic Acid** (134 g/mol)
- **Tartaric Acid** (150 g/mol)
- **Mandelic Acid** (152 g/mol)
- **Citric Acid** (192 g/mol)

Acids & Skin Type: AHA vs BHA

	ACID	MOLECULAR WEIGHT	SKIN BENEFITS	SKIN TYPE/ CONDITION
AHA	Glycolic Acid	72	Improves fine lines and wrinkles, reduces pigmentation, exfoliates skin, improves skin texture, reduces pore size, increases collagen production, improves skin tone/brightness.	ALL EXCEPT SENSITIVE
AHA	Lactic Acid	90	Improves fine lines and wrinkles, exfoliates skin, improves skin texture, increases collagen production, improves skin tone hydration, may improve skin microbiome.	DRY DEHYDRATED SENSITIVE COMBINATION
AHA & BHA	Malic Acid	134	Less effective than glycolic & lactic acids but may enhance their effects when combined. Improves fine lines and wrinkles, exfoliates skin, improves skin texture.	ALL EXCEPT SENSITIVE
AHA	Tartaric Acid	150	Less research to support its effectiveness. Improves fine lines and wrinkles, exfoliates skin, improves skin texture, has antioxidant properties.	DRY SENSITIVE
AHA	Mandelic Acid	152	Improves fine lines and wrinkles, exfoliates skin, improves skin texture. Has antibacterial and anti-inflammatory properties, can improve the appearance of acne.	SENSITIVE OILY COMBINATION ACNE-PRONE
AHA & BHA	Citric Acid	192	Improves fine lines and wrinkles, exfoliates skin, improves skin texture, has antibacterial properties, may act as astringent. Research on OTC concentrations limited.	OILY COMBINATION ACNE-PRONE
BHA	Salicylic Acid	138	Improves fine lines and wrinkles, exfoliates skin, improves skin texture, has antibacterial and anti-inflammatory properties, reduces oil production, unclogs pores.	OILY COMBINATION ACNE-PRONE

Glycolic Acid

Glycolic acid is probably the most well-known and commonly used AHA and is made from the sugar cane plant. It has the smallest molecular weight among AHAs which means that it is better able to penetrate skin and can be more effective. However, this also means that it has the potential to be more irritating.

Lactic Acid

Lactic acid is another well-known AHA that is made from the sugars found in milk (lactose). It is naturally present in our skin as part of the natural moisturizing factors (NMFs) which means that it makes an excellent moisturiser. Lactic acid is generally less irritating than glycolic acid and, due to its moisturising properties, may be more suitable for those with dry skin.

Malic Acid

Malic acid is made from acids found in fruits such as apples. It is less effective than both glycolic acid and lactic acid which is likely due to its larger molecular weight. However, it may enhance the effects of other acids when used in combination.

Tartaric Acid

Tartaric acid is a lesser-known AHA that is made from acids found in grapes (and wine!). There is less research to support the effectiveness of tartaric acid, but it is known to have antioxidant properties.

Mandelic Acid

Mandelic acid is made from bitter almond extracts and has a particularly large molecular weight. This means that it is unlikely to cause irritation but probably needs to be combined with other AHAs or BHAs in order to be effective. However, it does have antibacterial and anti-inflammatory properties which may be of benefit to those with acne.

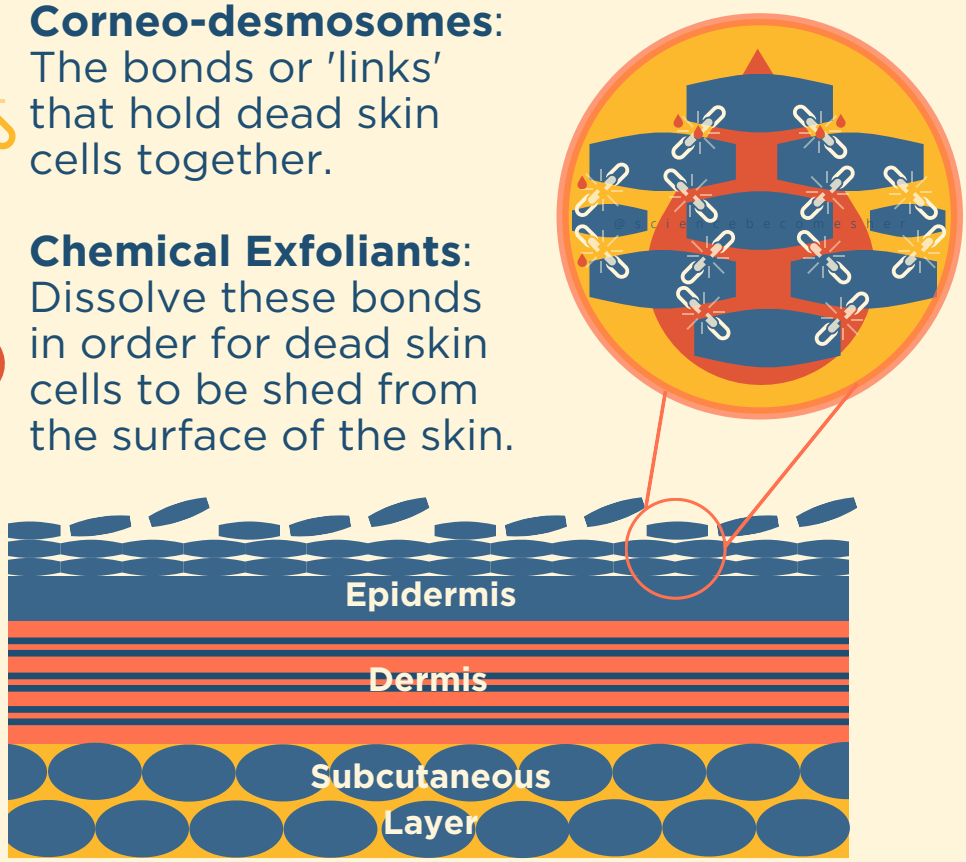
Citric Acid

Citric acid is made from citrus fruits and has the largest molecular weight among AHAs. It is often added into skincare products to adjust the pH level closer to the skin's natural pH (approx. 4.7 – 6). Research regarding the effectiveness of citric acid as a chemical exfoliant has generally looked at concentrations higher than those found within over-the-counter skincare products.

How Chemical Exfoliants Work

Corneo-desmosomes: The bonds or 'links' that hold dead skin cells together.

Chemical Exfoliants: Dissolve these bonds in order for dead skin cells to be shed from the surface of the skin.



BHA

BHAs are oil-soluble carboxylic acids that can penetrate deeper into the pores to exfoliate and remove dead skin cells and sebum. The most common BHA is salicylic acid but some AHAs, such as malic acid and citric acid, are also BHAs.

In addition, derivatives of salicylic acid, such as beta-lipohydroxy acid (LHA), are also considered to be BHAs.

BHAs are commonly used to improve the appearance of acne due to their antibacterial and anti-inflammatory properties and their ability to effectively penetrate pores.

Salicylic Acid

Salicylic acid is made from the bark of the willow tree and has a higher molecular weight than a lot of AHAs (138). Like AHAs, salicylic acid can help exfoliate skin and reduce the signs of premature aging. However, due to its ability to reduce oil, it is better suited to oilier skin types in order to avoid over-drying skin.

Citric Acid & Malic Acid

Citric acid and malic acid are both classed as AHAs & BHAs due to their chemical structure. Both appear to have antibacterial properties and citric acid may have an astringent effect, meaning that it can help ‘dry-out’ the skin.

AHA vs BHA

One key difference between AHAs vs BHAs is how they affect the skin's photosensitivity. Photosensitivity refers to the skin's ability to tolerate UV radiation and plenty of skincare ingredients, as well as some medications, can affect this.

Skincare ingredients can be photosensitising, meaning that they decrease the skins tolerance of UV radiation, or photoprotective, meaning that they increase the skins tolerance to UV radiation.

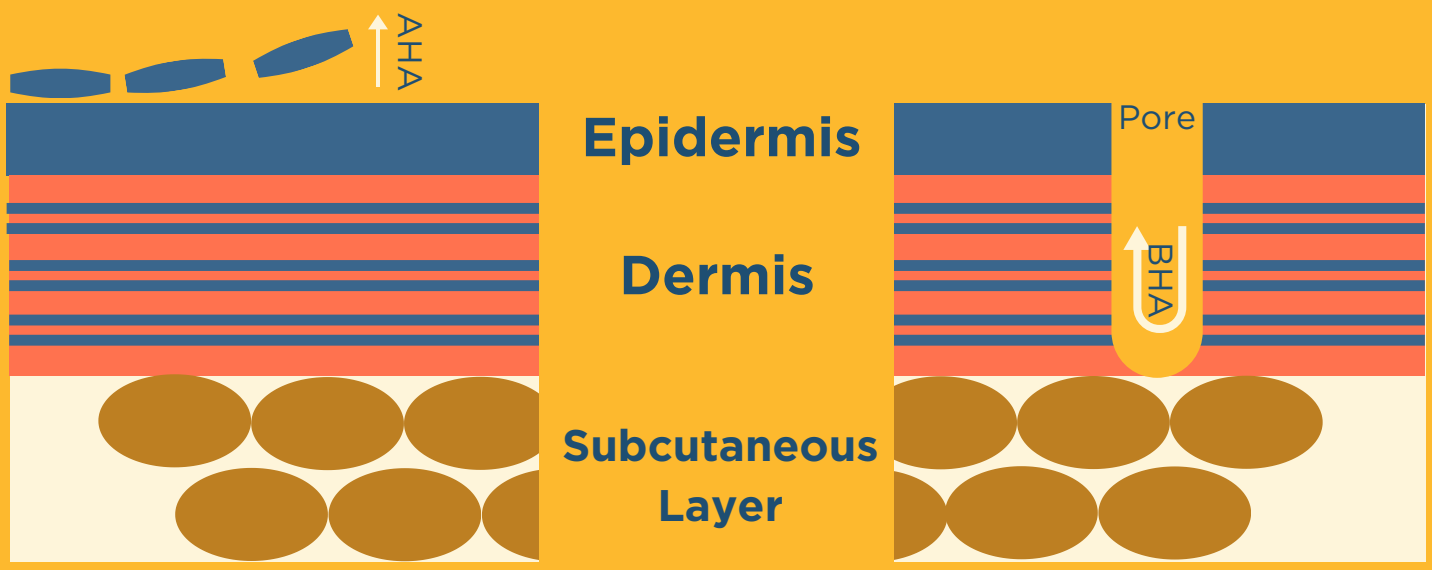
Generally speaking, BHAs are photoprotective whereas AHAs are photosensitising – although this appears to mainly be the case for glycolic acid.

However, this key difference between AHA vs BHA shouldn't really matter as we should all be wearing sunscreen everyday (sometimes even indoors) to prevent sun damage in the first place.

The acid you choose to use will mainly be dependent on your skin type. Both AHAs and BHAs exfoliate skin, improve the appearance of fine lines and wrinkles, and reduce pigmentation and other signs of sun damage. However, BHAs are better suited to those with combination or oily, acne-prone skin types and may be too drying for dry and sensitive skin types.

AHAs are generally suitable for all skin types, but those with sensitive skin should opt for higher molecular weight AHAs in order to reduce the risk of irritation.
Those with dry skin may find that lactic acid suits them best due to its excellent ability to hydrate skin.

AHA VS BHA



ALPHA-HYDROXY ACIDS

- Water-soluble
- Exfoliates dead skin cells from the surface of the skin
- Suitable for all skin types
- Can make the skin more sensitive to UV damage
- Can help hydrate skin
- Can stimulate collagen production

Glycolic Acid

Lactic Acid

Mandelic Acid

Tartaric Acid

Malic Acid

BETA-HYDROXY ACIDS

- Oil-soluble
- Penetrates into pores to exfoliate dead skin cells & sebum
- Suitable for oily/combination skin types
- Can help protect skin from UV damage
- Can help reduce inflammation & bacteria growth

Salicylic Acid

Lipohydroxy Acid (LHA)

Polyhydroxy Acids (PHAs)

Polyhydroxy acids (PHAs) work in a similar way to AHAs and break down the bonds between your skin cells, facilitating your skin's natural exfoliation process and revealing newer, smoother, and more youthful skin.

However, they're much gentler than AHAs which makes them a better option for exfoliating sensitive skin.

PHAs also offer antioxidant benefits and don't appear to increase sun sensitivity like AHAs.

Examples of PHAs include:

- **Lactobionic acid**
- **Gluconolactone**
- **Galactose**

They offer similar benefits to other chemical exfoliants, although there is less research behind them.

Other Acids

While hydroxy acids are usually what people are referring to when they talk about acids in skincare, there are other 'acids' that you may come across. These aren't considered to be chemical exfoliants, although some do have a mild exfoliating effect.

Ascorbic Acid

Ascorbic Acid is the active form of Vitamin C - the most abundant antioxidant in your skin that's essential for the production of collagen.

More collagen = plumper, younger looking skin.

As well as it's excellent anti-aging benefits, vitamin C also:

- Reduces dark marks and brightens skin by preventing the activity of the enzymes required for melanin production.
- Reduces inflammation
- Reduces blood vessel dilation and facial redness
- Prevents the growth of 'bad' bacteria (the type that cause skin infections and acne)
- Some derivatives of vitamin C can improve the appearance of acne
- Improves skin texture
- Prevents premature skin aging (when used with sunscreen) by neutralising free radicals (substances that damage DNA and break down collagen and elastin)

Azelaic Acid

Azelaic acid is a dicarboxylic acid found in grains like wheat and barley. It's suitable for even the most sensitive, rosacea prone skin and offers a wide-variety of benefits.

- It reduces inflammation
- It improves redness and rosacea
- It removes dirt, bacteria, and oil from pores
- It's antibacterial
- It can improve the appearance of acne and acne marks (post-inflammatory erythema/hyperpigmentation)
- It prevents melanin synthesis which helps brighten skin and reduce dark marks/hyperpigmentation
- It reduces skin sensitivity
- It improves skin texture

It also provides a gentle exfoliating effect that is well tolerated by sensitive skin but may cause an initial worsening of breakouts (purging).

Ellagic Acid

Ellagic acid is an antioxidant found in various fruits and vegetables that can help protect your skin from sun damage and the associated collagen loss. It's also an underrated brightening treatment that works by inhibiting tyrosinase and reducing melanin production.

Ferulic Acid

Ferulic acid is an antioxidant found in various plants and fruits that helps boost the effectiveness of other antioxidants, particularly vitamins C & E. At higher concentrations (12-14% - i.e. ferulic acid peels) it can help fade pigmentation and brighten and hydrate your skin.

Hyaluronic Acid

Hyaluronic acid is a glycosaminoglycan (amino sugar) that can bind up to 1000x its weight in water. It's a humectant, and a component of your skin's natural moisturising factors (NMFs) which means that it draws water into your skin and holds it there.

So, even though it has 'acid' in its name, it actually nourishes and hydrates your skin rather than exfoliating it.

As well as hydrating your skin, hyaluronic acid helps to:

- Increase skin elasticity (well-hydrated skin has more elasticity or 'bounce' which means that it returns to its shape when pulled or poked)
- Reduce the appearance of fine lines and wrinkles almost instantly thanks to its hydrating effect (dehydrated skin makes fine lines and wrinkles appear much worse)
- Heal wounds by reducing inflammation and bacteria growth

It's naturally present all round your body but the majority of your body's hyaluronic acid is found in your skin.

As you age, your body produces less hyaluronic acid which can reduce the volume of your dermis and your epidermal skin cells as well as reducing overall skin hydration. This can leave you with dry, cracked, and irritated skin that has less bounce as well as more visible fine lines and pores.

Kojic Acid

Kojic acid is made from various different types of fungi. It can also be created as a byproduct when some foods ferment (e.g. soy sauce).

In skincare, it's mainly used to reduce hyperpigmentation and brighten skin as it targets tyrosinase and prevents the production of melanin.

There is also evidence to suggest that it is:

- Anti-inflammatory
- Anti-bacterial
- Anti-aging
- An antioxidant

Kojic acid may offer a certain amount of UV protection too but, when used over a long period of time it can actually make your skin more sensitive to the sun and increase your risk of sunburn.

It may cause irritation, and inflamed and itchy skin, but this is usually when it's used at higher concentrations or by individuals with sensitive skin.

Also, it has been suggested that kojic acid might contribute to skin cancer if it's applied to broken skin, although further research is needed to confidently support this claim.

Polyglutamic Acid

Polyglutamic acid is a polypeptide made from chains of the amino acid glutamic acid, found in fermented soybeans. Like hyaluronic acid, it's also a humectant but it has the added bonus of increasing the production of your skin's natural moisturising factors.

When compared to hyaluronic acid, research suggests that polyglutamic acid is more hydrating as it can absorb 5000x its own weight in moisture compared to hyaluronic acid's 1000x absorption. However, it is a larger molecular weight that hyaluronic acid so will sit on top of the skin.

Polyglutamic acid also protects your skin's natural hyaluronic acid by preventing the activity of (inhibiting) hyaluronidase - an enzyme that breaks down hyaluronic acid.

Tranexamic Acid

Tranexamic acid comes from the amino acid lysine and has traditionally been used as an oral medication to reduce heavy bleeding. However, it has gained attention in the skincare industry for its ability to reduce melanin production and brighten skin.

It can also help:

- Strengthen your skin barrier
- Improve the symptoms of rosacea
- Improve acne

Retinoic Acid

Retinoic acid (retin-a/tretinoin) is the active form of vitamin A/retinoids and is what retinol has to convert to when it penetrates your skin. Retinoic acid helps treat a wide-range of skin conditions and is one of the only skincare ingredients that's clinically proven to alter your skin on a cellular level.

Retinoic acid is an antioxidant that increase the rate that your skin makes new skin cells and moves them to the surface of your skin in order to be shed. It also:

- Boosts collagen production
- Reduces inflammation
- Helps prevent acne scarring
- Helps unclog pores and treat acne
- Reduces pigmentation by preventing melanin production as well as getting rid of existing pigmentation by increasing skin cell turnover
- Improves the appearance of fine lines and wrinkles.

Unfortunately, retinoic acid is renowned for causing skin irritation - particularly when you first start using it. It can also damage your skin barrier if used improperly which can make a lot of skin conditions worse and take a long time to correct.

When starting retinoic acid use, it's important to start slowly (e.g. once a day for two weeks, then twice a day for two weeks, and so on) in order to reduce the risk of irritation.

Acids Cheat Sheet

	ANTI-AGING	ACNE-FIGHTING	BRIGHTENING	EXFOLIATING	HYDRATING
AHAS	✓	✓	✓	✓	✓
BHAS	✓	✓	✓	✓	
RETINOIC ACID	✓	✓	✓		✓
ASCORBIC ACID	✓		✓		✓
PHAS	✓	✓	✓	✓	✓
HYALURONIC ACID	✓				✓
TRANEXAMIC ACID	✓	✓	✓		✓
AZELAIC ACID	✓	✓	✓	✓	
KOJIC ACID	✓		✓		
FERULIC ACID	✓		✓		✓
ELLAGIC ACID	✓		✓		