



Erythropoietic Protoporphyrin (EPP)

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➤ 1. What is Erythropoietic Protoporphyrin?

Erythropoietic protoporphyria (EPP) is an uncommon inherited porphyria, first identified in the early 1960s, that affects about 1/150 000 of the population in Western Europe. In EPP there is a build-up of one particular porphyrin called **protoporphyrin** that is produced in excess from the bone marrow. Protoporphyrin accumulates in the body especially in the red blood cells, in the liver and in the skin which becomes sensitive to light.

➤ 2. What causes EPP ?

In EPP, there is usually a shortage of an enzyme (a protein which helps convert one chemical substance into another), called ferrochelatase (FECH), that adds iron to protoporphyrin to make haem. As a result of the enzyme shortage, protoporphyrin levels build up in the blood. As blood passes through the skin, the protoporphyrin can absorb the energy from sunlight. This sets off a chemical reaction that can slightly damage surrounding tissues. The nerve endings in the skin interpret this as itching or burning pain, and if the blood vessels are affected, they can leak slightly, causing swelling. The light that the protoporphyrin absorbs is different from that which causes normal sunburn. Sunburn is caused by the shorter wavelengths of ultraviolet light (UVB), but in EPP the skin is more sensitive to longer wavelengths (UVA) and visible light. Light of the wavelengths that cause the skin reaction in EPP, unlike those that cause sunburn, can pass through window glass.

➤ 3. How is EPP inherited?

Everyone has two genes for ferrochelatase in each cell in their body (one inherited from their mother and one from their father). In over 90% of families, EPP comes about by the affected individuals inheriting a gene for a severely underactive ferrochelatase enzyme from one parent, and a less severely underactive gene from the other parent. This less severely affected gene (so called "weak FECH gene") is quite common in Northern Europe, being present in about 10% of the population, but by itself does not normally cause EPP even when present in both gene copies. This explains why although EPP is inherited there are not always others in the family with the condition.

➤ 4. Will my children inherit EPP?

To get an answer to this question, you should seek advice from a genetic counsellor or porphyria specialist and both you and your partner may need a gene test. For most people with EPP, the risk that their child will have EPP depends on whether their partner carries the 'weak FECH gene' (see paragraph 3 above). Nine out of ten partners will not carry this weak gene and for such couples the risk of having a child with EPP is very low, less than one in a 100. But if your partner does carry the weak gene, the risk becomes much higher at one in 4. In about 5% of families, inheritance is more complicated but this can usually be revealed by gene testing.

➤ 5. What are the symptoms of EPP?

Exposure of the skin to sunlight causes the skin to tingle, itch or burn, and may be associated with redness and swelling. This usually starts within a few minutes of skin exposure to direct sunlight. Often these effects can take hours to days to go away completely, and during this time the skin may feel more sensitive to extremes of temperature. The light need not be direct – reflected light off water, snow and sand, and through window glass, including car windscreens, can also cause the symptoms.

EPP usually starts in childhood, and affects males and females equally. Infants can cry or scream after being taken out into the sunlight, and older children may complain of burning, try to wave hands in the air, or put them in cold water to try to relieve the pain.

A very small number of people who have EPP may develop liver damage. Fortunately this is rare.

➤ 6. What does EPP look like?

Despite severe discomfort there may be no visible changes in the skin, although sometimes the skin can become red and swollen. With time and repeated exposure to sunlight, some people develop thickening of the skin over their knuckles and



small scars on the cheeks, nose and backs of the hands. However there is wide variation in the skin changes between different individuals.

7. How is EPP diagnosed?

The diagnosis is usually suspected from the story that is told to the doctor, and can be confirmed by a blood test. The blood test measures the amount of protoporphyrin in the blood. Some doctors will also ask for a stool sample to measure the level of protoporphyrin. No urine tests are relevant to this condition except to exclude other types of porphyria.

Although it is unlikely that you will develop liver problems as a complication of EPP, your doctor may monitor the way your liver is working by yearly blood tests and/or US examination of the liver. If deterioration in liver function is detected, your doctor will provide specific advice on certain treatments that may help to halt or reverse this.

Your doctor may also measure your haemoglobin as it is very common for those with EPP to be slightly anaemic (a low haemoglobin combined with a low serum iron). However this does not usually need to be treated as oral supplementation with iron will be ineffective in correcting the slightly low haemoglobin concentration. Iron treatment is usually required only for those who also have iron deficiency from another cause.

8. Is there a cure for EPP?

At present there is no cure for EPP.

9. How can EPP be treated?

The aim of most treatments is to give your skin extra protection from sunlight, so that you can tolerate sunlight better.

Medical treatments for EPP include:

- **Beta-carotene** – derived from the chemical that makes carrots orange, some people with EPP find taking beta-carotene capsules helpful. The capsules are available on prescription from your doctor, are taken by mouth, and usually give the skin a slight orange colour. This medicine is considered safe, but may occasionally cause slight tummy upset.
- **Antihistamines** – these tablets or syrups may be useful for the few people in whom the swelling response of the skin is a major problem.
- **Phototherapy** – Narrow-band UVB and PUVA therapy is a form of ultraviolet light therapy used in dermatology departments. It involves careful exposure to artificial ultraviolet light, usually three times a week for about five weeks in the spring, to allow the skin to thicken slightly and develop a tan. This acts as a natural sunblock and can improve tolerance to sun exposure.
- Treatments being developed and assessed include the use of L-acetyl cysteine, MSH (melanotan), and dihydroxyacetone paint.

You should also see your doctor regularly, at least once a year, to have a blood test to determine whether your liver is being damaged by protoporphyrin. Although this rare, if it does happen, it is important to detect it as early as possible.

10. What can I do?

It is sensible to avoid unnecessary exposure to sunlight. Other helpful measures include the wearing of protective clothing and use of special sunscreens

- **Clothing** – simple measures such as clothes from tightly woven cloth, long sleeves, wearing a hat (ideally with a wide brim or Foreign Legion-style), shoes rather than sandals, and gloves, particularly for driving.
- **Sunscreens** – as EPP is characterised by sensitivity mainly to visible light, conventional sunscreens that protect against ultraviolet (particularly UVB) are usually not effective. Reflectant sunscreens based on titanium dioxide or zinc oxide cover both UVA, UVB, and visible light to a degree, will be more effective.
Examples of reflectant sunscreen products available on prescription and from chemists include:

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| - Ambre Solaire® lotion SPF 60 | - RoC total Sunblock® lotion SPF 25 |
| - Delph® lotion SPF25 | - Sensense® Ultra SPF 60 |
| - Delph® lotion SPF 30 | - Uvistat® cream SPF 22 |
| - E45 Sun® lotion SPF25 | - Ultrablock® cream SPF30 |
| - E45 Sun® lotion SPF50 | |
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11. Can certain medications make EPP worse?

EPP is an erythropoietic porphyria which differs from acute hepatic porphyrias that can be made worse by certain medications. **EPP is not made worse by any of these medications.** Therefore, unless the person is allergic to a medication for any other reason, individuals with EPP have no restrictions in taking any form of medication that their health requires.

12. Where can I get more information about EPP?

As EPP is uncommon, most general practitioners will have little experience of the condition. However, dermatologists see most people with EPP; if they have little personal experience of the problem, they may refer you to one of their colleagues with particular expertise or to a **porphyria specialist centre for investigations and discussion.**

The content on this website is based on a consensus agreed by EPNET partners. Although there are a number of other sources of information, the majority of which are on the internet, they may not have been validated by porphyria specialists. Most give details about all the forms of porphyria, although there are a few specialising just in EPP:



↳13. Organisations specialising in EPP

Erythropoietic Protoporphyrin Research and Education Fund (EPPREF)

www.brighamandwomens.org/eppref

Netherlands EPP Foundation

www.epp.info

↳14. Organisations dealing with all forms of porphyria

Dedicated internet sources on all forms of porphyria

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