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skin 'n' bones connection



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2 Contents

3 Fertility and psoriasis

4-5 From skin to joint

6-7 Artificial intelligence

8 NHS waiting list

9 Are you what you eat?

10-14 Scalp psoriasis

15 Psoriasis and the heart

16 Methotrexate and photosensitivity

17-19 Pso Pscience

20 Campaigning

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Dear Reader

Developing any condition can be a worry; is that small patch of irritated skin a passing problem? Or something of greater concern?

For most people the former is most likely, but if it's psoriasis, then the story is more complicated. Once believed to be just an external problem, which will resolve with some cream, the psoriatic picture is now much bigger.

It is accepted that the skin signs are an external indication of something deeper; as far back as 1959 in *The American Journal of Medicine* Dr Verna Wright published *Rheumatism and psoriasis: A re-evaluation*. In 1964 psoriatic arthritis was recognised as a separate disease, and in 1973 Wright, along with colleague Dr John Moll, defined the criteria for psoriatic arthritis.

Today, our understanding has moved on, and links and risks to other conditions have been established. These are explored on pages 3, 4, 5, 9 and 15. In Pso Pscience, starting on page 17, Dr David Ashton once again explores a variety of studies that add further to the expanding knowledge of what is now known as psoriatic disease.

Managing editor

PAPAA's position on pharmaceutical funding

PAPAA does not receive funds (either directly or in kind) from the pharmaceutical industry or commercial sector. All activities are funded via donations, subscriptions, charitable grants, legacies or other income generation. We believe that this allows us to act in an open, non-biased way and free from any perceived influence or agendas that may arise. We do not link our activities to commercial marketing or public relations campaigns and will only link our name or logo to an activity if we believe it is beneficial to our constituent group.

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Disclaimer

The contents of the journal are aimed at providing information that may be of interest to people with psoriasis and/or psoriatic arthritis or those who have a specialist interest, whether in a personal or professional capacity. Some articles which will be included are of general interest and may or may not relate directly to either psoriasis or psoriatic arthritis. This material may include aspects related to health, services or products that are available.

We believe that at the time of printing all information is correct and cannot be held responsible for any inaccuracies that may occur, nor do we endorse any products that may appear in this journal.

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Always consult your own doctor or medical healthcare provider.

PAPAA is an independently funded UK patient-centred charity that supports both patients and professionals by providing material that can be trusted (evidence based), which has been approved and contains no bias or agendas

Main activities revolve around the themes of Care, Cause and Cure, where we provide extensive information, provide education and support research via a small grants scheme. Collaborative work is also part of the charity's activities, we are open to approaches to work together as a partner organisation or as a supportive promotor, to raise awareness of areas of activity, which are beneficial to people affected by psoriasis, psoriatic arthritis and associated co-morbid conditions, including other auto-immune mediated diseases.

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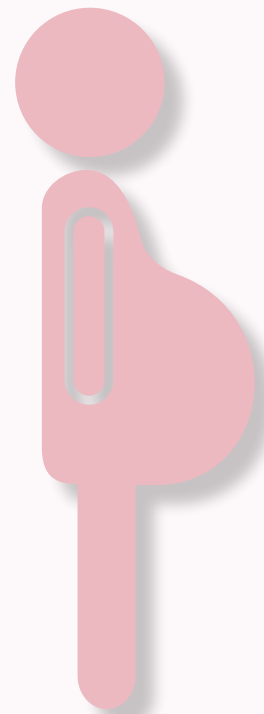


COVER PHOTO:

Psychedelic man space portal colours

By Adrian Tambo

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Studies examining fertility and pregnancy outcomes in women with psoriasis have reported conflicting findings, mainly due to limitations of study design. Most studies had small sample sizes (less than 100 women) and were therefore too small to detect significant differences. In addition, most studies lacked a matched comparison group and so were unable to estimate the association of fertility and adverse pregnancy outcomes in women with psoriasis when compared with the general population.

Therefore, in this very recent, large population-based cohort study from the UK, researchers aimed to investigate fertility rates and pregnancy outcomes in patients with psoriasis, compared with matched, non-psoriatic controls. They used data from 887 primary care practices which had contributed to the UK Clinical Practice Research Datalink GOLD database between 1998 and 2019. Overall, there were 4,224,536 female patients in the dataset, 63,681 of whom had psoriasis. Of these, 3,252 (5.1%) were classified as having moderate-to-severe disease, defined as having been prescribed systemic treatments (methotrexate, apremilast, ciclosporin etc), phototherapy or biologic therapies (adalimumab, secukinumab, ustekinumab etc). For each person with psoriasis, five comparators without psoriasis were identified. The median follow-up was 4.1 years.

Outcome measures included pregnancy losses (including miscarriages, ectopic pregnancy, and any unspecified loss), antenatal haemorrhage, hypertension, gestational diabetes, pre-eclampsia, and caesarean section.

Results showed that overall, women with psoriasis had higher fertility rates than controls, but that women with moderate-severe psoriasis had lower fertility rates. They also found that people with psoriasis had a slightly higher risk of pregnancy loss. However, there were no significant

differences between the groups in the risks of antenatal haemorrhage, gestational hypertension, gestational diabetes, pre-eclampsia, or caesarean delivery.

Comment

For most women with psoriasis, these findings are reassuring. They show that for the majority (95%), fertility rates are actually higher than in controls. Overall, fertility rates in women with psoriasis follow national trends. In the group with moderate-severe disease, however, fertility rates were significantly (25%) lower, and the researchers speculate on what mechanisms might account for this. Their observation that women with psoriasis had a statistically higher risk of pregnancy loss needs to be treated with caution, because it really is only a slight increase, of little practical significance. It was also reassuring that there was no significant increase in risk of other pregnancy-associated complications.

The take-home message is that whilst women with moderate-to-severe psoriasis may find it more difficult to conceive, when they do, they (as with those with mild psoriasis) do not have a significantly increased risk of pregnancy-associated complications.

Reference:

Chen TC, Iskandar IYK, Parisi R, et al. Fertility Trends and Adverse Pregnancy Outcomes in Female Patients with Psoriasis in the UK. *JAMA Dermatol.* 2023; 159:736-744.

The transition from psoriasis to psoriatic arthritis and the early diagnosis of psoriatic arthritis are of considerable scientific and clinical interest. People typically have psoriatic skin disease for a decade or more before they begin to experience the joint involvement of psoriatic arthritis.

Understanding more about the natural history and trajectory of this disease will help in the future prevention of the transition from psoriasis to psoriatic arthritis. The early diagnosis of psoriatic arthritis is also of considerable scientific and clinical interest.

The new EULAR (The European Alliance of Associations for Rheumatology) points-to-consider¹ were developed by a multidisciplinary task force of 30 members from 13 European countries, with healthcare professionals from rheumatology and dermatology, as well as methodologists and patient research partners.

The work was completed in line with EULAR standardised operating procedures. All information included in the final paper, published in the June 2023 issue of the *Annals of the Rheumatic Diseases*, was based on two systematic literature reviews plus expert consensus.

Overall, five overarching principles and ten points-to-consider were formulated. The principles acknowledge that people with psoriasis may develop psoriatic arthritis at different times (or not at all) and highlight that there is a need for close collaboration between dermatologists and rheumatologists, although the rheumatologist has a key role in psoriatic arthritis diagnosis and management.

They also stress that being able to identify risk factors for psoriatic arthritis may influence therapy choices in people with psoriasis, especially since certain systemic treatments for psoriasis may reduce the risk of transition to psoriatic arthritis. The points-to-consider highlight arthralgia (joint pain) and abnormalities seen on ultrasound or MRI (magnetic resonance imaging) as key elements of sub-clinical psoriatic arthritis that can potentially be used as short-term predictors of who will go on to develop psoriatic arthritis.

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This also makes these elements useful in designing clinical trials looking at psoriatic arthritis interception and prevention. Traditional risk factors for psoriatic arthritis development, such as psoriasis severity, obesity and nail involvement, may represent more long-term disease predictors. As such, these are felt to be less useful for short-term trials investigating the transition from psoriasis to psoriatic arthritis.

The task force also proposed some standard naming for three distinct stages in psoriatic arthritis development. Firstly, people with psoriasis at higher risk of psoriatic arthritis, then people with sub-clinical psoriatic arthritis, and then people with clinical psoriatic arthritis. This is important, as it has been shown in other inflammatory rheumatic musculoskeletal diseases that clinical onset is preceded by a pre-clinical phase where a person has arthralgia and immunological or imaging abnormalities, in the absence of a clinical diagnosis. The task force also proposed a definition for early psoriatic arthritis based on the development of joint swelling as a clinical outcome measure for trials of psoriatic arthritis.

EULAR hopes this publication will help to define the clinical and imaging features of people with psoriasis who should raise clinical suspicion for progression to psoriatic arthritis. They also hope it can be used to identify people who could benefit from a therapeutic intervention to delay or prevent psoriatic arthritis.

In the meantime, people with psoriasis should be informed about the risk of developing psoriatic arthritis and encouraged to report their symptoms to facilitate early psoriatic arthritis recognition.

In another study, published in *Arthritis & Rheumatology*, investigators developed and validated a tool called PRESTO² that identifies people with psoriasis who face an elevated risk of



arthritis. For example, PRESTO can be used to enrich prevention trials with at-risk populations. It can also identify patients with psoriasis who can benefit from early treatments, and it can serve as an educational tool for patients to increase awareness of psoriatic arthritis risk," said corresponding author Lihi Eder, MD, PhD, of Women's College Hospital and the University of Toronto in Canada. "Ultimately, we hope that these efforts will improve the lives of people living with psoriatic disease."

Comment:

In these two recent pieces of work, a clear message is that early detection of psoriatic arthritis is needed, along with monitoring people with psoriasis, so action can be taken to avoid the potential issues that arise once psoriatic arthritis has become obvious.

developing psoriatic arthritis and may therefore benefit from preventive therapies.

Among 635 people with psoriasis followed in the University of Toronto psoriasis cohort, 51 and 71 developed psoriatic arthritis during one-year and five-year follow-up periods, respectively.

The risk of developing psoriatic arthritis within one year was higher in people of younger age, male sex, family history of psoriasis, back stiffness, nail pitting (dents, ridges, and holes in the nails), joint stiffness, use of biologic medications, poor health or pain severity.

The risk of developing psoriatic arthritis within five years was higher in people with morning stiffness, psoriatic nail lesion, psoriasis severity, fatigue, pain, or use of systemic non-biologic medication or phototherapy.

Taking these data into account, PRESTO uses a mathematical model to estimate an individual's risk of developing psoriatic arthritis. The PRESTO calculator is available online.

"The PRESTO tool could serve future efforts to reduce the progression from psoriasis to psoriatic

References:

1. Zabotti A, et al. EULAR points to consider for the definition of clinical and imaging features suspicious for progression from psoriasis to psoriatic arthritis. *Ann Rheum Dis* 2023; 0:1–9. doi:10.1136/ard-2023-224148.
2. Eder L, et al. Derivation of a Multivariable Psoriatic Arthritis Risk Estimation Tool (PRESTO): A Step Towards Prevention. *Arthritis & Rheumatology*. First published: 09 August 2023.

About EULAR:

The European Alliance of Associations for Rheumatology, EULAR, is the non-profit organisation that represents people with rheumatic and musculoskeletal diseases (RMDs), health professionals in rheumatology (HPR), rheumatologists and scientific societies of rheumatology of all the European nations.

The Medicines and Healthcare products Regulatory Agency (MHRA) has announced it is taking forward its new 'regulatory sandbox', the AI-Airlock, which will provide a regulator-monitored virtual area for developers to generate robust evidence for their advanced technologies.

Artificial intelligence in healthcare represents the exciting potential to improve patient outcomes in many ways, for example through improving diagnoses and treatment selections, optimising medication dosages, and providing enhanced personalised care for patients.

Technologies like these can sometimes be challenging to test using traditional trial techniques and would therefore benefit from the AI-Airlock project's collaborative approach to identifying and managing evidence requirements.

This means patients could benefit from faster access to developing technologies, such as improved diagnostics or precision medicine, in light of this recent announcement.

This world-leading partnership between government, regulators and industry will see advanced AI technology used in NHS settings, with strict safety controls, ahead of navigating regulatory approval. Where successful, the AI-Airlock will help NHS patients to benefit earlier from emerging technologies before they are available anywhere else in the world.

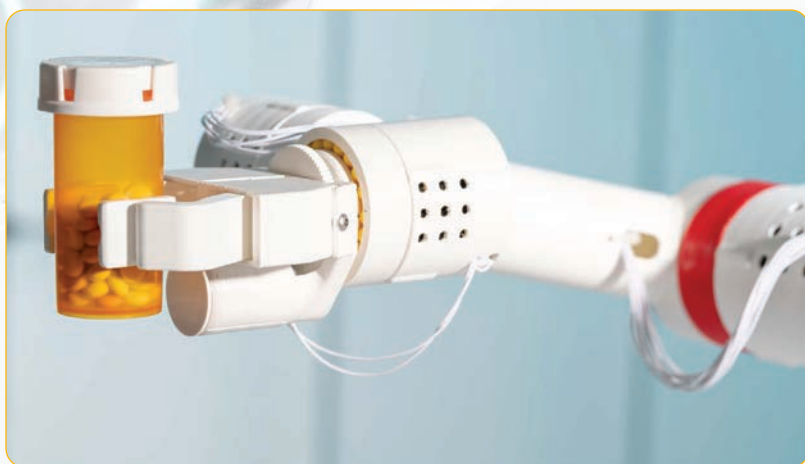


This will support innovators to work within the current regulatory system, identify where their products need to build more evidence needed for a safety and efficacy assessment, and help resolve issues.

It follows a robust process, so manufacturers of software and AI medical devices understand and deliver what is required to ensure the real-world viability of these devices. The process, following the 'regulatory sandbox' model, is a world-leading mechanism to assist in the safe development and deployment of software and AI medical devices.

This learning can then be shared, helping to provide an evidence base that promotes a wider understanding of the challenges and potential solutions that are available.

This initiative demonstrates the MHRA's commitment to building on its existing capabilities and investing its regulatory expertise to enable highly innovative areas of medical product development, bringing cutting-





edge products to UK patients faster, without compromising on its robust standards of safety and performance.

The AI-Airlock is designed to be a collaborative space, bringing together expertise from innovators, regulatory organisations including approved bodies, government, the NHS and academia.

The announcement of government funding from the Department of Science, Innovation and Technology and the Department of Health and Social Care will enable development of the service so that it will be ready to launch in April 2024.

Dr Paul Campbell, MHRA head of software and AI, said: "Building on the success of the regulatory sandbox, we are excited to deliver a new,

world-leading methodology to support safe early access to AI for patients and healthcare.

"We need to ensure that AI is safe and properly regulated, but in a way that doesn't stifle innovation and access to the latest of medical technologies to improve patient care.

"The deployment of AI and machine learning enabled med-tech devices is challenging, given the level of complexity of these products.

"However, by moving beyond conventional product concepts and associated regulations, sandboxes like the AI-Airlock offer a unique and safe learning space for manufacturers to work with regulators and other parties to explore new, cutting-edge solutions to help resolve these challenges.

"The new AI-Airlock scheme run by the MHRA will give us answers about how best to provide safe and effective products, such as AI-driven medical devices, to the NHS and patients."

Dominic Cushnan, NHS England AI, imaging & deployment director, said: "The NHS is already a leader in the testing of new AI technologies, and I am proud that we are now funding and collaborating on this new initiative with the MHRA to help move the dial even further, to bring the latest state-of-the-art AI and its benefits to the NHS and patients faster."

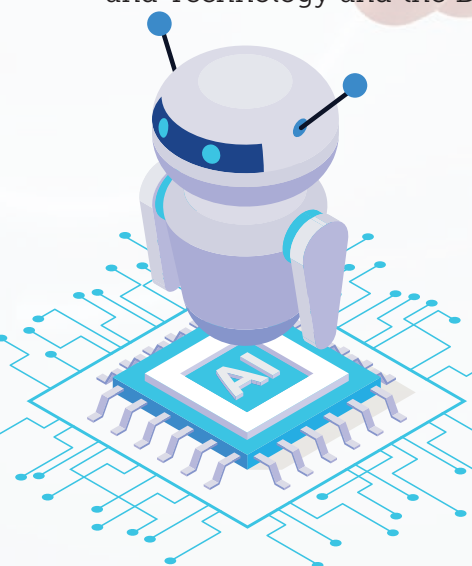
About the MHRA:

The Medicines and Healthcare products Regulatory Agency (MHRA) is responsible for regulating all medicines and medical devices in the UK by ensuring they work and are acceptably safe. Its work is underpinned by robust and fact-based judgements to ensure that the benefits justify any risks.

The MHRA is an executive agency of the Department of Health and Social Care.

Source:

MHRA media release



New analysis by the Health Foundation shows that, if current trends continue, the waiting list for routine hospital treatment (elective care) in England could rise to over eight million by next summer, regardless of whether NHS industrial action continues.

The analysis models four different future scenarios to look at the prospects for reducing the waiting list by the end of 2024. It shows that, on current trends, the waiting list could peak at eight million by August 2024 if there is no further strike action, before starting to fall. If strike action were to continue, the waiting list could be 180,000 higher.

The analysis finds that industrial action by consultants and junior doctors has so far lengthened the waiting list by around 210,000, just 3% of the overall size of the list, which totalled 7.75 million at the end of August 2023. The analysis points out that strikes are also likely to have indirect impacts, by squeezing NHS finances and diverting management attention away from productivity improvement.

Tackling the NHS waiting list is a key priority for the government. NHS England's elective care recovery plan, published in February 2022, included an expectation that it would be falling by March 2024, while in January 2023, the Prime Minister pledged that 'NHS waiting lists will fall and people will get care more quickly'. At the time the pledge was made, the waiting list stood at 7.2 million.

The analysis, which features an interactive 'waiting list calculator', also includes illustrative better and worse case scenarios. Only in the better case scenario, where the number of completed treatments grows by 10.4% a year, a third faster than currently, would the waiting list fall to the same level as when the Prime Minister made his pledge by the end of 2024. The expectation set out in the elective care recovery plan would not be met under any of the scenarios.

The analysis also shows that monthly referrals for treatment are now back to pre-pandemic levels,

and growing at a faster rate, which is a positive sign that patients are coming forward having

postponed treatment. The NHS has responded well, with monthly treatments growing at a faster rate than pre-pandemic. But the waiting list is still rising as the number of treatments does not yet exceed the number of referrals.

The analysis notes that efforts to reduce the waiting list could also be disrupted by a new wave of COVID or a bad winter flu season, or by cutbacks to hospital care as a result of financial pressures.

Charles Tallack, director of data analytics at the Health Foundation, said: "Despite the progress made by the NHS in increasing activity, the waiting list for elective care in England has now reached over 7.7 million, and is likely to continue to grow for several more months. Behind these numbers are people anxious for a diagnosis, patients in avoidable pain and lives put on hold.

"While industrial action has a range of impacts on NHS organisations, the strikes have only directly resulted in a small increase in the size of the overall waiting list. Ministers have been quick to blame industrial action for the lack of progress in reducing the waiting list but the roots of this crisis lie in a decade of underinvestment in the NHS, a failure to address chronic staff shortages and the longstanding neglect of social care. The pandemic heaped further significant pressure on an already stressed system but waiting lists were already growing long before COVID.

"Eliminating the backlog for elective care and returning waiting times to 18 weeks is entirely possible - it was done in the early 2000s and it can be done again. However, it will be very challenging and will require sustained focus, policy action and investment."



Source:

www.health.org.uk

October 2023



What's your gut got to do with it? you may ask, regarding your psoriasis. Apparently, quite a lot, according to new published data in *Science Translational Medicine* by the Inflammatory Arthritis Microbiota Consortium, based at the Kennedy Institute of Rheumatology.¹

The study looked at the human microbiome, which is the term for a group of bacteria and microorganisms that play a vital part in our body's function but which in some instances can be harmful. Imbalances can cause problems, not least bloating, indigestion and diarrhoea. There has already been a link made between the microbiome and IBS (irritable bowel syndrome).

In the study, stool (poo) samples were analysed from 221 individuals with rheumatoid arthritis, ankylosing spondylitis or psoriatic arthritis and 219 healthy controls. The aims were to see whether what was in the gut bacteria of those with inflammatory conditions was linked to higher levels of inflammation.

The study results found that those with inflammatory arthritis shared similar alterations to the make-up of their gut bacteria, which has suggested that there is some link with or influence on inflammation in humans.

The researchers feel that the work has expanded the understanding of what likely role changes in the gut have on those with inflammatory arthritis.

Regardless of whether gut bacteria are associated with higher levels of inflammation, it needs to be remembered that the vast majority of people developing psoriatic arthritis have pre-existing psoriasis.

While studies have suggested that smoking, obesity and heavy alcohol consumption may make existing psoriasis worse, their relationship to psoriatic arthritis is unclear.

A recent large study² examined whether these factors may increase the risk of psoriatic arthritis in a large population of patients with pre-existing psoriasis.

Using the U.K. Clinical Practice Research Datalink between 1998 and 2014, researchers identified 90,189 people with psoriasis, 1,409 of whom subsequently developed psoriatic arthritis.

They then examined the association between changes in body mass index (BMI), smoking habits and reported alcohol consumption in relation to the risk of developing psoriatic arthritis.

Results showed that being overweight or obese significantly increased the risk of developing psoriatic

arthritis. Indeed, those with a BMI of 35 (obese class II) or above were 2.5 times more likely to develop psoriatic arthritis than those with a normal body weight.

Importantly, reducing BMI over a 10-year period was associated with a reduction in the risk of developing psoriatic arthritis compared with weight remaining constant over the same period. There was an increased risk with moderate alcohol consumption but not with heavy consumption, but no association with smoking.

References:

1. Alterations in the gut microbiome implicate key taxa and metabolic pathways across inflammatory arthritis phenotypes Thompson, et al. Published 26 July 2023 <https://www.science.org/doi/10.1126/scitranslmed.abn4722>
2. Reference: Green A, Shaddick G, Charlton R, et al. Modifiable risk factors and the development of psoriatic arthritis in people with psoriasis. *Br J Dermatol* 2020, 182: 714-720



If you have scalp psoriasis, you are not alone. Around one in two people who have psoriasis will have it on their scalp. The area usually includes the hairline, forehead, back of the neck and, often most irritating, around the ears. The reasons why the scalp is more commonly involved are unknown.

As most people with scalp involvement know, treating it can be difficult and usually requires specifically formulated treatments. The shedding flakes can cause embarrassment and make choice of clothing a challenge too. The scalp psoriasis page on the PAPAA website is the most commonly visited page, which suggests that people are keen to learn more and try to resolve the problem.

Is it different?

Psoriasis on the scalp forms in the same way as on other parts of the body but the hair traps the scales of skin. This means it does not rub away as it would, for instance, on the elbow. The result is that the scale can quickly build up, causing a thicker plaque which becomes more difficult to treat. This difficulty is compounded by the hair, which acts as a physical barrier obstructing the easy application of creams and ointments to the affected skin. On rare occasions, scalp psoriasis has been known to disappear spontaneously, but it can remain on the scalp for lengthy periods of time too.

What are the symptoms?

Scalp psoriasis causes redness – in darker skin this may be purple or greyish – and of course there will be a certain amount of flaky skin scale. It can range from very mild with slight, fine scaling to very

severe, crusted, thick scaling covering the entire scalp. Hair loss during the flare-up can occur in some cases, but the hair will normally grow back. Psoriasis can be itchy, make the scalp feel tight, and occasionally cause soreness, especially if there are cracks in the skin.

What are the treatments?

There are many treatment options that can help scalp psoriasis and often a combination approach using a number of different treatments may be required until the symptoms have settled. It is important to remember to continue to treat the scalp even if hair falls out. Hair usually grows back once the inflammation and scale has cleared.

Treatments can be time-consuming and you may find them easier if you ask someone to help you. It is important to choose one that suits your lifestyle; carrying out intensive treatments over the weekend, for example, when you have more free time. Scalp psoriasis is not curable, but the signs and symptoms can be well controlled.

It can take at least eight weeks until you gain adequate control of the plaques. Remember to try to treat psoriasis daily when it is active.

If, however, you have seen no improvement after four weeks' continuous treatment, you should return to your healthcare provider for further assessment.

Once you have gained adequate control of your scalp psoriasis, it is important to maintain the improvement. This can usually be done with regular use of a tar shampoo and/or by moisturising the scalp occasionally with an oil or emollient. Some people find daily treatment of the scalp an advantage in keeping the scales from returning, but this would be a personal preference depending on your circumstances. If you have no success in controlling your scalp psoriasis, ask your GP to refer you to a specialist. This will most often be a dermatologist at your local hospital or, in some instances, other specialist services may be on offer.

In 2012¹, the National Institute for Health and Care Excellence (NICE) published a guideline on treating scalp psoriasis. It is recommended that you begin with the treatment process below.

This guidance is based on the scientific evidence available and will not always be suitable for everyone.



Topical treatment for scalp psoriasis in adults, young people and children

- Offer a potent corticosteroid applied once daily for up to four weeks as initial treatment for people with scalp psoriasis.
- Show people with scalp psoriasis (and their families or carers where appropriate) how to safely apply corticosteroid topical treatment.
- If treatment with a potent corticosteroid does not result in clearance, near clearance or satisfactory control of scalp psoriasis after four weeks, consider:
 - a different formulation of the potent corticosteroid (for example, a shampoo or mousse) and/or
 - topical agents to remove adherent scale (for example, agents containing salicylic acid, emollients and oils) before application of the potent corticosteroid.
- If the response to treatment with a potent corticosteroid for scalp psoriasis remains unsatisfactory after a further four weeks of treatment, offer:
 - a combined product containing calcipotriol monohydrate and betamethasone dipropionate applied once daily for up to four weeks, or
 - vitamin D or a vitamin D analogue applied once daily (only in those who cannot use steroids and with mild to moderate scalp psoriasis).
- If continuous treatment with either a combined product containing calcipotriol monohydrate and betamethasone dipropionate applied once daily or vitamin D or a vitamin D analogue applied once daily for up to eight weeks does not result in clearance, near clearance or satisfactory control of scalp psoriasis, offer:
 - a very potent corticosteroid applied up to twice daily for two weeks for adults only, or
 - coal tar applied once or twice daily, or
 - referral to a specialist for additional support with topical applications and/or advice on other treatment options.



Below is more detailed information about the treatments and how they are used in the current treatment pathway.

Topical steroids (corticosteroids)

Topical steroids come in various formulations and some are specifically designed as scalp products. These tend to be lotions, gels, foams, sprays or shampoo, so they can be used more easily in hair-covered areas, are more cosmetically acceptable and are easier to wash out. When there is a lot of scale and soreness, you may be advised to avoid topical treatments with high alcohol content as these often cause drying and stinging; a gel or lotion-based product might be more suitable.

Corticosteroids come in different strengths, ranging from mild to very strong potency. Potent steroids are usually prescribed for scalp treatment, but these are not suitable for the face or around the ears. They should not be used continuously for long periods of time. They are used, ideally, for a few weeks to bring the psoriasis under control, and then gradually phased out, switching to maintenance treatment with a coal tar shampoo and/or emollients. Sometimes the corticosteroid becomes less effective after repeated use and you may need to try an alternative formulation or treatment for a while.

When you are using potent steroids on the scalp, take care not to let the treatment run onto your face or behind your ears, as the skin is much thinner in these areas and more prone to damage. It's important to wash your hands after using these treatments so you do not spread the treatment to other areas by mistake.

Vitamin D analogues

Vitamin D analogues are available as ointment, gel, foam or lotion, depending on the brand. They are usually applied once or twice a day and left in contact with the scalp (i.e. do not need to be washed out). They do not smell or stain clothing, and are relatively easy to use, although not all are specifically designed for use on the scalp. They can be used to bring the scalp psoriasis under control and maintain that control. One manufacturer combines the treatment with a potent steroid and this must therefore be avoided on the face and behind the ears. Products without steroid content are safe to use on the forehead too, but can sometimes cause irritation. It is wise to test a small patch before applying it to the entire scalp. In all cases, avoid contact with the eyes.



Tar products

Tar shampoos, gels, ointments and creams are commonly used to treat scalp psoriasis and can be used on the hairline, forehead and around the ears. They may be combined with other medications, such as salicylic acid or coconut oil, to help remove scale. Tar is effective but it can stain clothing and jewellery and has a strong smell, so some people dislike using it. The precise instructions for use will depend on the formulation of the product, but tar products are usually massaged into the scalp, left in contact for a period of time (perhaps 1-2 hours) and then washed off. Clothes and bedding can be protected from staining by wearing a shower cap during the contact period. Make sure you receive full instructions from your nurse, doctor or pharmacist on how to use the product safely and effectively.



Medicated shampoos

There are several coal tar and medicated shampoos for treating scalp psoriasis available from your local chemist. For further advice, speak to your pharmacist. You should bear in mind that medicated shampoos are designed for treating the scalp rather than washing hair, so using regular shampoo and conditioner after your scalp treatments will reduce any unpleasant smell and leave your hair shiny and manageable. When using tar shampoos, you should massage the shampoo into the scalp and leave for 5-10 minutes before rinsing out. Tar shampoo alone is not recommended for treating severe scalp psoriasis (i.e. where there is thick scaling and redness).

Emollients/Oils

Sometimes emollient ointments or oils can be useful in softening thick, adherent scale on psoriasis plaques. Other 'active' treatments like steroids or tar will work better if the scale is removed first, because they can then better penetrate the area that needs treating. There are a couple of products specifically marketed for this purpose, but preparations such as olive oil, coconut oil or softened emulsifying ointment may be used, or your pharmacist may be able to recommend an alternative emollient or lotion.

Oil (olive or coconut) can be dribbled onto the scalp and massaged in, section by section, trying to avoid too much going on the hair. The scalp can then be wrapped in a towel, shower cap or cling film and left for 30-60 minutes. The scalp and hair can then be washed with normal or tar shampoo. While the scalp is still damp, the scales should be softened and looser, making them easier to remove by hand. You may



find this more manageable if you have someone to help. Place a plastic, fine-toothed comb flat against the scalp and gently rotate it in a circular motion. Loosen the scale carefully and try to comb it out of the hair. Do not remove scales too fiercely as this can damage the skin and cause hair loss. You can then shampoo again to wash away debris from the scalp and out of the hair. The hair may need two washes if it remains oily. You can, of course, use a hairdryer to dry your hair afterwards. Once this is done, an active treatment such as a corticosteroid lotion can be applied. Some people find that a combination of techniques works better for them, so work out a regime that suits your circumstances and gives you the results that you find most convenient.

NB: Tar ointments are used in a similar way.

WARNING: Studies have shown that emollient creams that become dried on clothing, dressings and other material can catch fire if exposed to a source of ignition (this could include a spark from a naked flame, while smoking, using cigarette lighters or any other situation where the product could be exposed to a potential flame source). There have been reported incidents where injury caused by the ignition of material which has come in contact with emollient creams has led to serious and life-threatening situations and even death.

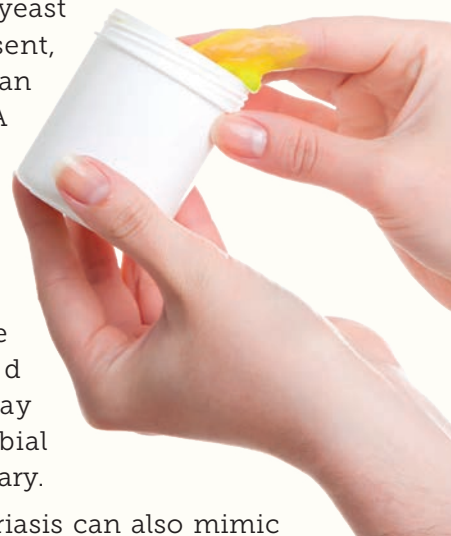
Beyond these commonly prescribed options there are other treatments that may be offered to you.

Dithranol

Dithranol creams may be effective in scalp psoriasis but, like coal tar, can be difficult to use and are not often prescribed for home use. Dithranol is usually applied to the scaly plaques and left in contact for up to 30 minutes before being rinsed out. It needs to be applied with great care as it can irritate and cause purple staining of blonde or red hair. Dithranol can also burn skin unaffected by plaques. Lipid-stabilised dithranol, if used correctly, can reduce staining. Do be aware that dithranol will stain clothing and baths, showers and wash basins. Extra attention is needed and so it is probably best reserved for supervised use in dermatology clinics only.

Antimicrobial treatment

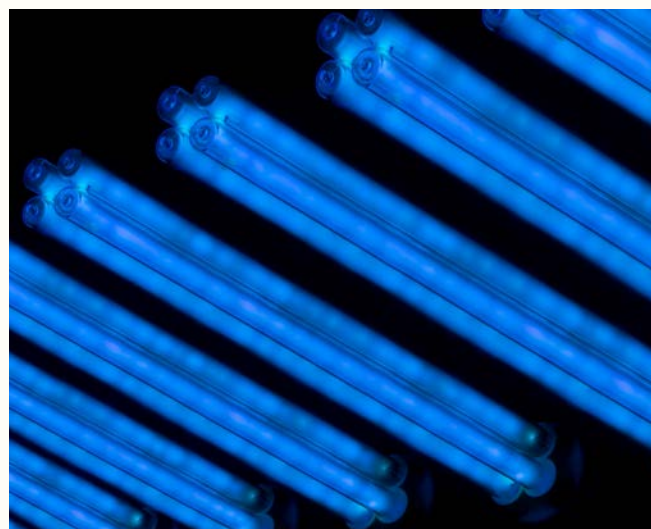
If a bacterial or yeast infection is present, scalp psoriasis can become worse. A crusting scalp together with scaling and/or swollen lymph nodes in the neck may indicate infection and your doctor may deem antimicrobial treatment necessary.



Mild scalp psoriasis can also mimic or coincide with a yeast infection and so may respond well to treatment with antifungal shampoos. Antifungal shampoos may have to be used once or twice a week thereafter to maintain results.

Ultraviolet light

Successful outcome from UV light treatments is poor because the hair blocks UV light from penetrating the scalp. It works best on shaved heads. Natural sunlight may help if your head is shaved or hair is thin.



Salicylic acid

A lot of product treatments will contain salicylic acid, known as a keratolytic. This ingredient aims to break down the psoriasis scales so they can be washed away more easily. It is contained in both over-the-counter (OTC) and prescription

products. It's worth remembering that treatment with high concentrations of this ingredient can cause irritation and sometimes weaken hair, resulting in some temporary hair loss. Hair should, however, return to normal after stopping the treatment.

Combination medications

The treatment of psoriasis should be tailored to each person. Your doctor or nurse may try various combinations of treatments before finding which works best for you. Make sure you ask how to use the treatments and, if possible, have some written instructions, as it can be confusing if you are prescribed several different products.

Systemic treatments

For severe and recalcitrant (difficult to treat) scalp psoriasis, systemic treatments may be considered. These may include treatments that are taken orally (tablet by mouth) or as a self administered subcutaneous injection. There are specific guidelines for these therapies and they would be administered under the care of a dermatologist.

Recent studies published and presented at the European Academy of Dermatology and Venereology (EADV) Congress held in Berlin last October reveal that topical cream and foam formulations of roflumilast, a highly potent and selective phosphodiesterase-4 (PDE4) inhibitor, are being investigated as a once-daily, nonsteroidal, topical treatment for multiple dermatologic conditions, including scalp psoriasis. Early efficacy data is promising, but research is still in the early stages, so it could be some time before such a therapy is available for patients. It is encouraging, though, that scalp psoriasis is being seen as an important area to tackle.



Hairdressing

Some people with scalp psoriasis find it embarrassing when they first visit a new hairdresser or barber. Any reputable hairdresser should have an understanding of conditions such as scalp psoriasis and be able to advise you on styles, colourings and hair products. It is always worth making general enquiries of friends and relatives about local hairdressers or contacting the Hairdressing Council (<https://haircouncil.org.uk>) for further advice. Some hairdressers are also happy to visit your home if you would prefer not to go to a salon.

There is no evidence to suggest the use of hair dyes, hair sprays or perms will affect your scalp, but make sure you ask your hairdresser to apply patch tests before embarking on any treatments, to see if the products will irritate your scalp or psoriasis lesions. They may be able to use or advise you of gentler products.

PAPAA produces a leaflet called *Scalp Psoriasis*, which is available to order from our shop as a free paper version or can be downloaded as a digital copy.

References:

1. Psoriasis: assessment and management: Clinical guideline [CG153]. Published: 24 October 2012. Last updated: 01 September 2017

Many studies have shown that people with psoriasis have a higher risk of cardiovascular disease when compared with the general population. This is generally believed to be due to a higher prevalence of cardiovascular risk factors such as hypertension, smoking, raised cholesterol levels and diabetes, leading to blockages – plaque deposits – in the coronary arteries (the blood vessels supplying the heart). When these deposits become so marked that the blood supply to the heart muscle is no longer adequate, the patient may suffer symptoms such as angina or a heart attack. This is called obstructive coronary artery disease (CAD), obviously because of the blockages in the main arteries.

However, in recent years, more attention has been paid to the microcirculation of the heart – the system of tiny capillaries that provide the heart muscle with blood and oxygen. Disease in this system of blood vessels is called coronary microcirculatory dysfunction (CMD). CMD has been shown to be a predictor of cardiovascular disease, both in the general population and in patients with psoriasis. However, measuring CMD directly is very expensive and time-consuming. Instead, measuring coronary flow reserve (CFR) with a form of ultrasound (echocardiography) has been shown to be an accurate and relatively easy way to assess CMD. Importantly, reduced CFR consistently identifies patients at increased risk of heart attack and death.

In a recent study, investigators assessed the prevalence of reduced CFR in patients with severe psoriasis, using echocardiography. The study population consisted of 448 psoriatic patients (69% male) with an average age of 45 years. Severity of psoriasis was assessed using the Psoriasis Area and Severity Index (PASI) score, the duration of the disease, and current medication. The average duration of psoriasis was 15.2 years and the average PASI score was 12.

Note that because a reduced CFR can occur in both CMD and obstructive coronary disease, patients who were found to have a low CFR underwent a procedure called angio-CT to exclude major blockages (stenoses) in the coronary arteries. None of the 448 subjects were found to have obstructive coronary disease, so all patients in this study with an impaired CFR were affected by disease of the microcirculation (CMD).

In all, a total of 141 (31.5%) of patients showed evidence of CMD. The study revealed that psoriasis severity, hypertension, the duration of the disease

and the presence of psoriatic arthritis were all independently associated with a higher risk of CMD – as confirmed by lower CFR measurements. Interestingly, other conventional cardiovascular risk factors, such as smoking, raised cholesterol levels and diabetes, did not predict microcirculatory heart disease.

Comment

Previous studies have shown that patients with severe psoriasis have an increased cardiovascular morbidity and mortality. However, there has been limited research on the specific mechanisms underlying this increased risk. This study suggests that heart disease in patients with psoriasis may involve two mechanisms: (1) blockage of main coronary arteries due to standard risk factors such as smoking, diabetes, raised cholesterol levels etc, and (2) CMD – damage to the microcirculation of the heart due to the generalised inflammation associated with psoriasis. Clearly, both forms of the disease may be found together, but they may also exist independently. In this study, almost one-third of patients with psoriasis had evidence of CMD, in the absence of any arterial blockages or symptoms. Moreover, the absence of traditional risk factors in a patient with psoriasis would not exclude the possibility of an increased risk of cardiovascular disease due to CMD. As the authors point out, CFR may have a role as a screening test for CMD in patients with severe psoriasis, along with standard risk factors.

More research is needed, however. We need prospective studies to establish whether the presence of CMD is a better predictor of morbidity and mortality from cardiovascular disease than traditional risk factors. We also need to understand whether earlier and more aggressive treatment for psoriasis with biologic agents would bring about an improvement in CMD and a reduced risk of cardiac disease.

In the meantime, this study emphasises yet again that psoriasis is a systemic inflammatory disease which may have detrimental effects well beyond the skin.

Reference:

Piaserico S, Papadavid E, Cecere A, *et al.* Coronary Microvascular Dysfunction in Asymptomatic Patients with Severe Psoriasis. *Journal of Investigative Dermatology*, 2023; 143, 1929-1936

Methotrexate is an immunosuppressant medicine that is used to treat inflammatory conditions such as rheumatoid arthritis, Crohn's disease and, of course, psoriasis and psoriatic arthritis. It is also used as a cancer treatment.

The Medicines & Healthcare products Regulatory Agency (MHRA) has recently received a coroner's report following a case of a photosensitivity reaction in a patient on methotrexate. This reaction was found to have contributed to their death by secondary infection. As a result of this, the MHRA have reviewed the information available to healthcare professionals and patients regarding these reactions and sought advice from the Pharmacovigilance Expert Advisory Group (PEAG) of the Commission on Human Medicines.

Photosensitivity reactions are established side effects of methotrexate treatment and are currently listed in the product information, including the Patient Information Leaflet (PIL). However, the PEAG was concerned that it is not a well-known side effect and many people may not be aware of the additional risks of sun exposure during methotrexate treatment.

Characteristics of reactions

Photosensitivity reactions often look and feel like sunburn. They can leave sun-exposed skin with a rash, redness, swelling, blisters, red bumps or oozing lesions. Severe cases can cause secondary skin infection.

Photosensitivity reactions fall into two categories: phototoxic reactions and photoallergic reactions.

In phototoxic reactions, a drug is activated by exposure to UV light and causes damage to the skin that can look and feel like a sunburn or a rash. These reactions can happen within minutes or after hours of exposure and are usually limited to the skin that has been exposed.

Photoallergic reactions occur when UV rays interact with the ingredients in medicines or other products applied directly to the skin. The body's immune system recognises changes caused by sun exposure as a foreign threat. The body produces antibodies and attacks, causing a reaction.

These reactions are distinct from "recall" reactions where radiation-induced dermatitis and sunburn can reappear on re-exposure to radiation and sunlight while on methotrexate therapy.



Advice:

- Methotrexate treatment may make your skin more sensitive to the sun
- Sun exposure during methotrexate treatment could cause very severe reactions that look and feel like sunburn
- Avoid exposure to intense sunlight (especially between 11 am and 3 pm) or to UV rays (for example, using sunbeds or tanning equipment) while taking methotrexate
- Use a sun protection product with a high protection factor when exposed to the sun
- Wear a hat, and clothes that cover your arms and legs, when in the sun
- Talk to a healthcare professional if you are worried about a skin reaction you have had while taking methotrexate.

If you do get any form of reaction while taking methotrexate, or indeed any medication, you can report it via the Yellow Card Scheme.

The Yellow Card scheme

The MHRA runs the Yellow Card scheme, which collects and monitors information on suspected safety concerns involving healthcare products, like a side effect with a medicine or an adverse medical device incident.

<https://yellowcard.mhra.gov.uk/>



This science-based newsletter is designed to provide a summary of recently published research. The material has been written and brought together by PAPAA medical advisor Dr David Ashton. A new edition is published in April and October as a free digital-only copy to download from the PAPAA website. To get access you will need to be a website member, which is also free and includes full access to material within PAPAA's Knowledge Bank. The following are the four articles that appeared in issue 4.

Dental health and psoriasis

While scientists do not know the exact causes, several studies conducted in recent years have examined the relationship between psoriasis and dental health. They have repeatedly shown that the worse a person's psoriasis symptoms, the worse their overall dental health tends to be.

In a 2019 study, researchers created a questionnaire for 265 patients seen at the Ohio State University's dermatology clinics.¹ Their aim was to examine the relationship between psoriasis and patient-reported oral health. They found that those who rated their oral health as poor also had the most severe psoriasis. Interestingly, they also noted that individuals who reported eating at least one piece of fruit per day reported better overall dental health. This was a relatively crude study, but it does suggest a link between psoriasis and dental health.

A second 2019 report, this time a prospective study from Germany, compared periodontal disease in 100 patients with plaque psoriasis, with 101 non-psoriatic controls.² The degree of periodontal disease was assessed using a variety of measures, including 'Bleeding on Probing', 'Bleeding on Toothbrushing' and the 'Community Periodontal Index'. Results showed that during the period of follow-up, patients with psoriasis experienced worse periodontal health than non-psoriatic controls – findings consistent with previous studies. Interestingly, however, despite patients with psoriasis having worse gum health than controls, they did not have higher rates of missing teeth.

A third study, this time from China, is a review – a meta-analysis – of all studies which have looked at dental health and psoriasis.³ In all, the authors included eight studies, featuring 812 psoriasis patients and 772 non-psoriatic controls.

Results again showed that psoriasis sufferers have worse periodontal health compared with non-psoriatic controls, in terms of worse gingival inflammation, more alveolar bone loss and – contra the previous study by Woeste *et al* – fewer remaining teeth and more missing teeth.

Comment

It seems clear from the evidence that psoriasis sufferers have significantly worse dental health when compared to their non-psoriatic counterparts. However, it is not clear why that should be the case. There

are similarities between the inflammation in gum disease and that seen in the skin lesions of psoriasis, but other factors such as diet, smoking, and alcohol consumption may also be relevant. It is not known whether improving periodontal health will have a beneficial impact on psoriasis, or whether better management of psoriasis will improve periodontal disease. What is crystal clear, however, is that patients with psoriasis need to be especially vigilant with regard to their dental health.



References:

1. Macklis P, Adams KM, Li D, et al. The impacts of oral health symptoms, hygiene and diet on the development and severity of psoriasis. *Dermatology Online Journal* 2019; Web location: <https://doi.org/10.5070/D3257044813>
2. Woeste S, Graetz C, et al. Oral Health in Patients with Psoriasis – A Prospective Study. *Journal of Investigative Dermatology* 2019; 139: 1237-1244
3. Qiao P, Shi Q, Zhang R, et al. Psoriasis Patients Suffer from Worse Periodontal Status – A Meta-Analysis. *Front Med.*, 2019: Volume 6 - 2019 ; <https://doi.org/10.3389/fmed.2019.00212>

Does vitamin D supplementation improve psoriasis severity?

It is well known that topical vitamin D analogues such as tacalcitol and calcitriol can be very effective in the treatment of psoriasis. However, the efficacy of oral supplementation on disease severity in psoriasis has yet to be demonstrated.

In this well-conducted Norwegian study¹, researchers studied the impact of vitamin D supplements in two parallel groups, across two winter seasons (2017-2018 and 2018-2019). Each of the participants was followed for four months. Adults from the general population in Tromsø with active plaque psoriasis and 25-hydroxyvitamin D (25-OHD) levels of less than 24 ng/mL were included. Measures of disease activity included the Psoriasis Area Severity Index (PASI) and Dermatology Life Quality Index Score.

A total of 122 participants (46 women) were included in the trial. Of these, 60 (49.2%) were randomised to receive vitamin D and 62 (50.8%) were given placebo. A total of 120 participants (59 vitamin D and 61 placebo) completed the trial.

At the conclusion of the study, no significant difference in terms of disease severity was observed between the two groups in any of the measures of disease activity used. The authors conclude that vitamin D supplementation did not affect psoriasis severity. They speculate that low baseline disease severity scores may explain the lack of measurable effect. They also noted that levels of 25-OHD in the vitamin D group did not increase to the levels they would have expected based on previous studies in the same population. This may also have affected the results.

A previous (2018) study of vitamin D supplementation in 65 patients with mild psoriasis (23 given vitamin D and 42 given placebo) also found no benefit for psoriatic patients compared with normal controls.²

Comment

Both studies are methodologically sound, and both suggest that vitamin D supplementation has no

significant effect on psoriatic disease. It is worth noting, however, that the numbers in both studies are relatively small, so we cannot say definitively that supplementation of psoriatic patients with vitamin D is of no benefit. What is needed is a large, properly controlled, long-term study which will look at benefits, optimal dosing, and adverse effects. Such studies are expensive and difficult to administer. In the meantime, given that vitamin D in recommended doses is generally safe, it would seem reasonable to measure levels in patients with moderate-severe psoriasis and to introduce supplements for those who are deficient.

Reference:

1. Jenssen M, Furberg AS, Jorde R, et al. Effect of Vitamin D Supplementation on Psoriasis Severity in Patients with Lower-Range Serum 25-Hydroxyvitamin D Levels: A Randomized Clinical Trial. *JAMA Dermatol* 2023; 159:518-525.
2. Jarrett P, Camargo CA, Coomarasamy C, et al. A randomized, double-blind, placebo-controlled trial of the effect of monthly vitamin D supplementation in mild psoriasis. *J Dermatolog Treat*, 2018;29:324-328.

Psoriasis and bone disease

Over the past decade, accumulating evidence has linked psoriasis and psoriatic arthritis with various diseases, including osteopenia and osteoporosis. Osteopenia is characterised by low bone mineral density (BMD), and can progress to osteoporosis, with diminished bone mass and an increased risk of bone fragility and fractures. Whilst it is generally assumed that having psoriasis increases the risk of low BMD, the evidence for the association is not as clear-cut as one might think. In this study, the authors carry out a comprehensive review of the literature to assess the strength of the association.¹

In all, only 13 studies fulfilled their inclusion criteria. Many of these had small sample sizes, and others had incomplete patient data and inadequate disease documentation. Overall, there does seem to be an association between psoriasis, osteopenia, and osteoporosis, especially in those whose psoriasis is longstanding. However, the strength of the association seems to vary greatly between studies and in several there was no association at all. Moreover, because patients with psoriasis are already in the medical system, they may be more





likely to be diagnosed with bone disease than individuals in the general population (surveillance bias). And to be clear, there is no definitive evidence to suggest that psoriasis causes osteoporosis.

The authors comment that there are very few data on the effect of various treatments on BMD. Some anti-psoriatic drugs, like methotrexate and ciclosporin, may interfere with bone metabolism. On the other hand, there is some early evidence that treatment with some biologic drugs (though not all) may reduce bone loss in patients with psoriasis.

Given the confusion, there is an urgent need for a large-scale, prospective, international multicentre study, to investigate the association between psoriasis and metabolic bone disease, including the impact of various drug and lifestyle interventions.

Comment:

This review confirms an association between psoriasis, osteopenia, and osteoporosis, i.e. that individuals with psoriasis are at an increased risk of metabolic bone disease and bone fractures. However, the magnitude of the risk is difficult to assess in any given case. It seems likely that those whose psoriasis is longstanding are the most vulnerable and, in these patients, close surveillance with regular measurements of bone density and vitamin D levels is probably warranted. Moreover, the use of a biological agent earlier rather than later would seem to be prudent.

Reference:

Psoriasis and osteoporosis: a literature review. Wi D, Wilson A, Stage F, et al. Clinical and Experimental Dermatology, 2022; 47:1438–1445

Outcomes of COVID-19 infection in patients with psoriasis

Do patients with psoriasis who contract COVID-19 infection have worse outcomes than non-psoriatic patients? In this very large study from Israel, investigators used a database of 4.7 million Israeli citizens which was screened for individuals with a diagnosis of psoriasis as documented by a dermatologist. In all, 144,304 patients with psoriasis and 144,304 age- and sex-matched control individuals were identified, 51.3% of whom were female.

Patients with psoriasis displayed a slightly elevated risk of COVID-19 infection compared with the non-psoriatic controls. However, with regard to complications requiring hospitalisation, there was no significant difference between the two groups. Similarly, there was no difference with regard to the risk of dying from COVID-19 infection; mortality in the psoriasis group was 1.61% compared with 1.68% in controls.

Comment:

This was a large and well-conducted study with reassuring results for psoriasis sufferers. While they have a slightly higher risk of COVID-19 infection, they do not have an increased risk for any of the associated complications, including death.

Reference:

Kridin K, Schonmann Y, Onn E, et al. Nineteen months into the pandemic, what have we learned about COVID-19-related outcomes in patients with psoriasis? J Cosmet Dermatol. 2022; 21:6549–6553

How you can help:

If you have seen a recent science-based article or interesting story about psoriasis and/or psoriatic arthritis that you feel needs further explanation or sharing, please let us know. We will endeavour to find the source and produce a simpler view, which we may be able use across our various publications and media outlets.

To contact us, you can use the methods stated on page 2 or use the website contact form at www.papaa.org/contact-us

Campaigning

- **Our vision:** To see psoriasis and psoriatic arthritis managed in a positive way, more effectively.
- **Our mission:** To put people with psoriasis and psoriatic arthritis at the centre of care, deserving of recognition and effective management.
- **Our values:** To act ethically, with integrity on behalf of our constituent group and represent them fairly.
- **Our strategy:** To educate and empower people affected by psoriasis and psoriatic arthritis and those who provide their support and medical care, in order to optimise available resources more effectively.

To supporting our aims, we have developed a campaign called: ~ Care ~ Cause ~ Cure:

- **Care** = Support and education – information, website, training programmes/events.
- **Cause** = Research – funding relevant aligned projects.
- **Cure** = Facilitating the conversation to meet peoples' needs.

Our achievements:

- Around three-quarters of a million pounds provided to support research and training initiatives in psoriatic disease.
- Created the most comprehensive psoriatic disease specific website in the UK, with thousands of free to access items and pages.
- Developed a huge range of printed leaflets on the core aspects of the condition, with hundreds of thousands distributed free.

Promotional material

If you are thinking about supporting PAPAA or raising awareness on behalf of PAPAA about psoriasis and/or psoriatic arthritis, why not check out some of the merchandise we have available?



www.papaa.org/shop

- Trained multidisciplinary healthcare professionals via our CPD accredited Psoriasis in Practice (PIP) programme, with many subsidised to access the training at no cost.
- Provided anonymised access to peer support to those often desperate for someone to listen and hear their voice.
- More than 1,000 healthcare professionals provided with free patient support material regularly.
- Supported 3,500 UK pharmacies to provide free patient resource at the point of medicine delivery.
- Biannual journal called Skin 'n' Bones Connection regularly distributed since 1993 to patients and a wide range of healthcare providers.
- Engaged and represented patient views with UK regulators, including NICE, SMC, AWMSC and the MHRA, to provide input into new drug appraisals and regulatory affairs.
- Actively engaged across the most popular social media applications.
- Gathered real stories via our engagement group and PAPAA surveys with individual views and suggestions from lived experience of psoriatic disease.
- Regular updates provided via an eNewsletter to a large dedicated subscription list.

We continue to furthering the ambition by:

- Raising visibility and the profile of psoriatic disease.
- Providing research funding and support.
- Improving and expanding professional training.
- Further developing information and support material.
- Reviewing and keeping the website accurate.
- Proactively engaging with relevant agencies.

We have so much more to do, your continued support is much appreciated. To see what others have done to support the campaign go to:

www.justgiving.com/campaign/papaa

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