Psoriasis affects nearly 2% to 3% of the world’s population, including 7 million Americans. Between 150,000 and 260,000 new cases are diagnosed annually; both young and old are affected. Racial and ethnic factors seem to influence the prevalence of psoriasis. There are no cases in the Samoan population, but up to 12% of persons in the Arctic Kasach’ye have psoriasis; within the US population, the prevalence in blacks is much lower than non-blacks. Although common, psoriasis has varied clinical presentations. Care providers should be able to recognize its protean manifestations.

Typically, psoriasis is a chronic skin disorder characterized by well-demarcated round or oval erythematous, salmon pink papules and plaques, often with a superimposed silvery scale (see Figure 1). Psoriasis affects men and women equally; onset typically occurs in young adulthood, but the condition can manifest early or late in life. Lesions have a predilection for elbows, knees, scalp, face, gluteal cleft, and umbilicus; the condition also can present on genital skin, palms, soles, and elsewhere. Nail changes include pitting, subungual hyperkeratosis, onycholysis, and the “oil spot,” a pathognomonic finding of a tan-brown spot under the nail plate. These nail changes usually present after cutaneous disease, but may precede its occurrence. When the scale of an individual skin lesion is scraped, spots of punctate bleeding may develop, a phenomenon known as Auspitz’s sign. A variant presentation with an abrupt appearance of numerous small “drop-like” lesions is known as guttate psoriasis. Although guttate psoriasis may flare in patients with a history of classic psoriasis, it may occur in someone without such history, often in the setting of a streptococcal infection, such as pharyngitis. Appropriate antibiotic therapy targeted at streptococci may lead to skin improvement in this presentation.

Inverse psoriasis, a form often misdiagnosed by non-dermatologists, presents in intertriginous parts of the body, such as the inguinal, axillary, intergluteal, and inframammary areas. Scale often is absent and providers should consider this diagnosis if treatment for fungal or bacterial infection has not led to improvement.

More severe forms of psoriasis can lead to serious morbidity and even mortality. Pustular psoriasis can present as an...
Psoriasis is characterized by an acute eruption of initially sterile “lakes of pus” with widespread erythema and scaling (see Figure 2). In addition to the pustules, the von Zumbusch variant also may present with fever, malaise, and leukocytosis. Infection, pregnancy, and withdrawal of oral corticosteroids may trigger pustular psoriasis. A less severe entity, pustulosis of the palms and soles, may cause tender pustules, often with bothersome fissuring.

Erythrodermic psoriasis, a rare manifestation, has been clinically observed to be acute or chronic, and may cause generalized, full body erythema (see Figure 3). Patients can develop complications from the loss of the integument, such as susceptibility to infection, as well as fluid and electrolyte disturbances.

Commonly employed treatments for psoriasis are listed in Table 1.

In addition to its skin-associated complaints, psoriasis has been found to be associated with arthritis, depression, and lower quality of life. Recently, associations with certain cardiovascular risk factors, such as smoking, dyslipidemia, obesity, and elevations of C-reactive protein and hyperhomocysteinemia have led, in part, to patients with psoriasis having an increased risk of myocardial infarction and risk of death. At this point in time, there is only an epidemiologic association between psoriasis and cardiovascular risk, and causation is not conclusively known. Speculation surrounds the systemic inflammatory nature of psoriasis.

Because dermatologists or primary care providers may be the only clinicians caring for a patient with psoriasis, they can play a pivotal role in identifying patients with psoriasis who are at risk for myocardial infarction and premature death. The purpose of this review is to alert clinicians caring for persons with psoriasis of this increased risk and remind them that they need to think about issues that extend beyond just the skin.

Association of Cardiovascular Risk Factors and Psoriasis

Several studies have found that numerous classic cardiovascular risk factors (such as hypertension, diabetes mellitus, obesity, smoking, and dyslipidemia) are significantly more prevalent in patients with psoriasis than in the general population. Smoking, either current or past, was associated with an increased risk of incident psoriasis in the Nurses’ Health Study II that assessed more than 78,000 subjects (RR 1.78 for current smokers and 1.37 for past smokers). Smoking also was identified as an independent risk factor for psoriasis in a prospective cohort study with nested case-control analysis.
of nearly 4,000 patients in the United Kingdom General Practice Research Database. In a large, population-based, cross-sectional study, Niemann et al. found significantly higher rates of diabetes mellitus, hypertension, hyperlipidemia, obesity, and smoking in more than 130,000 patients with psoriasis compared to those without psoriasis; also, persons with severe psoriasis had higher rates of obesity and diabetes than those with mild psoriasis. Similarly, another large case-control study found that patients with psoriasis, as well as persons with atherosclerosis, are at increased risk for developing diabetes mellitus compared to persons without psoriasis. This increased risk of atherosclerosis in psoriasis was further supported by the work of Gelfand et al., who found psoriasis (especially in persons affected at a young age with more severe disease) conferred an independent risk for myocardial infarction, which persisted even after controlling for traditional cardiovascular risk factors. This mounting evidence supports the association between psoriasis, cardiovascular risk factors, and myocardial infarction, making it essential for all physicians to be able to identify at-risk patients and determine when modifiable risk factors are not controlled optimally.

Potential Therapies for Specific Risk Factors

**Obesity.** Obesity is defined as a body mass index (BMI) >30.0; overweight is defined as a BMI between 25.0 and 29.9. BMI is calculated by weight in kilograms divided by the square of the height in meters and can be calculated online at: www.nhlbisupport.com/bmi/bmicalc.htm.

Obesity has well-known associations with diabetes, hypertension, dyslipidemia, sleep apnea, coronary heart disease, and stroke; it is also associated with psoriasis. Because both obesity and being overweight have been associated with increased mortality independent of psoriasis, it is critical to address the higher prevalence of increased BMI in this at-risk population.

**Treatment.** Weight loss can be achieved successfully using nonpharmacologic, pharmacologic, and surgical options. Sibutramine and orlistat, both oral medications, can lead to modest weight loss. Sibutramine, a norepinephrine and serotonin reuptake-inhibitor, occasionally can induce elevations in blood pressure and pulse, insomnia, dry mouth, and constipation. Orlistat, an inhibitor of gut lipase that causes malabsorption of fat, can lead to greasy stools, flatulence, diarrhea, and anal leakage. Bariatric surgery is generally reserved for persons with a BMI >40 or persons with a BMI >35 with other risk factors. This approach has been shown in a retrospective study to lead not only to sustained weight loss, but also to a decrease in mortality in patients followed on average for 10.9 years.

**Hypertension.** Hypertension, defined as a blood pressure of >140/90 mm Hg, has been found to have a high prevalence in patients with psoriasis. Epidemiologic studies have shown the threshold for cardiovascular risk is blood pressures >115/75 mm Hg in all patients, doubling with each increment of 20/10 mm Hg. The higher the blood pressure, the greater the risk of stroke, myocardial infarction, heart failure, and kidney failure.

**Treatment.** Treating hypertension has been found to lower the risk of heart failure by >50%, the risk of stroke by 35% to 40% and the risk of myocardial infarction by 20% to 25%. According to the Joint National Committee guidelines, treatment should be initiated when the blood pressure is ≥140/90 mm Hg for persons without diabetes and ≥130/80 for persons with diabetes or renal disease. Thiazide diuretics, alone or in combination with other anti-hypertensive medications, are preferred for most people with uncomplicated hypertension. For patients with high-risk comorbidities, other agents may be considered for initial therapy, such as beta-blockers (for those with coronary artery disease) or angiotensin-converting enzyme (ACE) inhibitors (for those with congestive heart failure or diabetes mellitus and proteinuria). Although retrospective
studies have shown that beta-blockers are associated with the initiation or worsening of psoriasis, ACE inhibitors, angiotensin II receptor blockers, and the thiazide diuretic, chlorthalidone, also have been associated with psoriasis. 

**Diabetes mellitus.** Diabetes mellitus, which is increasing in prevalence, has been associated with psoriasis. Diabetes is associated with microvascular (retinopathy, nephropathy, and neuropathy) and macrovascular (myocardial infarction, stroke, peripheral arterial disease) complications. Treatment of diabetes mellitus has been found to reduce microvascular complications in both type I and type 2 diabetes, as well as myocardial infarction in persons with type 1 diabetes; whether it decreases macrovascular complications in type 2 diabetes is a subject of investigation. Diabetes management includes diagnosis and maintaining the patient’s glycemic control at accepted targets.

According to the American Diabetes Association, diabetes is diagnosed by a repeatedly abnormal fasting glucose, an elevated nonfasting glucose level in the presence of symptoms, or an abnormal oral glucose tolerance test (see Table 1). Although hemoglobin A1c (a measure of glycemic control for the preceding 2 to 3 months) is not part of the diagnostic criteria, it is helpful in assessing overall glycemic control.

**Treatment.** In the absence of contraindications, the goal hemoglobin A1c for a diabetic patient is <7.0%. Medical management of diabetes mellitus is beyond the scope of this article; an excellent review of the subject has been published by Nathan et al.

**Smoking.** In the US, tobacco use is the leading cause of preventable death and is responsible for more than 400,000 deaths per year, nearly one in five of all deaths; approximately one half of all smokers die prematurely of diseases related to tobacco. Conversely, smoking cessation increases survival. Interestingly, studies have shown that patients who quit smoking for >20 years also reduced their risk for psoriasis.

Counseling and pharmacotherapy have been effective in improving rates of smoking cessation. Simply advising patients to quit increases smoking cessation rates by 30%. Brief counseling, even for fewer than 3 minutes, is more successful than simply advising a patient to quit and has been found to increase the cessation rate two-fold when compared to no intervention.

Nicotine replacement (transdermal patches, gum, vapor inhaler, or nasal spray), the anti-depressant bupropion, and varenicline, the first new smoking cessation medication in nearly a decade, are effective pharmacologic therapies to help smokers quit tobacco use. Varenicline may lead to higher smoking cessation rates than bupropion, but it has been linked to the development or worsening of several psychiatric syndromes.

The combination of counseling and pharmacotherapy may double the rate of smoking cessation seen with pharmacologic therapy alone. More than any other intervention, smoking cessation likely has the greatest impact on a patient’s overall health.

**Dyslipidemia.** Large epidemiological studies have demonstrated that elevated cholesterol levels increase cardiovascular risk. 

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**Table 1. Cardiovascular risk factors and psoriasis: assessment and treatment recommendations**

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Assessment</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obesity</td>
<td>Measure height/weight&lt;br&gt;Consider calculating BMI</td>
<td>Recommend diet and exercise if overweight, consider nutrition consult or referral for medical/surgical therapy</td>
</tr>
<tr>
<td>Hypertension</td>
<td>Measure blood pressure</td>
<td>Recommend diet and exercise, consider medication if BP remains above goal or if initial reading is &gt;160/100 mm Hg.</td>
</tr>
<tr>
<td>Diabetes</td>
<td>Fasting plasma glucose (to diagnose)&lt;br&gt;Hemoglobin A1c (to assess control)</td>
<td>Counsel about the importance of glucose control, refer to appropriate medical professional if new diagnosis or A1c &gt;7.0 %</td>
</tr>
<tr>
<td>Smoking</td>
<td>Ask if current smoker</td>
<td>Recommend smoking cessation, personalize risk, refer to smoking cessation program if available</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>Fasting lipid panel</td>
<td>Refer to NCEP guidelines, recommend diet and exercise if above goal, consider medications if persistently above goal</td>
</tr>
<tr>
<td>Cardiovascular disease</td>
<td>Ask about known heart or vascular disease&lt;br&gt;Assess risk factors&lt;br&gt;Consider calculating a Framingham risk score</td>
<td>Recommend daily aspirin if patient has cardiovascular disease or if 5-year risk of coronary disease is 3% or greater</td>
</tr>
</tbody>
</table>
risk and lowering cholesterol reduces this risk.\textsuperscript{60,61} Guidelines for optimal low density lipoprotein (LDL) cholesterol levels are based on the patient’s underlying risk (see Table 2).\textsuperscript{62} For patients with no or one traditional cardiac risk factor, the goal LDL cholesterol is <160 mg/dL. For persons with more than one cardiac risk factor, the goal LDL cholesterol is <130 mg/dL. For patients with known vascular disease or a calculated Framingham 10-year risk of >20%, LDL targets are <100 mg/dL. An optional LDL goal of <70 mg/dL can be considered for patients at highest risk for myocardial infarction — ie, persons with known vascular disease and diabetes or an ongoing uncontrolled risk factor.\textsuperscript{63} The Framingham 10-year risk assessment can be calculated at: hp2010.nhlbhin.net/atpiii/calculator.asp?usertype=prof.

Treatment. HMG-CoA reductase inhibitors (statins) are preferred cholesterol-lowering agents. They appear to have added benefits, or pleiotropic effects, (ie, improvements in endothelial function and reduction of inflammatory markers) beyond the effect of lowering LDL levels. If their use is contraindicated, nicotinic acid, bile acid sequestrants, ezetimibe, or fibrates can be used.\textsuperscript{62} High-density lipoprotein (HDL) is protective against cardiovascular disease, but HDL increase has been found to be more amenable to dietary than to pharmacotherapeutic intervention than lowering the LDL.\textsuperscript{63}

Aspirin use. Aspirin’s anti-platelet and anti-inflammatory properties\textsuperscript{64,65} have been shown to reduce recurrent cardiovascular events in persons with established cardiovascular or cerebrovascular disease.\textsuperscript{66} Several studies\textsuperscript{67-70} also have evaluated the role of aspirin in primary prevention. The US Preventive Service Task Force\textsuperscript{71} found aspirin use decreases the risk of coronary heart disease in persons with increased risk, but at the cost of higher rates of gastrointestinal bleeding and fair consensus evidence of increases in hemorrhagic stroke. The researchers concluded aspirin should be used when the 5-year risk of coronary disease is 3% or greater, but only after discussing potential risks and benefits with the patient. The absolute risk of major coronary events can be calculated using the Framingham risk score.\textsuperscript{72,73} Aspirin also is recommended for patients with diabetes because they have similar cardiac risk as patients with established coronary artery or other vascular disease.\textsuperscript{65,74}

**Conclusion**

Psoriasis is common and is associated with both cardiovascular risk factors and cardiovascular events independent of these risk factors, as well as premature mortality. The inflammatory milieu seen in this autoimmune process may account for the recently appreciated association between psoriasis, cardiovascular disease, and mortality. Clinicians caring for patients with psoriasis should recognize these cardiovascular risk factors and ensure they are being appropriately addressed and controlled. As with patients

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**Table 2. National Cholesterol Education Program Adult Treatment Panel III Guidelines for the Treatment of Hyperlipidemia**

<table>
<thead>
<tr>
<th>Risk Category</th>
<th>Begin Lifestyle Changes if:</th>
<th>Consider Drug Therapy if:</th>
<th>LDL Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>High: CAD or CAD equivalents (10-year risk &gt;20%)</td>
<td>LDL ≥160 mg/dL</td>
<td>LDL ≥130 mg/dL, Drug optional if &lt;100 mg/dL</td>
<td>&lt;100 mg/dL; &lt;70 mg/dL optional</td>
</tr>
<tr>
<td>Moderate high: ≥2 risk factors with 10-year risk 10% to 20%</td>
<td>LDL ≥130 mg/dL</td>
<td>LDL ≥130 mg/dL</td>
<td>&lt;130 mg/dL; &lt;100 mg/dL optional</td>
</tr>
<tr>
<td>Moderate: ≥ two risk factors with 10-year risk &lt;10%</td>
<td>LDL ≥130 mg/dL</td>
<td>LDL ≥160 mg/dL</td>
<td>&lt;130 mg/dL; &lt;100 mg/dL optional</td>
</tr>
<tr>
<td>Lower: 0 to 1 risk factor</td>
<td>LDL ≥160 mg/dL</td>
<td>LDL ≥190 mg/dL; Drug optional if 160–189 mg/dL</td>
<td>&lt;160 mg/dL</td>
</tr>
</tbody>
</table>

CAD = coronary artery disease; LDL = low density lipoprotein; HDL = high density lipoprotein

CAD risk equivalents: Diabetes, coronary artery disease, peripheral arterial disease, carotid artery disease, abdominal aortic aneurysm, Framingham calculated 10-year risk of ≥20%

Risk factors: Age (men ≥45 years, women ≥55 years), cigarette smoking, hypertension, HDL cholesterol <40 mg/dL, family history of premature CAD (<55 years in first-degree male relative or <65 years in first-degree female relative

Negative risk factor (protective): High HDL (≥60 mg/dL)

with traditionally known vascular disease risk factors, it is important to monitor and discuss patient weight, blood pressure, glycemic control, cholesterol level, and tobacco use, as well as aspirin usage. Dermatologists and primary care physicians have a unique opportunity to intervene by assessing these risk factors. By recognizing and treating these common comorbidities, clinicians may be able to reduce the risk of myocardial infarction and other potentially devastating complications. Future trials must assess the impact of interventions such as aspirin use and aggressive risk factor control in this population. Finally, it is possible, but yet unconfirmed, that treating severe psoriasis may reduce cardiovascular risk. If so, it would be extremely helpful to know whether the various systemic therapies for the treatment of severe psoriasis have differential impacts in reduction of cardiovascular risk in this vulnerable population.

References

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### Table 3. Topical therapies for psoriasis

<table>
<thead>
<tr>
<th>Medication</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corticosteroids</td>
<td>Relatively inexpensive generics available, effective, rapid onset</td>
<td>Atrophy, telangiectasia, systemic absorption possible</td>
</tr>
<tr>
<td>Vitamin D analogues (eg, calcipotriene)</td>
<td>No steroid side-effects, effective, can be used in combination with corticosteroids to minimize side effects</td>
<td>Irritating to face and genitals, slower onset and more expensive than corticosteroids, more than 100 g/week can cause hypercalcemia</td>
</tr>
<tr>
<td>Retinoids (eg, tazarotene)</td>
<td>Effective for limited plaques</td>
<td>Irritating to normal skin, relatively expensive, would not use if pregnancy expected</td>
</tr>
<tr>
<td>Tars</td>
<td>Inexpensive, some over-the-counter preparations available</td>
<td>Malodorous, stains, possible carcinogen</td>
</tr>
<tr>
<td>Keratolytics</td>
<td>Debridement of scale-allow penetration into plaque of second agent</td>
<td>More effective on scale than underlying plaque</td>
</tr>
</tbody>
</table>

### Table 4. Systemic and light therapies for psoriasis

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methotrexate</td>
<td>Effective, useful for psoriatic arthritis</td>
<td>Liver toxicity, leucopenia, dose reductions needed with kidney disease</td>
</tr>
<tr>
<td>Cyclosporine</td>
<td>Rapid onset, effective</td>
<td>Immunosuppressive, hypertension, potential for decrease in GFR, hyperlipidemia</td>
</tr>
<tr>
<td>Retinoids (eg, acitretin)</td>
<td>Efficacious for thick plaques and palmar and plantar psoriasis, useful in combination with UV light</td>
<td>Dryness of skin and mucous membranes, hypertriglyceridemia, highly teratogenic, alopecia, often not useful as monotherapy</td>
</tr>
<tr>
<td>Biological agents (eg, alefacept, efaluzimab, infliximab, etanercept, adalimumab)</td>
<td>Alternative to oral medication, more selective mode of action</td>
<td>Expensive, toxicities include immunosuppression, CHF, and demyelinating diseases for some, questionable risk of malignancy</td>
</tr>
<tr>
<td>Ultraviolet light therapy</td>
<td>Effective and can avoid need for systemic therapy</td>
<td>Time consuming, inconvenient, expensive, doesn’t work for scalp psoriasis, photodamage</td>
</tr>
</tbody>
</table>
Tsankov N, Angelova I, Kazandjieva J. Drug-induced psoriasis.


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