Expert opinion on Psoriasis Management, 2020 and Beyond

Natta Rajatanavin MD,
Chanisada Wongpraparut MD,
Ploysyne Rattanakaemakorn MD,
Leena Chularojanamontri MD,
Padcha Pongcharoen MD,
Bensachee Pattamadilok MD,
Julphat Intarasupht MD,
Napatra Tovanabutra MD,
Pravit Asawanonda MD DSc.

From: Division of Dermatology, Department of Medicine Faculty of Medicine, Chulalongkorn University, Bangkok, Thailand.
Corresponding author: Pravit Asawanonda MD DSc., E-mail: fibrosis@gmail.com

Received: 3 September 2021 Revised: 1 November 2021 Accepted: 7 March 2022

ABSTRACT:

RAJATANAVIN N*, WONGPRAPARUT C, RATTANAKAEMAKORN P*, CHULAROJANAMONTRI L**, PONGCHAROEN P***, PATTAMADILOK B****, INTARASUPHT J*****, TOVANABUTRA N******, ASAWANONDA P*******. EXPERT OPINION ON PSORIASIS MANAGEMENT, 2020 AND BEYOND. THAI J DERMATOL 2022;38:1-16.**

**DIVISION OF DERMATOLOGY, DEPARTMENT OF MEDICINE, FACULTY OF MEDICINE, RAMATHIBODI HOSPITAL, MAHIDOL UNIVERSITY, BANGKOK, THAILAND.*

***DEPARTMENT OF DERMATOLOGY, FACULTY OF MEDICINE SIRIRAJ HOSPITAL, MAHIDOL UNIVERSITY, BANGKOK, THAILAND.*

****DIVISION OF DERMATOLOGY, THAMMASAT UNIVERSITY, PATHUM THANI, THAILAND.*

*****INSTITUTE OF DERMATOLOGY, BANGKOK, THAILAND.*

******DIVISION OF DERMATOLOGY, PRAMONGKUTKLAO HOSPITAL, BANGKOK, THAILAND.*

*******FACULTY OF MEDICINE, CHIANG MAI UNIVERSITY, CHIANG MAI, THAILAND.*

********DIVISION OF DERMATOLOGY, DEPARTMENT OF MEDICINE FACULTY OF MEDICINE, CHULALONGKORN UNIVERSITY, BANGKOK, THAILAND.*

Psoriasis is a chronic immune-mediated inflammatory condition affecting the skin and several other systems. Hence, the holistic approach is recommended to alleviate various organ involvements and multidisciplinary team plays a vital role for patient care. Recently, several studies have shown the promising clinical outcomes of biologic agents to ameliorate either skin plaque or other organ manifestations in psoriasis patients. However, many products are currently available in the market with each agent possessing individual risk-benefit in specific circumstances. Thai dermatologists established a working group to develop this expert opinion for psoriasis management based on international guidelines, the updated clinical studies and real practice experience. The objective aims to be an interim guidance for physicians and healthcare professionals in Thailand who are taking care of psoriasis patients. The summary of expert opinion highlighted in (1) As a systemic inflammatory disease, all moderate-to-severe psoriasis patients should be screened for relevant comorbidities annually, including mental health, (2) Biologic treatment may be recommended for moderate-to-severe psoriasis patients, either as monotherapy or adjunct with conventional therapy, (3) Biologic treatment should be individualized according to patient disease condition and comorbidities and (4) Multidisciplinary collaboration is critical in improving holistic care of psoriasis.

Key words: Psoriasis, Biologic, Comorbidities, Systemic inflammatory disease, Guidance

Introduction

Psoriasis is a chronic immune-mediated inflammatory condition, characterized by erythematous plaques covered by white scales, typically occurring in a symmetrical distribution involving elbows, knees, trunk and scalp. World Health Organization (WHO) reported prevalence of psoriasis varying from 0.09% to 11.4% worldwide. It affects both male and female, of all age groups[1]. Historically, psoriasis was considered a skin disease and was typically treated with topical agents or phototherapy. A new paradigm, that is "Psoriasis as a systemic disease", has been introduced. This more comprehensive approach accounts for disease pathogenesis which involves many inflammatory mediators including tumor necrosis factor (TNF)-alpha, interferon (IFN)-gamma, interleukin (IL)-17, IL-22, IL-23 and IL-1beta. These complex cytokines systemically affect several organs, not only the skin, and contribute to a higher prevalence of myriads of comorbidities among psoriasis patients than the general population. Psoriatic arthritis (PsA), cardiovascular diseases, diabetes mellitus, obesity, inflammatory bowel disease, non-alcoholic fatty liver disease, as well as psychiatric conditions have been reported in relevance with psoriasis presence (Figure 1)[2]. Systemic treatment provides additional benefits on clinical outcomes, besides an improvement of skin symptoms. It potentially prevents damages associated with systemic inflammation.

Treatment landscape for psoriasis has rapidly and continuously evolved. While research and development of novel biologic treatment may promise to reverse existing inflammatory damage and comorbidity, a current psoriasis treatment guideline in Thailand would still need more real life and long-term clinical information for its up-to-date version. In the meantime, it is of academic and clinical values to share and learn from clinical experiences of these biologic agents. An expert meeting, convened in October 2020, has discussed biologic drugs used in psoriasis in Thailand and has developed this expert opinion. Three groups of biologic agents included in the discussion were TNF inhibitors, IL-12/23 inhibitors, and IL-17 inhibitors.

This expert opinion paper shall be considered an interim guidance for physicians and healthcare professionals in Thailand who are taking care of psoriasis patients.

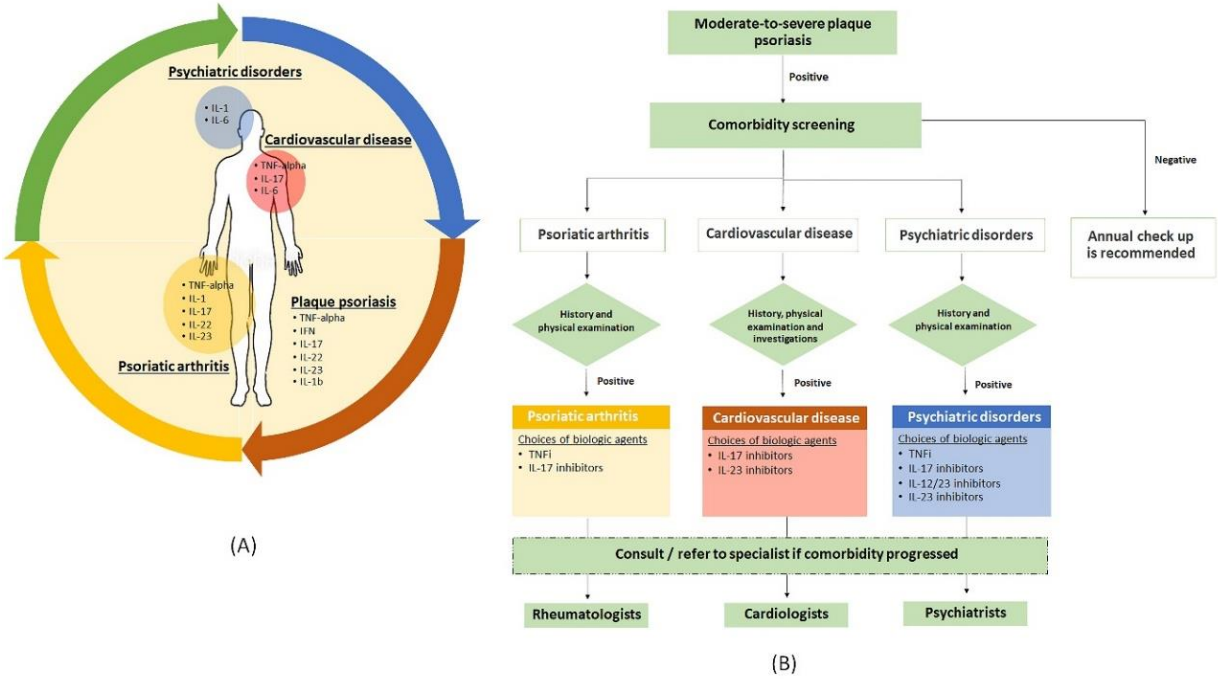

Figure 1

Expert Opinion 1

As a systemic inflammatory disease, all moderate-to-severe psoriasis patients should be screened for relevant comorbidities annually, including mental health.

1. Siriraj psoriatic arthritis screening tool (SiPAT)[3] is a simple tool, which can be used by dermatologists for psoriatic arthritis screening. Patients with any suspected joint involvement should be referred for rheumatologic consultations.

2. Cardio-metabolic diseases should be evaluated. Weight loss program is recommended for overweight/obese psoriasis patients.

3. Psychological assessment, particularly for depression, is recommended.

All psoriasis patients should be evaluated for other relevant diseases or symptoms with a validated structured questionnaire. This approach re-emphasizes patient centricity and that psoriasis is a systemic disease. Comorbidities, that are frequently reported in psoriasis, include psoriatic arthritis (PsA), cardiovascular diseases, metabolic syndrome, and psychological disorders.

PsA is a chronic inflammatory spondyloarthropathy that inhibits daily activities and worsens quality of life. In Thailand, the expert panel reported 45-60% PsA prevalence in their

practice. SiPAT has been widely utilized as a preliminary PsA evaluation and is a simple, clinician-friendly, validated screening tool with 91% sensitivity and 69% specificity[3]. While peripheral arthritis may be alleviated with non-steroidal anti-inflammatory drugs (NSAIDs) and disease-modifying antirheumatic drugs (DMARDs), axial joints are more complicated in both differential diagnosis and management. To prevent further joint damage, axial-joint involvement should be managed by rheumatologists[4].

The expert panel recommended the use of SiPAT to screen for joint involvement. All axial-joint and peripheral spondyloarthropathy should be referred to rheumatologists, especially in (i) patients who have signs of inflammatory joint diseases that are unrelieved by NSAIDs, or (ii) patients with disabling joint symptoms, or (iii) patients with no improvement on DMARDs, or (iv) patients with other causes of joint pain[3].

Systemic diseases, such as cardiovascular and metabolic syndrome, and psoriasis share similar inflammatory pathways. Cytokines e.g. TNF-alpha, IL-6, IL-17 and inflammatory markers e.g. c-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) play roles in disease activity[5].

The prevalence of metabolic syndrome was reported significantly higher in psoriasis patients than in the general population (49.25% vs 30.65%, respectively)[6]. Moreover, US observational study also showed a significant association of psoriasis and ischemic heart disease, cerebrovascular and peripheral vascular disease[7]. A systematic review demonstrated that weight control intervention improves both skin and joint manifestations[8]. In clinical practice, metabolic syndrome and obesity explicitly activate psoriasis episodes. They potentially limit patient's socializing as well as burden patients with additional social-related stress, besides skin lesions. All experts agreed that patients who lost weight responded better to treatment.

The expert panel therefore recommended screening of cardio-metabolic diseases in psoriasis patients and that weight-loss program be introduced to overweight/obese patients.

Psychological comorbidity worsens skin symptoms whilst treatment of depression indirectly improves patients' skin lesions. Similarly, delayed psoriasis treatment unpleasantly impacts patients' clinical outcomes and quality of life. It is of note that almost half of psoriasis patients with psychological distress are not identified[9]. International guidelines urge awareness of mental illness in psoriasis patients and that patients should receive an assessment[10]. In Thailand, screening for psychological conditions and referral are not regularly practiced

due to social stigmatization and personal ill-perception.

The expert panel recommended that psoriasis patients should be assessed for psychological conditions, particularly depression.

Expert Opinion 2

Biologic treatment may be recommended for moderate-to-severe psoriasis patients, either as monotherapy or as an adjunct to conventional therapy.

1. Biologic agents can be recommended as a first line treatment in psoriasis patients with other relevant organ manifestations.

2. Interleukin (IL)-17 inhibitors and IL-12/23 inhibitors are preferred over tumor necrosis factor (TNF)-inhibitors as tuberculosis (TB) is endemic in Thailand. However, annual TB screening and monitoring are still recommended.

3. Regarding cost-effectiveness, among IL-17 inhibitors, secukinumab should be considered as the first option for its overall profile and Thailand healthcare landscape.

While symptoms in patients with mild-to-moderate psoriasis are well-controlled by either topical medications, phototherapy or combination therapy, patients with moderate-to-severe psoriasis do not usually respond well to these treatments[10]. Pathogenesis of psoriasis suggests that complex cytokines are ill-regulated throughout multiple organ systems in the body, hence treatment should be more systemic and comprehensive. Biologic treatment has been reported to be effective in psoriasis, with a remarkable improvement of both cumulative and rapid clinical outcomes[11]. In the recent Cochrane review, chronic plaque psoriasis patients treated with biologic agents showed higher Psoriasis Area and Severity Index (PASI) 90 responses than those treated with conventional therapy. The review compared TNF, IL-17, and IL-12/23 inhibitors with ciclosporin, methotrexate and acitretin. Rate of serious adverse events was low and comparable with placebo group[12].

The Joint American Academy of Dermatology (ADD) - National Psoriasis Foundation (NPF), and British Association of Dermatologists (BAD) guidelines and the literature review have recommended biologic agents to be used first line in appropriate patients and specific comorbidities (Table 1)[10,13,14].

Table 1 Summary of efficacy and safety of biologic agents in moderate-to-severe psoriasis[13,14, 26].

Drug class	Drug name and dosage[a]	Structure of biologic agents	PASI 90 after 3-4 months[b]	Notes on comorbidities			General precautions
				Psoriatic arthritis	Cardiovascular diseases	Psychiatric disorders	
TNF-inhibitors	**Etanercept:** 50 mg administered once weekly; alternatively, 50 mg given twice weekly may be used for up to 12 weeks followed, if necessary, by a dose of 50 mg once weekly	Fusion protein between a TNF-alpha receptor protein and the crystallizable fragment portion of IgG1	23%	25 mg twice weekly, or 50 mg once weekly	Caution in mild-to-moderate CHF (NYHA class I/II) and should be avoided in severe CHF (NYHA class III/IV).	No increased risk of depression	- Heart failure or cardiovascular risks - Multiple sclerosis (or other neurologic conditions) - Not preferred in patients with history of latent TB
	Infliximab: 5 mg/kg given as an intravenous infusion followed by additional 5 mg/kg infusion doses at 2 and 6 weeks after the first infusion, then every 8 weeks thereafter	Human chimeric monoclonal IgG1 antibody	53%	No dose adjustment		No increased risk of depression	
IL-17 inhibitors	**Secukinumab:** 300 mg given by subcutaneous injection as initial dosing at weeks 0, 1, 2 and 3. Followed by monthly maintenance dosing starting at week 4. * Each 300 mg dose is given as two subcutaneous	Human monoclonal IL-17A antibody	60%	- No dose adjustment. - Subclinical benefits in early PsA and improve structural changes.	- No increased risk of MACEs - Potential subclinical benefits in flow-mediated dilation, endothelial function, and biomarkers.	No increased risk of depression	- Inflammatory bowel disease (e.g. Crohn's disease or ulcerative colitis) - Recurrent candida infection - Incidences of injection site reaction and anti - drug antibody are commonly higher in

Drug class	Drug name and dosage[a]	Structure of biologic agents	PASI 90 after 3-4 months[b]	Notes on comorbidities			General precautions
				Psoriatic arthritis	Cardiovascular diseases	Psychiatric disorders	
	injections of 150 mg.						humanized monoclonal antibody
	Ixekizumab: Initial dose of 160 mg by subcutaneous injection (two 80 mg injections) at week 0, followed by 80 mg (one injection) at weeks 2, 4, 6, 8, 10, and 12, then maintenance dosing of 80 mg (one injection) every 4 weeks	Humanized monoclonal IL-17A antibody	72%	No dose adjustment	No increased risk of MACEs	No increased risk of depression	
	Brodalumab: 210 mg given by subcutaneous injection at weeks 0, 1, and 2 followed by 210 mg every 2 weeks. Consider discontinuation when no response after 12-16 weeks.	Human monoclonal IL-17 receptor antibody	73%	Not approved	No increased risk of MACEs	Suicides reported in clinical trials. Caution in patients with risk of depression/suicide.	
IL-12/23 inhibitors	**Ustekinumab:** 45 mg (90 mg if >100 kg), administered subcutaneously, followed by a 45 mg (90 mg) dose 4 weeks later, and then every 12 weeks thereafter	Human monoclonal antibody against the p40 subunit, shared by IL-12/23	46%	Approved	Caution in patients with high cardiovascular risk	No increased risk of depression	Limited evidence

Drug class	Drug name and dosage[a]	Structure of biologic agents	PASI 90 after 3-4 months[b]	Notes on comorbidities			General precautions
				Psoriatic arthritis	Cardiovascular diseases	Psychiatric disorders	
IL-23 inhibitors	**Guselkumab:** 100 mg by subcutaneous injection at weeks 0 and 4, followed by maintenance dose every 8 weeks	Human monoclonal IL-23 antibody	68%	Not approved	No increased risk of MACEs	No increased risk of depression	Limited evidence

[a] Thai marketed biologic drugs were listed in the table. [b] Data came from clinical trials including a mixed biologic-naïve and experienced population. Abbreviation; Congestive heart failure (CHF), Kilogram (kg), Immunoglobulin G (IgG), Interleukin (IL), Major adverse cardiovascular events (MACEs), Milligram (mg), New York Heart Association (NYHA), Psoriasis area severity index (PASI), Tumor necrosis factor (TNF), Tuberculosis (TB).

Table 2 Summary of biologic agents recommended in moderate-to-severe psoriasis with other organ manifestations[10,13].

Biologic agents	Psoriatic arthritis	Congestive heart failure	Infections			Inflammatory bowel disease	Psychological conditions
			Latent TB	Hepatitis B	HIV		
Etanercept	√	×	×	±	±	√	√
Infliximab	√	×	×	±	±	√	√
Secukinumab	√	√	√	±	±	×	√
Ixekinumab	√	√	√	±	±	×	√
Brodalumab	±*	√	√	±	±	√	±
Ustekinumab	√	±	√	±	±	√	√
Guselkumab	±*	√	√	0	0	√	√

√ Recommended, × Not recommended, ±* brodalumab and guselkumab are not approved for psoriatic arthritis in Thailand at the time of preparing this manuscript, ± Use with caution, 0 No specific data present

Embracing a systemic disease concept and aligning with internationally recognized evidences, the expert panel recommended biologic treatment for moderate-to-severe psoriasis patients, either as monotherapy or adjunct with conventional therapy. Patients with other organ involvement are good candidates for biologic agents as a first line treatment (Table 2).

Although generally safe, doctors should discuss an increased risk of infection and regularly evaluate adverse events throughout the course of biologic treatment. Biologic treatment potentially cast risks of infection through its mechanism of action i.e. immune modulation. Incidents have been reported in clinical trials as well as in clinical practice. The most concerned adverse event is TB infection as it is endemic in Thailand, either active

or latent. TB screening is needed before initiating biologic treatment with annual screening[10].

TB reactivation has been well documented in TNF inhibitors post-marketing surveillance. Evidently, the real-world experience in Japan also reported an incidence of TB reactivation in a patient treated with TNF inhibitors[15]. International expert opinion exclusively recommended that IL-17 inhibitors and apremilast can be used in patients with latent TB infection who has been receiving a prophylactic 9-month isoniazid[16]. These different clinical adverse events among biologic agents may result from their different primary structures, even though they are in the same drug class[17].

Considering available biologic agents, TB epidemiology, domestic clinical experiences and case reports, together with published evidence, the panel recommended that physicians exercise great cautions when using TNF inhibitors for psoriasis treatment in Thailand. IL-17 inhibitors and IL-12/23 inhibitors are preferred over TNF inhibitors as TB is not relevant to IL-17 inhibitors and IL-12/23 inhibitors. However, the annual TB screening and monitoring are recommended in biologic treated patients.

The expert panel shared clinical experience and insights regarding onset of biologic treatment. While IL-17 inhibitors act downstream and provide a fast onset, IL-12/23 inhibitors act intra-lymphatic-upstream and provide delayed onset. Clinical outcomes of IL-17 inhibitors could be observed as early as 1-2 weeks compared to approximately 4 weeks in IL-12/23 inhibitors.

Three available IL-17 inhibitors in Thailand are secukinumab, ixekizumab, and brodalumab. Secukinumab is the only fully human monoclonal antibody targeting IL-17A. Ixekizumab is a humanized monoclonal antibody, also targeting IL-17A. Brodalumab is a human monoclonal antibody, targeting IL-17 receptors. It has been discussed that long-term effects of humanized monoclonal antibody on patient's immunogenicity have not been fully understood. Unlike a fully human monoclonal antibody, a humanized antibody may alter immunogenicity. Although the overall incidence of anti-drug antibody (ADA) development is low for brodalumab, ixekizumab, and secukinumab; the decreased incidence of ADAs with brodalumab and secukinumab may be secondary to the structure and chemical make-up of the drugs themselves, as fully human antibodies such as brodalumab and secukinumab tend to be less immunogenic than other types of antibodies, including humanized antibodies such as ixekizumab[17,18]. Neutralizing antibodies of TNF and IL-12/23 inhibitors have been also reported leading to reduced clinical response[17].

In terms of domestic clinical experience, secukinumab is the first IL-17 inhibitor available in

Thailand. All panel experts expressed their confidence in the agent's consistent real-world efficacy and tolerability. In Japan, a real-world experience of 52-week secukinumab treatment showed promising clinical outcomes, comparable with its clinical trials. Both Psoriasis Area Severity Index (PASI) and Dermatology Life Quality Index (DLQI) scores were satisfactorily improved while safety was not compromised[16]. Local expert insights also aligned with the global real-world meta-analysis, confirming that secukinumab improved clinical symptoms and quality of life without new safety signals. Patients treated with secukinumab achieve PASI90 and PASI100 over the course of one-year treatment[19].

It was also elaborated, regarding cost of treatment, that secukinumab is generally the least costly IL-17 inhibitor in Thailand. Hence, from clinical and financials perspectives, secukinumab offers the most preferable balance.

Accounted for biologic treatment onset, structural-related immunogenicity, sustained and consistent clinical efficacy, and updated medical reimbursement policy for civil servants, secukinumab is recommended as an initial biologic, among all IL-17 inhibitors.

Expert Opinion 3

Biologic treatment should be individualized according to patient disease condition and comorbidities.

1. Early biologic treatment may be promising in patients with comorbidities, in order to delay disease progression and other organ manifestations.

2. Due to the high efficacy of skin clearance and modest cost of treatment comparing to TNF inhibitors, IL-17 inhibitors may be preferred for peripheral and axial PsA when there is relevant skin involvement with an inadequate response to at least one conventional synthetic disease-modifying antirheumatic drugs (csDMARDs) and/or non-steroidal anti-inflammatory drugs (NSAIDs)[20].

3. IL-17 inhibitors should be considered as one of the treatments of choice in patients with cardiovascular risks.

Together with "psoriasis as a systemic disease" approach, evidences have demonstrated that subclinical effects from inflammatory mediators relatively caused comorbidities.[2] Technically and hypothetically, the use of early biologic treatment to decrease cytokines levels would 1) prevent damage associated with inflammation and prevent future damage/comorbidities; and 2) reverse existing damage and comorbid conditions caused by inflammation.

In lieu with the fundamental disease etiology, STEPIn trial investigated an effect of early biologic treatment in new-onset psoriasis. It is a randomized, 52-week long multicenter study, comparing early secukinumab treatment to standard of care treatment. Secukinumab is the

first and only IL17 inhibitor to investigate robustly in its potential of disease modification. STEPIn trial would suggest a new strategy in psoriasis management; secukinumab could potentially modify long-term clinical outcomes and the natural course of disease[21].

For patients with PsA, many international dermatology guidelines have recommended either TNF, IL-17 and IL12/23 inhibitors as monotherapy. Moreover, only TNF inhibitors have evidence of slowing progression of radiographic changes. Regarding the high rate of skin clearance, the rheumatology guideline, EULAR 2019, recommended IL-17 inhibitors as a preferred treatment option for peripheral and axial PsA when there is relevant skin involvement with an inadequate response to at least one csDMARDs and/or NSAIDs[10,13,20].

Considering clinical efficacy on skin clearance and subclinical inflammation, the expert panel recommended IL-17 inhibitors for patients who have moderate to severe plaque psoriasis and PsA with inadequate response to at least one csDMARDs and/or NSAIDs.

In terms of cardiovascular effects, the systematic review and meta-analysis reported no association between biologic treatment and increased cardiovascular risks – major adverse cardiovascular events (MACEs). It analyzed 38 RCTs of 18,024 psoriasis patients treated with biologic agents for up to 30 weeks (adalimumab, etanercept, infliximab, ustekinumab, ixekizumab and secukinumab)[22]. In addition, a recent prospective, observational study found that biologic agents positively affect lipid-rich necrotic core (LRNC), a subclinical parameter causing high risk of cardiovascular events. The study included two TNF inhibitors (adalimumab and etanercept), one IL-12/23 inhibitor (ustekinumab), and two IL-17 inhibitors (ixekizumab and secukinumab). Biologic treatment significantly decreased LRNC after 1-year of treatment, compared to conventional therapy[23].

As a class effect, IL-17 inhibitors provided the most advantages on non-calcified coronary plaque burden over one-year, compared with TNF and IL-12/23 inhibitors[24]. A primary analysis of ObePso-S study suggested cellular and molecular effects of secukinumab, presumably on adipose tissue and eventually on metabolic syndrome. CARIMA, an RCT, echoed positive effects of secukinumab on endothelial function and sub-clinical atherosclerosis biomarkers[25]. These primary evidences support an early biologic treatment in patients with cardiovascular risks. Clinical implication is that secukinumab may be a disease-modifying biologic agent.

Despite a general cardiovascular safety of biologic treatment, the expert panel noted that ustekinumab might be associated with an increased risk of acute coronary syndrome or stroke[26]. It was hypothesized that, through its

TH17 inhibitory pathway, ustekinumab indirectly induces atherosclerotic plaque rupture and atherothrombotic events. Similarly, a systematic review suggested that TNF inhibitors (e.g., etanercept and infliximab) should be avoided in patients with concomitant symptomatic moderate-to-severe congestive heart failure (CHF), New York Heart Association (NYHA) classes III-IV[27].

In summary, the expert panel recognized cardiovascular safety of biologic treatment with no increased risk of MACEs. The panel recommended IL-17 inhibitors to be a preferred treatment of choice in patients with cardiovascular risks.

Correlation between psoriasis and higher rates of depression has been well-aware. It has also been well-recognized that biologic treatment simultaneously improves plaque psoriasis, quality of life and mood disorders in patients. Biologic treatment significantly decreased risk of depressive symptoms[28].

Although four completed suicides were reported in clinical trials of brodalumab and led to a box warning in suicidal ideation, further analysis did not establish a causal association between brodalumab and increased risk or treatment-induced suicides[10].

The expert panel recognized benefits of biologic treatment on clinical outcomes and patient's quality of life.

Expert Opinion 4

Multidisciplinary collaboration is critical in improving holistic care of psoriasis.

1. Comorbidity management and lifestyle modification require multidisciplinary collaboration.

2. A one-stop clinic with multi-specialty collaboration should be implemented where applicable, to streamline referral.

Disease journey of psoriasis is continuum throughout life course, affecting all aspects of life and living. Therefore, psoriasis care should involve more than one specialty for holistic approach and greater outcomes in terms of physical and emotional illness and disability[1].

Psoriasis multidisciplinary team may deploy dermatologists as a gate keeper. Roles of dermatologists are as a main curer for skin lesions, a seeker of other comorbidities, and a clinical coordinator who invites other care givers into the team. Other specialties should include, but not limit to, rheumatologists, cardiologists, psychiatrists, dietitians or nutritionists, nurses, and public health educators. Family members and friends should also be engaged[1].

Where applicable, a one-stop psoriasis clinic is recommended. By pooling resources together, it is convenient for patients and ensure a seamless inter-departmental referral. Ideally, at the one-stop clinic, psoriatic arthritis patients can receive treatment and joint rehabilitation from

rheumatologists; patients with cardiovascular involvement can see their cardiologists; overweight and obese psoriasis patients can be educated for life-style modification. The expert panel shared their best practice and agreed that a one-stop setting has significantly reduced referral time, prevented future joint deformity, and resulted in higher patient satisfaction. However, weight loss has been the most challenging task among psoriasis patients. With limited resources, the panel encourages seeking for collaboration across institutes. Digital media or other educational materials e.g., short videos titling self-care topics could be more impactful in addition to a face-to-face patient education session.

Acknowledgement: The author would like to thank the advisory team members for their critical review, advice and assistance. The expert meeting was funded by Novartis (Thailand) Ltd. Medical writing support was provided by MIMS (Thailand) Ltd. and funded by Novartis (Thailand) Ltd.

References

1. World health organization. Global report on psoriasis: WHO Press; 2016. 48p.
2. Swindell WR, Johnston A, Xing X, Voorhees JJ, Elder JT, Gudjonsson JE. Modulation of Epidermal Transcription Circuits in Psoriasis: New Links between Inflammation and Hyperproliferation. PLoS ONE. 2013;8:e79253.
3. Chiowchanwisawakit P, Wattanamongkolsil L, Srinonprasert V, Petcharat C, Siriwanarangsun P, Katchamart W. Developing the Thai Siriraj Psoriatic Arthritis Screening Tool and validating the Thai Psoriasis Epidemiology Screening Tool and the Early Arthritis for Psoriatic Patients questionnaire. Rheumatol Int 2016;36:1459-68.
4. Taylor SL, Petrie M, O'Rourke KS, Feldman SR. Rheumatologists' recommendations on what to do in the dermatology office to evaluate and manage psoriasis patients' joint symptoms. J Dermatolog Treat 2009;20:350-3.
5. Ghazizadeh R, Shimizu H, Tosa M, Ghazizadeh M. Pathogenic mechanisms shared between psoriasis and cardiovascular disease. Int J Med Sci 2010;7:284-9.
6. Kokpol C, Aekplakorn W, Rajatanavin N. Prevalence and characteristics of metabolic syndrome in South-East Asian psoriatic patients: a case-control study. J Dermatol 2014;41:898-902.
7. Prodanovich S, Kirsner RS, Kravetz JD, Ma F, Martinez L, Federman DG. Association of psoriasis with coronary artery, cerebrovascular, and peripheral vascular diseases and mortality. Arch Dermatol 2009;145:700-3.
8. Ford AR, Siegel M, Bagel J, et al. Dietary Recommendations for Adults With Psoriasis or Psoriatic Arthritis From the Medical Board of the National Psoriasis Foundation: A Systematic Review. JAMA Dermatol 2018;154:934-50.
9. Liang SE, Cohen JM, Ho RS. Screening for depression and suicidality in psoriasis patients: A survey of US dermatologists. J Am Acad Dermatol 2019;80:1460-62.

10. Menter A, Strober BE, Kaplan DH, et al. Joint AAD-NPF guidelines of care for the management and treatment of psoriasis with biologics. J Am Acad Dermatol 2019;80:1029-72.
11. Warren RB, Gooderham M, Burge R, et al. Comparison of cumulative clinical benefits of biologics for the treatment of psoriasis over 16 weeks: Results from a network meta-analysis. J Am Acad Dermatol 2020;82:1138-49.
12. Sbidian E, Chaimani A, Afach S, et al. Systemic pharmacological treatments for chronic plaque psoriasis: a network meta-analysis. Cochrane Database Syst Rev 2020;1:CD011535.
13. Smith CH, Yiu ZZN, Bale T, et al. British Association of Dermatologists guidelines for biologic therapy for psoriasis 2020: a rapid update. Br J Dermatol 2020;183:628-37.
14. Armstrong AW, Read C. Pathophysiology, Clinical Presentation, and Treatment of Psoriasis: A Review. JAMA 2020;323:1945-60.
15. Fujita H, Ohtsuki M, Morita A, et al. Safety and effectiveness of secukinumab in psoriasis vulgaris and psoriatic arthritis: Real-world evidence in Japan. J Dermatol. 2021;48:175-83.
16. Kaushik SB, Lebwohl MG. Psoriasis: Which therapy for which patient: Focus on special populations and chronic infections. J Am Acad Dermatol 2019;80:43-53.
17. Jullien D, Prinz JC, Nestle FO. Immunogenicity of biotherapy used in psoriasis: the science behind the scenes. J Invest Dermatol 2015;135:31-8.
18. Spindeldreher S, Maillère B, Correia E, et al. Secukinumab Demonstrates Significantly Lower Immunogenicity Potential Compared to Ixekizumab. Dermatol Ther (Heidelb) 2018;8:57-68.
19. Augustin M, Jullien D, Martin A, Peralta C. Real-world evidence of secukinumab in psoriasis treatment - a meta-analysis of 43 studies. J Eur Acad Dermatol Venereol 2020;34:1174-85.
20. Gossec L, Baraliakos X, Kerschbaumer A, et al. EULAR recommendations for the management of psoriatic arthritis with pharmacological therapies: 2019 update. Ann Rheum Dis 2020;79:700-12.
21. Iversen L, Eidsmo L, Austad J, et al. Secukinumab treatment in new-onset psoriasis: aiming to understand the potential for disease modification-rationale and design of the randomized, multicenter STEPIn study. J Eur Acad Dermatol Venereol 2018;32:1930-9.
22. Rungapiromnan W, Yiu ZZN, Warren RB, Griffiths CEM, Ashcroft DM. Impact of biologic therapies on risk of major adverse cardiovascular events in patients with psoriasis: systematic review and meta-analysis of randomized controlled trials. Br J Dermatol 2017;176:890-901.
23. Choi H, Uceda DE, Dey AK, et al. Treatment of Psoriasis With Biologic Therapy Is Associated With Improvement of Coronary Artery Plaque Lipid-Rich Necrotic Core: Results From a Prospective, Observational Study. Circ Cardiovasc Imaging 2020;13:e011199.
24. Elnabawi YA, Dey AK, Goyal A, et al. Coronary artery plaque characteristics and treatment with biologic therapy in severe psoriasis: results from a prospective observational study. Cardiovasc Res 2019;115:721-8.

25. von Stebut E, Reich K, Thaçi D, et al. Impact of Secukinumab on Endothelial Dysfunction and Other Cardiovascular Disease Parameters in Psoriasis Patients over 52 Weeks. J Invest Dermatol 2019;139:1054-62.
26. Poizeau F, Nowak E, Kerbrat S, et al. Association Between Early Severe Cardiovascular Events and the Initiation of Treatment With the Anti-Interleukin 12/23p40 Antibody Ustekinumab. JAMA Dermatol 2020;156:1208-15.
27. Heslinga SC, Van Sijl AM, De Boer K, Van Halm VP, Nurmohamed MT. Tumor necrosis factor blocking therapy and congestive heart failure in patients with inflammatory rheumatic disorders: a systematic review. Curr Med Chem 2015;22:1892-902.
28. Strober B, Gooderham M, de Jong EMGJ, et al. Depressive symptoms, depression, and the effect of biologic therapy among patients in Psoriasis Longitudinal Assessment and Registry (PSOLAR). J Am Acad Dermatol 2018;78:70-80.