

## Supplementary Online Content

Chen TL, Lee LL, Huang HK, et al. Association of psoriasis with incident venous thromboembolism and peripheral vascular disease: a systematic review and meta-analysis. *JAMA Dermatol*. Published online December 1, 2021.  
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This supplemental material has been provided by the authors to give readers additional information about their work.

## **eMethod.** Approximation of Adjusted Risk Estimates.

The risk estimates of the overall effect in each study were utilized for the meta-analysis. Nevertheless, two of our included studies only reported the adjusted risk estimates of separated subgroups (based on psoriasis severity or age) instead of the overall risk estimates. To extract the data and perform the meta-analysis according to the overall effects, combination of subgroups is necessary. However, if we combined the two groups using fixed effect model, a unit-of-analysis error might occur since we calculated the reference group repeatedly.<sup>1</sup> To address this problem, we used the method proposed by Hamling et al and the R software version 4.0.5 (R Foundation for Statistical Computing, Vienna, Austria).<sup>2,3</sup>

First, we used the adjusted estimates to approximate the effective counts in each subgroup. The approximated event and total number of each subgroup was calculated. Then, we combined the event and total number of each subgroup to yield the overall event and total number of the overall group. Adjusted relative risks were calculated according to the approximated numbers.

### References:

1. Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, Welch VA (editors). Cochrane Handbook for Systematic Reviews of Interventions version 6.2 (updated February 2021). Cochrane, 2021. Available from [www.training.cochrane.org/handbook](http://www.training.cochrane.org/handbook).
2. Hamling J, Lee P, Weitkunat R, Ambühl M. Facilitating meta-analyses by deriving relative effect and precision estimates for alternative comparisons from a set of estimates presented by exposure level or disease category. *Stat Med*. 2008 Mar 30;27(7):954-70. doi: 10.1002/sim.3013.
3. Orsini N, Li R, Wolk A, Khudyakov P, Spiegelman D. Meta-analysis for linear and nonlinear dose-response relations: examples, an evaluation of approximations, and software. *Am J Epidemiol*. 2012 Jan 1;175(1):66-73.

**eTable 1.** Search Strategies Modified for (a) Medline, (b) Embase, (c) Cochrane Library, (d) Web of science, and (e) CINAHL.

**a. Search strategy in MEDLINE (via Ovid MEDLINE(R), 1946 to present; search date: 2021/05/19)**

| #  | Search syntax  | Citations found |
|----|--|-----------------|
| 1  | Psoria\$.mp  | 57,306          |
| 2  | exp "Psoriasis"/ OR exp "Arthritis, Psoriatic"/  | 41,258          |
| 3  | Venous thrombo\$.mp  | 65,385          |
| 4  | (VTE OR DVT OR PE).mp  | 69,063          |
| 5  | exp "Venous Thromboembolism"/ OR exp "Pulmonary Embolism"/ OR exp "Embolism"/ OR exp "Thrombosis"/ | 188,159         |
| 6  | ("Peripheral Arter* Disease" OR "Peripheral Vascular Disease" OR "Limb Isch\$emia").mp.            | 32,949          |
| 7  | (PAD OR PAOD OR PVD).mp  | 29,128          |
| 8  | exp "Peripheral Artery Disease"/ OR exp "Peripheral Vascular Disease"/                             | 54,323          |
| 9  | (#1 OR #2) AND (#3 OR #4 OR #5)  | 146             |
| 10 | (#1 OR #2) AND (#6 OR #7 OR #8)  | 91              |

**b. Search strategy in Embase (via Ovid Embase, 1974 to present; search date: 2021/05/20)**

| #  | Search syntax   | Citations found |
|----|---|-----------------|
| 1  | psoria\$.mp   | 100,859         |
| 2  | exp "psoriasis"/ OR exp "psoriatic arthritis"/  | 92,801          |
| 3  | venous thrombo\$.mp   | 91,455          |
| 4  | (VTE or DVT or PE).ti,ab,kw.  | 98,408          |
| 5  | exp "venous thromboembolism"/   | 161,680         |
| 6  | ("peripheral arter* disease" or "peripheral vascular disease" or "limb isch\$emia").mp. | 67,536          |
| 7  | (PAD OR PAOD OR PVD).mp   | 50,191          |
| 8  | exp "peripheral artery disease"/  | 174,292         |
| 9  | (#1 OR #2) AND (#3 OR #4 OR #5)   | 549             |
| 10 | (#1 OR #2) AND (#6 OR #7 OR #8)   | 415             |

**c. Search strategy in Cochrane Library (via Cochrane Collaboration; search date: 2021/05/21)**

| # | Search syntax   | Citations found |
|---|---|-----------------|
| 1 | MeSH descriptor: [Psoriasis] explode all trees              | 3,364           |
| 2 | MeSH descriptor: [Arthritis, Psoriatic] explode all trees   | 458             |
| 3 | Psoria*   | 9,265           |
| 4 | MeSH descriptor: [Venous Thromboembolism] explode all trees | 679             |
| 5 | MeSH descriptor: [Pulmonary Embolism] explode all trees     | 1,043           |

| #  | Search syntax   | Citations found |
|----|---|-----------------|
| 7  | MeSH descriptor: [Thrombosis] explode all trees                             | 4,876           |
| 8  | Venous thrombo* OR VTE OR DVT OR PE   | 20,624          |
| 9  | MeSH descriptor: [Peripheral Arterial Disease] explode all trees            | 1,087           |
| 10 | MeSH descriptor: [Peripheral Vascular Diseases] explode all trees           | 3,272           |
| 11 | MeSH descriptor: [Arterial Occlusive Diseases] explode all trees            | 12,327          |
| 12 | Peripheral Arter* Disease OR Peripheral Vascular Disease OR Limb Isch\$emia | 8,812           |
| 13 | PAD OR PAOD OR PVD  | 19,750          |
| 14 | (#1 OR #2 OR #3) AND (#4 OR #5 OR #6 OR #7 OR #8)                           | 79              |
| 15 | (#1 OR #2 OR #3) AND (#9 OR #10 OR #11 OR #12 OR #13)                       | 71              |

**d. Search strategy in Web of Science Core Collection (2015 to present; search date: 2021/05/21)**

| # | Search syntax   | Citations found |
|---|---|-----------------|
| 1 | ALL=(Psoria* OR Psoriatic Arthr*)   | 25,640          |
| 2 | ALL=(Venous Thrombo* OR Embolism OR Thrombo* OR VTE OR DVT OR PE)                                       | 188,543         |
| 3 | ALL=(Peripheral Arter* Disease OR Peripheral Vascular Disease OR Limb Isch\$emia OR PAD OR PAOD OR PVD) | 42,665          |
| 4 | #1 AND #2   | 276             |
| 5 | #1 AND #3   | 55              |

**e. Search strategy in CINAHL (via EBSCOhost CINAHL Complete, 1937 to present; search date: 2021/05/21)**

| # | Search syntax   | Citations found |
|---|---|-----------------|
| 1 | Psoria* OR Psoriatic Arthr*   | 7,095           |
| 2 | Venous Thrombo* OR Embolism OR Thrombo* OR VTE OR DVT OR PE                                       | 209,984         |
| 3 | Peripheral Arter* Disease OR Peripheral Vascular Disease OR Limb Isch\$emia OR PAD OR PAOD OR PVD | 80,902          |
| 4 | #1 AND #2   | 93              |
| 5 | #1 AND #3   | 61              |

**eTable 2.** Adjusted Covariates of Included Studies.

| Source   | Age | Gender | Race | BMI | Alcohol | Socioeconomic data | Smoking | DM | HTN | Dyslipidemia | Stroke | CHF | CAD | COPD | Cancer | Other variables  |
|--|-----|--------|------|-----|---------|--------------------|---------|----|-----|--------------|--------|-----|-----|------|--------|--|
| Ahlehoff et al, <sup>29</sup> 2011 (Denmark)             | •   | •      |      |     |         | •                  |         |    |     |              |        |     |     |      |        | Concomitant medication   |
| Bengtsson et al, <sup>30</sup> 2017 (Sweden)             | •   | •      |      |     |         |                    |         |    |     |              |        |     |     |      |        |  |
| Charlton et al, <sup>38</sup> 2018 (UK)                  |     |        |      | •   |         |                    | •       | •  | •   | •            |        |     |     |      |        | Psoriasis severity, concomitant medication   |
| Chung et al, <sup>31</sup> 2017 (Taiwan)                 | •   |        |      |     |         |                    |         | •  | •   |              |        | •   |     | •    | •      | Frequency of medical visits/year, length of stay                                   |
| Dowlathshahi et al, <sup>39</sup> 2013 (The Netherlands) |     |        |      |     |         |                    |         |    |     |              |        |     |     |      |        |  |
| Galloway et al, <sup>32</sup> 2020 (UK)                  | •   | •      | •    | •   | •       |                    | •       | •  | •   | •            | •      |     | •   | •    | •      | Peripheral arterial disease, atrial fibrillation, CKD, chronic liver disease       |
| Kaine et al, <sup>40</sup> 2018 (United States)          | •   | •      |      |     |         | •                  |         |    |     |              |        |     |     |      | •      | Region, health plan type, index year, Charlson Comorbidity Index                   |
| Kaye et al, <sup>41</sup> 2008 (United States)           |     |        |      |     |         |                    |         |    |     |              |        |     |     |      |        |  |
| Lutsey et al, <sup>33</sup> 2012 (United States)         | •   |        |      | •   |         |                    | •       | •  |     |              |        |     |     |      |        | Education, hormone replacement therapy use   |
| Ogdie et al, <sup>34</sup> 2018 (United States)          | •   | •      |      |     | •       |                    | •       |    |     |              |        |     |     | •    | •      | Hospitalization, joint replacement, liver disease, oral glucocorticoids, NSAIDs    |
| Ramagopalan et al, <sup>35</sup> 2011 (UK)               | •   | •      |      |     |         |                    |         |    |     |              |        |     |     |      |        | Time-period in single calendar years, region                                       |
| Schneeweiss et al, <sup>36</sup> 2021 (United States)    | •   | •      |      | •   | •       |                    |         | •  | •   | •            | •      |     | •   | •    | •      | Index year, history of surgery, hospitalization, concomitant medication            |
| Zoller et al, <sup>37</sup> 2012 (Sweden)                | •   | •      |      | •   | •       |                    |         |    | •   |              | •      | •   | •   | •    |        | Alcohol-related liver disease, sepsis, varicose veins, peripheral vascular disease |

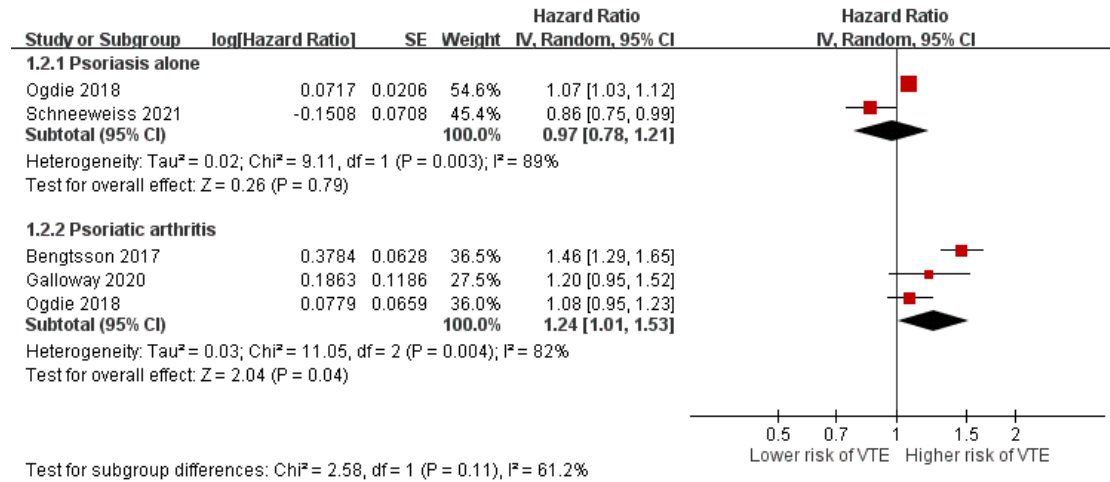
BMI, body mass index; CAD, coronary artery disease; CHF: chronic heart failure; CKD, chronic kidney disease; COPD, chronic obstructive pulmonary disease; DM, diabetes mellitus; HTN, hypertension; NSAIDs, nonsteroidal anti-inflammatory drugs.

**eTable 3. Sensitivity Analyses.**

| Sensitivity analysis   | No. of studies | Pooled HR (95%CI)     | P value | I <sup>2</sup> (%) |
|--|----------------|-----------------------|---------|--------------------|
| Venous thromboembolism                                       |                |                       |         |                    |
| Exclusion of studies with only the calculated risk estimates |                |                       |         |                    |
| Before exclusion   | 7              | 1.26 (1.08 to 1.48)** | 0.004   | 93                 |
| After exclusion  | 6              | 1.31 (1.08 to 1.60)** | 0.007   | 90                 |
| Exclusion of high-risk studies                               |                |                       |         |                    |
| Before exclusion   | 7              | 1.26 (1.08 to 1.48)** | 0.004   | 93                 |
| After exclusion  | 6              | 1.25 (1.05 to 1.48)*  | 0.01    | 94                 |
| Definition of diagnostic codes                               |                |                       |         |                    |
| ICD codes  | 5              | 1.34 (1.06 to 1.69)*  | 0.01    | 92                 |
| Read codes   | 2              | 1.08 (1.04 to 1.12)** | < 0.001 | 0                  |
| Peripheral vascular disease                                  |                |                       |         |                    |
| Definition of diagnostic codes                               |                |                       |         |                    |
| ICD codes  | 1              | 1.25 (1.09 to 1.44)** | 0.002   | NA                 |
| Read codes   | 1              | 1.29 (1.13 to 1.47)** | 0.0001  | NA                 |

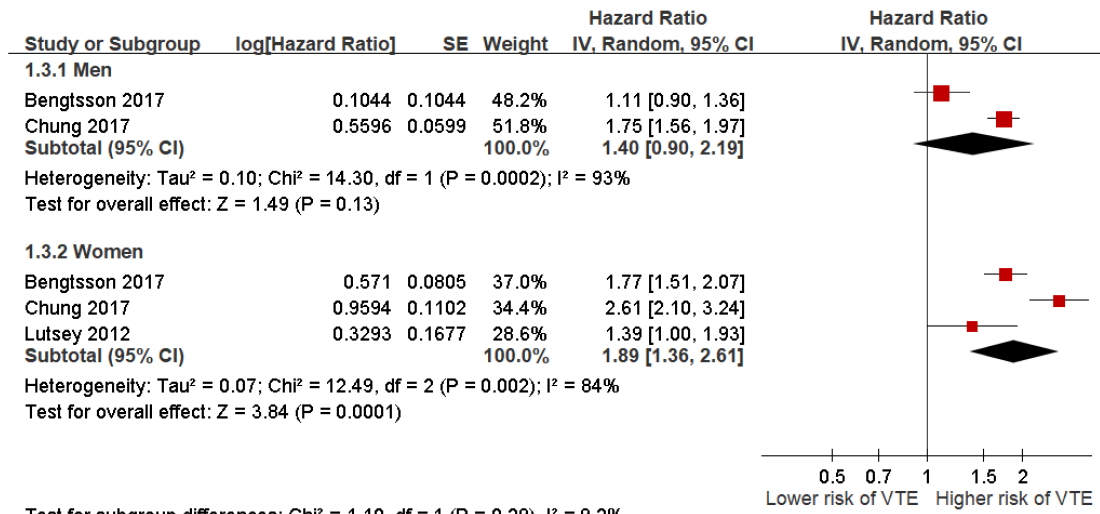
NA, not applicable. \*P < 0.05; \*\*P < 0.01.

**eFigure 1.** Subgroup Analysis of Venous Thromboembolism According to Arthritis Status.



IV, inverse variance; SE, standard error.

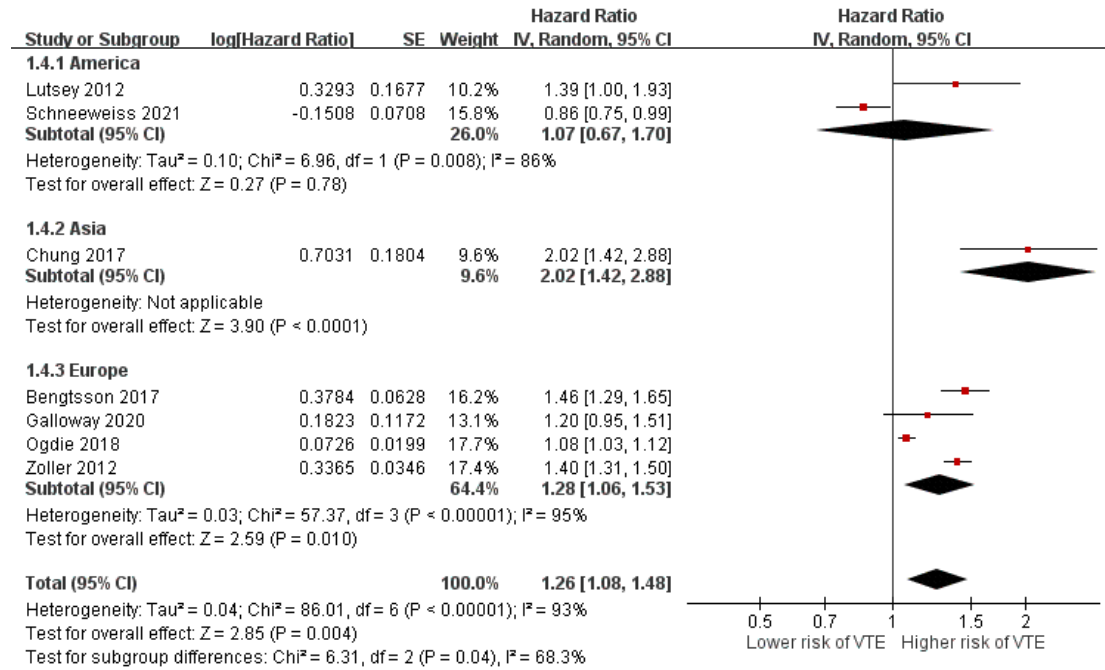
**eFigure 2.** Subgroup Analysis of Venous Thromboembolism According to Gender.



IV, inverse variance; SE, standard error.

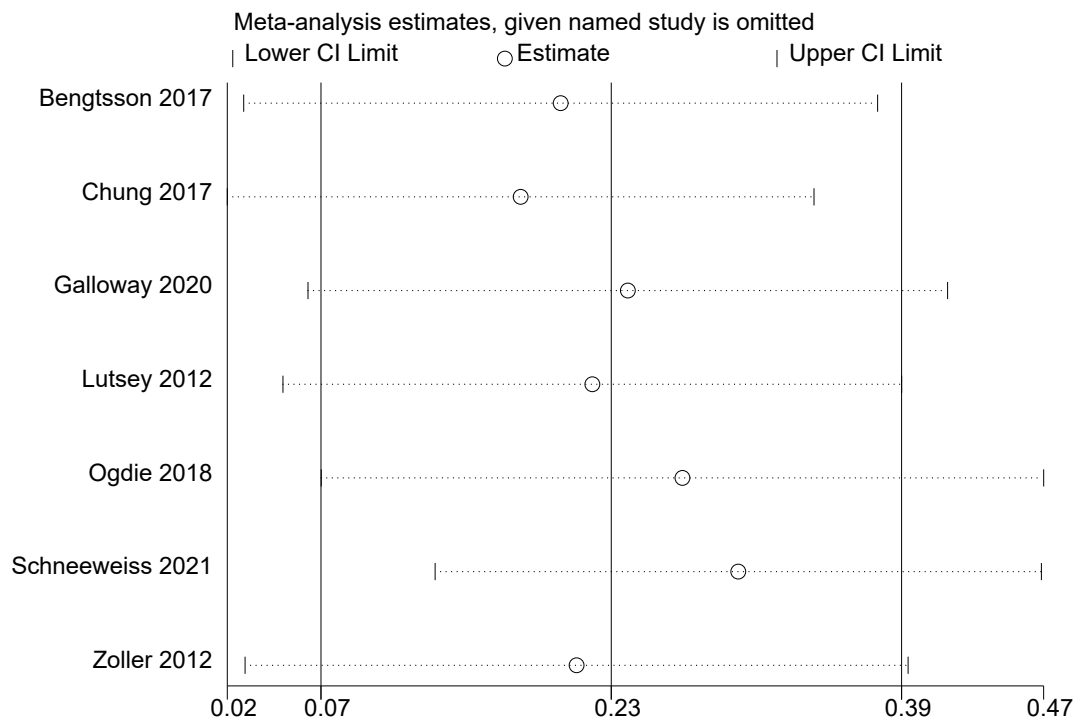


**eFigure 3. Subgroup Analysis of Venous Thromboembolism According to Geographic Location**



IV, inverse variance; SE, standard error.

**eFigure 4. Leave-one Out Sensitivity Analysis of Venous Thromboembolism**



**eFigure 5. Leave-one Out Sensitivity Analysis of Peripheral Vascular Disease**

