

## RESEARCH LETTER

## Biologic Treatment of Psoriasis and Tuberculosis Testing: A Retrospective Analysis

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### ABSTRACT

**Background:** Current recommendations for biologic use in psoriasis recommend baseline TB screening with IGRA. Studies have found in low TB prevalence countries that TB conversion occurs at low rates in those utilizing biologic therapies.

**Objectives:** To evaluate utilization and cost effectiveness of TB testing in patients with psoriasis being treated with biologics.

**Methods:** We retrospectively queried a national commercial claims database (Truven Health MarketScan) from 1/1/2014 to 12/31/2018 to investigate the use of TB screening and disease prevalence among patients with psoriasis being treated with a biologic agent. Inclusion criteria consisted of psoriasis disease status, continuous utilization of a biologic for one year prior and three years after the first biologic claim; and no claims for TB within the year prior to starting the biologic.

**Results:** 3,421 patients with psoriasis and concurrent biologic treatment use were included in the study. 84.7% (2,897) had a baseline TB test within 15 months prior to first claim of biologic use. Baseline tests were primarily IGRA (75.8%, n=2,195) with PPD tests only being used in 24.2% (n = 702) of patients. Total cost for baseline TB test in the cohort amounts to \$738,117. TB tests were positive in 4.1% (n = 147) of patients and TNF- $\alpha$  inhibitors was the most frequently prescribed biologic.

**Conclusions:** The majority of patients diagnosed with psoriasis had a claim for baseline TB testing. Current recommendations surrounding biologics and TB screening should take into account the high cost of baseline TB testing and the low rate of TB prevalence among patients on biologics.

### INTRODUCTION

Several biologic therapies are commonly used for the treatment of moderate-to-severe psoriasis<sup>1,2</sup>, including tumor necrosis factor (TNF)- $\alpha$  inhibitors. These treatments may

increase the risk of reactivation of latent tuberculosis infection (LTBI) or active tuberculosis (TB) infection.<sup>3</sup> While the United States (US) has a low TB burden<sup>4</sup>, it is recommended that patients have a pretreatment test with discretionary testing thereafter for all but high-risk patients<sup>3</sup>. This

paper examines the utilization and cost of TB testing for US patients with psoriasis treated with biologics.

## METHODS

A retrospective cohort study was conducted from 1/1/2014 to 12/31/2018 using the Truven Health MarketScan Commercial Claims Database (Ann Arbor, MI), which contains healthcare claims from approximately 350 payers in the US. Inclusion criteria included psoriasis (1+ claims with International Classification of Diseases version [ICD]-9: 696.1 or ICD-10: L40.0/L40.1/L40.4/L40.8/L40.9), 1+ claims for one a biologic therapy including: etanercept, adalimumab, ustekinumab, brodalumab, certolizumab, guselkumab, infliximab, ixekizumab, or secukinumab; continuous enrollment for one year prior to and three years after the first biologic claim; and no claims for TB within the year prior to starting the biologic. Demographic characteristics, TB diagnosis (LTBI: latent Tb - ICD-9 795.51/795.52 ICD-10 R76.11/R76.12; Active TB: ICD-9 10-18, ICD-10 A15/A17/A18/A19) as well as frequency and costs for TB testing were extracted. Common Procedural Terminology (CPT) codes were used to identify purified protein derivative (PPD) test and interferon gamma release assay (IGRA) claims (CPT 86580 and 86480/86481, respectively). Costs were taken from the perspective of the health-system and were adjusted for inflation to 2020 US dollars (<https://www.usinflationcalculator.com/>). Analyses were performed with SAS version 9.4 (SAS, Cary, NC).

## RESULTS

Overall, 3,421 patients with psoriasis and biologic treatment were included (**Table 1**). Of these, 84.7% (n=2,897) had a baseline TB test (within 15 months prior or three months after first claim for starting a biologic). The majority of baseline tests were IGRA (75.8%, n=2,195) with PPD accounting for 24.2% (n=702). Annual testing was performed in the minority (18.0%, n=1034) and of these 92.9% (961/1034) received a TNF-inhibitor. The majority (96.7%, n=2,129) had less frequent testing (mean=9.22 (standard deviation [SD] 13.44) months). Repeat testing, defined as a second claim within 30 days, was performed for 1.3% (n=29). Of these, the majority (27.6%, n=8) had a PPD as the first test and 72.4% (n=21) had an IGRA. The total cost of testing for the cohort was \$738,117.

TB tests were positive in 4.1% (n=147/3,559). Most patients with a positive TB test had no biologic prescription within 30 days (53.6% [233/435]). For those prescribed a biologic, TNF- $\alpha$  inhibitor was most frequently prescribed, including etanercept (18.4% [42/228]), adalimumab (43.9% [100/228]), infliximab (1.3% [3/228]), or certolizumab (2.2% [5/228]) compared to other biologics including secukinumab (10.5% [24/228]) (**Table 2**).

## DISCUSSION

The majority of people with psoriasis treated with a biologic did not have a claim for baseline TB testing. Of those tested at baseline, the majority did not have subsequent annual testing. The rate of TB in the US is low<sup>5</sup> and TB testing can be non-specific, thus the value of routine widespread testing should be reconsidered. Current recommendations do not require annual testing and suggest that patients be instead screened for symptoms and risk factors for TB.<sup>3</sup> While guidelines recommend IGRA

**Table 1.** Sample characteristics (n=3,421)

<b>Demographic</b>	<b>n</b>	<b>%</b>
<b>Sex</b>		
Male	1,655	48.38%
Female	1,766	51.62%
<b>Age Group</b>		
0-17	56	1.64%
18-34	363	10.61%
35-44	725	21.19%
45-54	1,092	31.92%
55-64	1,185	34.64%
<b>Region</b>		
Northeast	620	18.12%
North Central	685	20.02%
South	1,731	50.60%
West	380	11.11%
Unknown	5	0.15%

**Table 2.** Tuberculosis testing utilization and costs

	<b>n (%)</b>	<b>Cost*</b>
Baseline TB test performed		
Yes	2,897 (84.7%)	Total: \$738,117
No	344 (10.1%)	--
Baseline TB test type		
PPD	702 (24.2%)	Total: \$56.43 (29.57)^
IGRA	2,195 (75.8%)	
<b>Testing Frequency</b>		
	<b>n (%)</b>	<b>Months between any TB test Mean (SD)</b>
Tested annually	72 (3.3%)	12.5 (1.2)
Tested at interval other than annually	2,129 (96.7%)	33.1 (48.1)
<b>TB Diagnosis</b>		
	<b>Yes</b>	<b>No</b>
Age, mean (SD)	51.0 (9.9)	47.5 (11.9)**
Sex, male, n (%)	(51.7%)	(48.6%)
Months on biologic, mean (SD)	20.4 (11.3)	20.1 (11.7)
*Cost adjusted for inflation to 2020 US dollars		
^Mean (SD), median cost per test		
**p-value <.001		

rather than PPD, we found that IGRA was used infrequently.<sup>6</sup> There are limitations to this study; clinical risk factors for TB were not examined and only patients with private insurance were included. Overall, this data suggests that there is an opportunity to re-evaluate the value of TB laboratory screening given these trends, the low TB infection rate in the US, and the cost and consequences of false-positive tests.

**Conflict of Interest Disclosures:** None

**Funding:** None

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**References:**

1. Boehncke WH, Schön MP. Psoriasis. *Lancet*. 2015;386(9997):983-994.
2. Karataş Toğral A, Muştu Koryürek Ö, Şahin M, Bulut C, Yağci S, Ekşioğlu HM. Association of clinical properties and compatibility of the QuantiFERON-TB Gold In-Tube test with the tuberculin skin test in patients with psoriasis. *Int J Dermatol*. 2016;55(6):629-633.
3. 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(4):1029-1072.
4. Global tuberculosis report 2019. In. Geneva: World Health Organization 2019.
5. Schmit KM, Wansaula Z, Pratt R, Price SF, Langer AJ. Tuberculosis - United States, 2016. *MMWR Morb Mortal Wkly Rep*. 2017;66(11):289-294.
6. Lewinsohn DM, Leonard MK, LoBue PA, et al. Official American Thoracic Society/Infectious Diseases Society of America/Centers for Disease Control and Prevention Clinical Practice Guidelines: Diagnosis of Tuberculosis in Adults and Children. *Clin Infect Dis*. 2017;64(2):111-115.