

Q7. Search the NCBI PubMed database (<https://www.ncbi.nlm.nih.gov/pubmed/>): does the connection between Asthma and these two diseases appear to be valid? Cite 3-4 papers and include excerpts from the paper abstracts.

There does exist a connection between asthma and rheumatoid arthritis, type 1 diabetes as studied by the research papers cited below.

Association between asthma and rheumatoid arthritis:

1. Asthma is traditionally regarded as a chronic airway disease, and recent literature proves its heterogeneity, based on distinctive clusters or phenotypes of asthma. In defining such asthma clusters, the nature of comorbidity among patients with asthma is poorly understood, by assuming no causal relationship between asthma and other comorbid conditions, including both communicable and noncommunicable diseases. However, emerging evidence suggests that the status of asthma significantly affects the increased susceptibility of the patient to both communicable and noncommunicable diseases. Specifically, the impact of asthma on susceptibility to noncommunicable diseases such as chronic systemic inflammatory diseases (e.g., rheumatoid arthritis), may provide an important insight into asthma as a disease with systemic inflammatory features, a conceptual understanding between asthma and asthma-related comorbidity, and the potential implications on the therapeutic and preventive interventions for patients with asthma. This review discusses the currently under-recognized clinical and immunological phenotypes of asthma; specifically, a higher risk of developing a systemic inflammatory disease such as rheumatoid arthritis and their implications, on the conceptual understanding and management of asthma.
  - Rolfes MC, Juhn YJ, Wi C-I, Sheen YH. Asthma and the Risk of Rheumatoid Arthritis: An Insight into the Heterogeneity and Phenotypes of Asthma. *Tuberculosis and Respiratory Diseases*. 2017;80(2):113-135. doi:10.4046/trd.2017.80.2.113.
2. TH1 and TH2 cells have counterregulatory relationships. However, the relationship between asthma, a TH2-predominant condition, and risk of systemic inflammatory diseases such as rheumatoid arthritis (RA), a TH1 condition, is poorly understood. The team conducted a retrospective population-based case-control study that examined existing incident RA cases and controls matched by age, sex, and registration year from the general population in Olmsted County, Minnesota, between January 2002 and December 2007. Despite the counterregulatory relationship between TH1 and TH2 cells, patients with asthma had a significantly higher risk of developing RA than healthy individuals.
  - Youn Ho Sheen MD, PhD, Mary C. Rolfes, Chung-II Wi MD, Cindy S. Crowson PhD, Richard S. Pendegraft MS, Katherine S. King MS, Euijung Ryu PhD and Young J. Juhn MD, MPH. *Journal of Allergy and Clinical Immunology: In Practice*, 2018-01-01, Volume 6, Issue 1, Pages 219-226, Copyright © 2017 American Academy of Allergy, Asthma & Immunology

## Association between asthma and type 1 diabetes:

1. The association between type 1 diabetes mellitus (T1DM) and asthma remains controversial and has led to new interest in these 2 disorders. The purpose of the study was to examine the associations among young people with T1DM and asthma and offer a clinical demonstration of the balance between Th1 and Th2 responses. The team conducted a retrospective cohort study by using data from the National Health Insurance (NHI) system of Taiwan. The cohort consisted of 3545 T1DM cases and 14,180 controls established during the 1998 to 2011 period. Of the 3545 T1DM patients, 55.1% were girls and 26.5% were in the age group <8 years.

The overall incidence of asthma was 47% higher in the T1DM cohort than in the control cohort (6.49 vs 4.42 per 1000 person-y), with an adjusted hazard ratio (HR) of 1.34 (95% confidence interval [CI]=1.11–1.62).

The team observed a significantly higher incidence of asthma in young patients with T1DM than in the general population. Among young people of T1DM with more ER visits or frequent hospitalization because of diabetes mellitus were associated with risk of asthma, may indicate that poor glycemic control significantly contributes to asthma risk.

- Hsiao Y-T, Cheng W-C, Liao W-C, et al. Type 1 Diabetes and Increased Risk of Subsequent Asthma: A Nationwide Population-Based Cohort Study. Xiaolin Z, ed. *Medicine*. 2015;94(36):e1466. doi:10.1097/MD.0000000000001466.

2. A negative association has been observed between type 1 diabetes and atopic diseases in individuals, a finding that supports the Th1/Th2 paradigm. By using published data on disease occurrence in different countries, the team shows a strong positive association between the occurrence of type 1 diabetes and symptoms of asthma at the population level in Europe and elsewhere. Their finding suggests that there may be common factors influencing susceptibility to the two disorders at the country level. Their observation must be accommodated in explanations of the epidemiology of type 1 diabetes or atopic diseases.

- Lars C Stene, Per Nafstad, Relation between occurrence of type 1 diabetes and asthma, *The Lancet*, Volume 357, Issue 9256, 2001, Pages 607-608, ISSN 0140-6736, [https://doi.org/10.1016/S0140-6736\(00\)04067-8](https://doi.org/10.1016/S0140-6736(00)04067-8).  
(<http://www.sciencedirect.com/science/article/pii/S0140673600040678>)

### Extra Credit Question:

Identify all the gene-diseases association common between Japanese and all other populations to establish an association amongst the people, research techniques, etc. Order by the number of associations (high to low), filter out the top ten associations.

### Query:

```
create view common_diseases as
select gene, phenotype, population
from gad;

select count(Common_Associations) as 'Total_Common_Associations', Population_2 as
'Population'
from
(
    select concat(gad.gene, gad.phenotype) as 'Common_Associations', gad.population as
'Population_1', common_diseases.population as 'Population_2'
    from common_diseases, gad
    where gad.phenotype = common_diseases.phenotype and gad.population = 'Japanese' and
common_diseases.population <> " and common_diseases.population <> 'Japanese'
    and gad.gene = common_diseases.gene
)
as t1
group by Population_1, Population_2
having count(Total_Common_Associations)>1
order by Total_Common_Associations desc
limit 10;
```

### Result:

Total Common Associations	Population
87	Chinese
26	caucasian
16	Tunisian
14	Korean
12	Iranian
10	Italian
9	Finnish
9	Danish
7	South Moroccan
7	white european

## Gene-Phenotype Association Common with the Japanese Population

