

Body Temperature in Patients with Primary Immunodeficiency

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Background

- While fever is considered a sign of infection, **many individuals with primary immunodeficiency (PI) anecdotally report a lower than normal average body temperature.**
- On Immune Deficiency Foundation (IDF) Friends and IDF PI CONNECT Research Forum online, PI patients report a **diminished fever response** even when other signs of infection are present.
- There is **limited knowledge** about the **average body temperature in persons with PI.** However, the implications of missing an infection in those with PI is well established.

Research Question

- Is there a subset of patients with primary immunodeficiency disease who exhibit lower than normal average body temperature?

Hypothesis

- There is **no difference** in mean body temperature between adults diagnosed with PI and those adults without PI.

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References:

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- Gomolin, IH, Aung MM, Wolf-Klein G, Auerbach C. Older Is Colder: Temperature Range and Variation in Older People. Journal of the American Geriatrics Society, 53:2170-2172. doi: 10.1111/j.1532-5415.2005.01111.x
- <https://primaryimmune.org/>

METHODS

- Study investigators partnered with "patient investigators" to design a **prospective cohort study** to determine whether body temperature differed between persons living with and without PI.
- Three hundred fifty adults with PI** were recruited from IDF and **one adult household member without PI was also recruited.**
- McKesson digital oral thermometers (Model 01-413BGM)** recorded temperatures in all participants **three times a day for five consecutive days.**
- Descriptive statistics were calculated.**
- Median body temperatures were compared between the two cohorts at each time point using Mann-Whitney test.**
- Prism 6.0 was used to perform all analyses.

RESULTS

- Data from **254 households** were used for analysis (**72.6% participation**).
 - The **PI population was largely female (85.8%)** with a **median age of 49 years** and **largely Caucasian population (97.6%).**
 - The **non-PI population was largely male (66.9%)** with a **median age of 53 years** and **largely Caucasian population (92.9%).**

- PI diagnoses** included CVID (74.8%), hypogammaglobulinemia (12.6%), IgG subclass deficiency (4.7%), selective IgA deficiency (3.1%), specific antibody deficiency (3.1%), agammaglobulinemia (0.4%), chronic granulomatous disease (0.4%), combined immunodeficiency (0.4%), and complement deficiency (0.4%).

- 123 individuals with PI (48.4%)** reported a **lower than normal non-sick body temperature**, while **108 individuals with PI (42.5%)** reported a **"normal (between 97°F - 99°F)" non-sick body temperature.**
- 172 individuals with PI (67.7%)** reported **absence of fever with infection**, while **50 (19.7%)** reported a **normal fever response with infection.**

- The **median body temperature was significantly higher for PI patients in the morning, but not evening or bedtime, reading in 4 out of 5 days.**
 - Monday: PI = 97.5°F vs. non-PI = 97.2°F, p = 0.0291
 - Tuesday: PI = 97.4°F vs. non-PI = 97.2°F, p = 0.0020
 - Wednesday: PI = 97.5°F vs. non-PI = 97.2°F, p = 0.0009
 - Thursday: PI = 97.4°F vs. non-PI = 97.2°F, p = 0.0575
 - Friday: PI = 97.4°F vs. non-PI = 97.2°F, p = 0.0008

CONCLUSIONS

- Despite the limitations of this non-clinical study, **individuals with PI are knowledgeable about their conditions** and can offer unique insights and direction to researchers.
- This study demonstrates that **collaboration with patient advocacy groups may facilitate patient-centered and patient-driven research** with high participation among the target population.

RESULTS

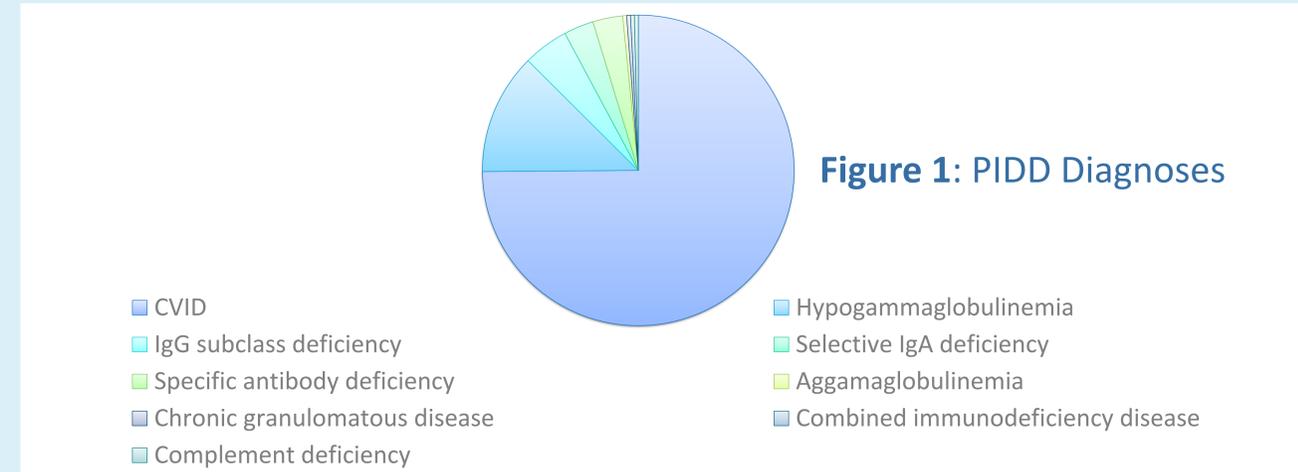


Figure 1: PIDD Diagnoses

Figure 2: Subjective Body Temperatures and Fever Responses in PI

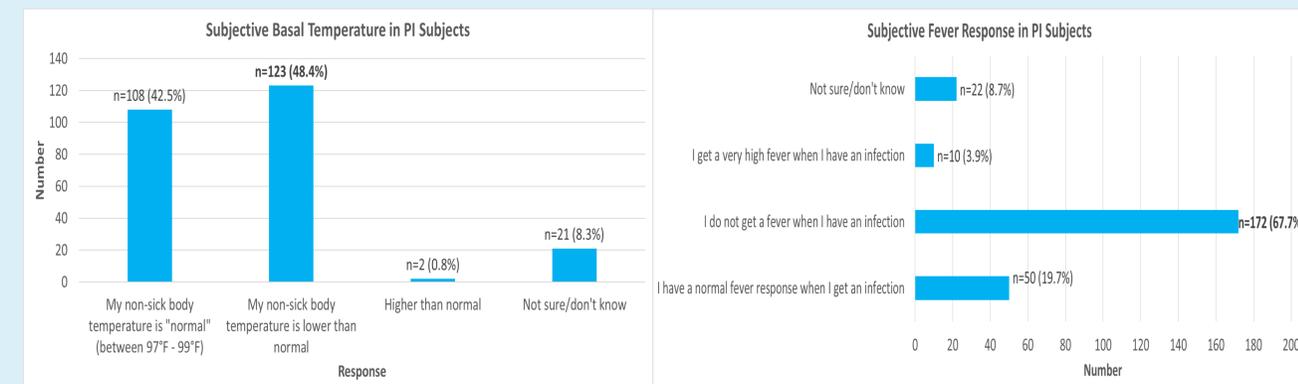


Figure 3: Objective Body Temperatures in PI and non-PI

