

# Health Ramifications of the Gush Katif Evacuation

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**ABSTRACT:** **Background:** Following the 2005 evacuation of Gush Katif, a community of Jewish settlements located in the greater Gaza Strip, many evacuees reported a deterioration in their health status. **Objectives:** To determine if and to what degree the evacuation of Gush Katif caused a worsening in the health status of the evacuees.

**Methods:** In this retrospective cohort study we assessed the medical records of 2962 evacuees for changes in prevalence of diabetes, hypertension and ischemic heart disease in the period beginning 1 year before and ending 5 years after the evacuation. The findings were compared to those for the general Israeli population. A questionnaire was distributed to 64 individuals to assess lifestyle and social change.

**Results:** An increase in diabetes and hypertension was found in men aged 45–64. The prevalence of diabetes mellitus in the 45–54 male group rose from 8.7% in 2004 to 12.6% in 2007 to 18.7% in 2010; in the 55–64 age group it rose from 24.6% in 2004 to 29.9% in 2007 to 32.9% in 2010. Hypertension in 45–64 year old men rose from 27.1% in 2004 to 35.12% in 2010. The increases in diabetes were significant and higher than those in the general population. The increases in hypertension were of similar magnitude. The prevalence of heart disease did not change and is similar to that in the general population. The questionnaire sample showed an increase in depression and overweight.

**Conclusions:** The Gush Katif evacuation appears to be associated with increased morbidity of chronic disease. This may be attributed to any of several mechanisms, with unemployment, depression, inactivity and overweight playing significant roles. Preventive medical interventions and measures should be employed to screen and treat this population which underwent a major stressful event and as a result seem at greater risk than their peers.

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recent years it has received special attention in the context of population displacement. The United Nations has published official guidelines dealing with the needs, deteriorating health, and psychological suffering of the displaced persons [5]. We sought to investigate the observed increase in the prevalence of diabetes and the suspected increase in hypertension in the largest of the communities of evacuees from Gush Katif, Israel. The changes in health appeared to correlate with psychosocial changes.

Gush Katif was a community of Jewish settlements located in the greater Gaza Strip established 40 years ago, beginning in 1967. Successive Israeli governments supported its development for strategic reasons and the population grew steadily, despite terror threats reaching staggering intensity. In 2005 a decision was made to evacuate the entire population of 8600 people in an effort to reduce points of conflict with Gaza Palestinians [6]. The evacuation took place on 15 August 2005 [7].

The evacuated residents of Gush Katif were offered monetary compensation on an individual basis to enable relocation and the purchase of alternative housing; in the meanwhile they were placed in temporary housing such as hotels, caravans, campuses, and vacation resorts. However, solutions for permanent resettlement, re-employment, and community and social support were not prepared in advance [8,9]. While negotiations for resettlement are ongoing, most evacuees still live in temporary housing areas in central Israel. Evacuee unemployment in 2007 was 27%, which later decreased to 20% where it persisted through 2009, three times that of the general population in Israel at the time [10]. Many evacuees believe their health has deteriorated due to depression, stress and ideological upheaval as a result of lifestyle changes. In particular, there is a concern that the prevalence of chronic disease is increasing.

The aim of this study was to ascertain whether the evacuation and its aftermath were associated with an increase in incidence of the common chronic disease burden in a community of evacuees. Diabetes, hypertension and ischemic heart disease were chosen as common conditions observed in the evacuee community and, where information was available, these were compared to trends in the general Israeli population during the years of the evacuation (2004–2010). Body mass index levels of evacuees were observed for potential confounding, and subject-

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**T**he interaction between personal upheaval and health has been discussed in the literature of many cultures [1–4]. In

tive perceptions of psychosocial change were studied by means of a questionnaire to examine possible effects on morbidity.

**SUBJECTS AND METHODS**

Clalit Health Services, the largest health fund in Israel, covers more than 90% of the original Gush Katif residents and was their health provider during the study period – which includes 1 year before through 5 years after the evacuation (2004–2010). Since the town of Nitsan is the largest site of temporary evacuee housing, evacuees living in Nitsan were studied as a cohort through their medical records. This community numbered 2692 in January 2010.

Patients’ identities as original Gush Katif residents were verified against the original Gush Katif-Clalit membership list in 2004, which was available in the Nitsan clinic. Patient charts were examined for diabetes, hypertension and ischemic heart disease, as defined by usage of at least one drug for the diagnosed condition. Patients’ age, gender, dates of diagnosis and, where applicable, dates of death were used to either categorize or exclude them from the proper age-gender groups. A random sampling of BMI readings was performed on 525 charts. Prevalence rates were calculated for the years 2004, 2007 and 2010. Diabetes prevalence rates for the entire Israeli population were taken from the Israel Health Ministry’s study “National Health Indicators for Community Health in Israel 2004 & 2007” [10]; hypertension and ischemic heart disease rates were taken from the Israel Health Ministry’s data in the World Health Organization study of 2004 [11]. No other data on hypertension and IHD for the general population were available from the Health Ministry. Employment rates were taken from “Report of the State Comptroller for the Management of the Gush Katif Evacuees” published in 2009 [8].

Approval for the study was obtained from the Institutional Review Board, and all medical records were codified with serial numbers to protect patient confidentiality.

A questionnaire on evacuees’ subjective perceptions of their experiences was distributed in non-clinical settings such as synagogues and community centers. Of the 100 participants who received the questionnaire, 64 responded.

**STATISTICAL ANALYSIS**

A test for one proportion with 95% confidence intervals, Z score and P value was performed for comparisons between the Nitsan evacuees and the general Israeli population. In addition, standard morbidity ratios were calculated for comparisons between the Nitsan evacuees, the general population, and low socioeconomic subgroups within Israel. The prevalence of disease in the evacuee sample was observed and, where information was available, compared to the gen-

eral population before the evacuation, and at two time points after the evacuation.

**INCLUSION CRITERIA**

Subjects were included if they had been registered members of Clalit Health Services at the Gush Katif clinic during 2000–2005 and remained Clalit members at the Nitsan clinic after the pullout.

**RESULTS**

The age and gender distribution of the original Gush Katif community and the evacuees living in Nitsan differed from those of the general Israeli population, as shown in Tables 1 and 2.

Diabetes and hypertension rates both increased by a magnitude of approximately 40% in middle-aged evacuee males (45–65 years old) during the years 2004 to 2010. The diabetes increase was statistically significant when compared with increases over the same period in the general male population and among low socioeconomic Israelis of combined genders. Evacuee females had diabetes trends very close to those of their general population counterparts, but less severe than those of low socioeconomic Israelis with the exception of the 65+ age group.

The increase in male hypertension rates was similar in magnitude to that of diabetes, and it too manifested most strongly in men aged 45–65, but the lack of information for the general Israeli population after 2004 precluded a statistical analysis. Nevertheless, virtually no increase in hypertension occurred over the same period in evacuee females of the same age, in

**Table 1.** BMI in Nitsan males aged ≥ 21 compared to Jewish Israeli rates

Age (yrs)	Number sampled in Nitsan	BMI 25–30 in Nitsan (%)	BMI > 30 in Nitsan (%)	Jewish Israeli rates of BMI > 30 (%)	CI for Nitsan obesity ratio (%)
21–34	145	28.3	5.5	10.0	1.8–9.2
35–44	35	42.9	22.8		8.9–36.8
45–54	59	47	31	17.7	18.8–42.3
55–64	37	54	27		12.7–41.3
65+	9	33	55	16.4	26.6–81.1

**Table 2.** BMI in Nitsan females aged ≥ 21 compared to Jewish Israeli rates

Age (yrs)	Number sampled	BMI 25–30 (%)	BMI > 30 (%)	Jewish Israeli BMI > 30 (%)	CI for Nitsan obesity ratio (%)
21–34	119	17.6	10.0	7.6	4.7–15.5
35–44	46	8.3	26.1		13.4–38.8
45–54	55	45	22	21.1	10.9–32.7
55–64	15	40	47		24.8–69.9
65+	5	60	20	22.4	3.6–62.4

BMI = body mass index  
IHD = ischemic heart disease

contrast to the male increases. In evacuee females over 65 with increased diabetes prevalence there was no change in hypertension prevalence after the evacuation.

**DIABETES IN THE NITSAN COMMUNITY**

Figure 1 shows that evacuee males generally had a higher diabetes prevalence in 2004 while still living in Gush Katif, and a larger subsequent increase when compared to their counterparts in the general population and to low socioeconomic subgroups in Israel. The most significant increase was experienced by evacuee men aged 45–65. Figure 2 shows that evacuee females had diabetes prevalence and trends closer to the Israeli norm and lower than among low socioeconomic Israelis of combined genders, with the exception of females aged 65+.

A similar pattern of increase was seen for hypertension. Among males aged 45–65 there was an increase in prevalence from 27.1% in 2004 (compared to 24.2 in the general population,  $P = 0.26$ ) to 35.12% in 2010. Lack of available Israeli rates in 2010 precludes assessment of whether the increases are specific to the evacuees.

The Nitsan female population experienced virtually no change in the years since the evacuation. The 45–64 female age group had a significantly lower hypertension prevalence than the general population. The prevalence was 13.3% for Nitsan evacuees compared to 27.3% in the general population ( $Z = -5.03, P < 0.0001$ ). This prevalence remained unchanged in 2010.

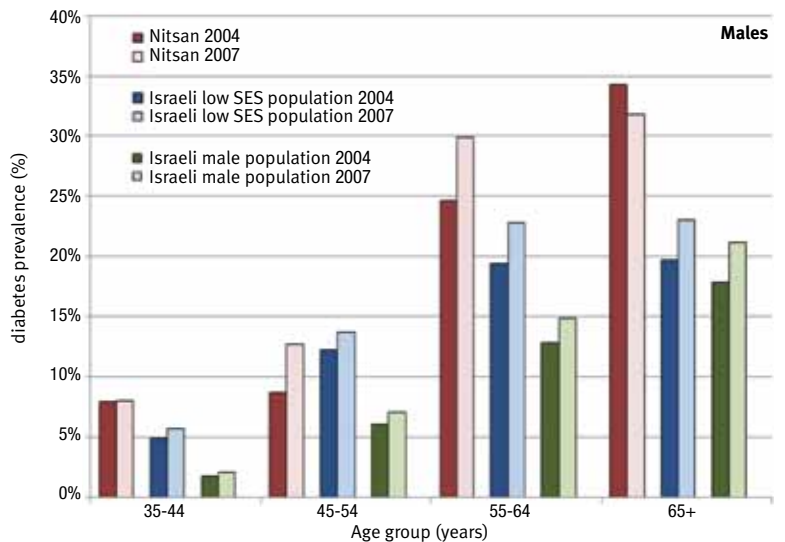
In ischemic heart disease there was no statistically significant difference between Nitsan males and general population males, and the change from 2004 to 2010 was not significant. Nitsan females started the period with a statistically significant lower rate of IHD compared to the general population and the difference remained unchanged over the subsequent 5 years.

**BMI IN THE NITSAN COMMUNITY**

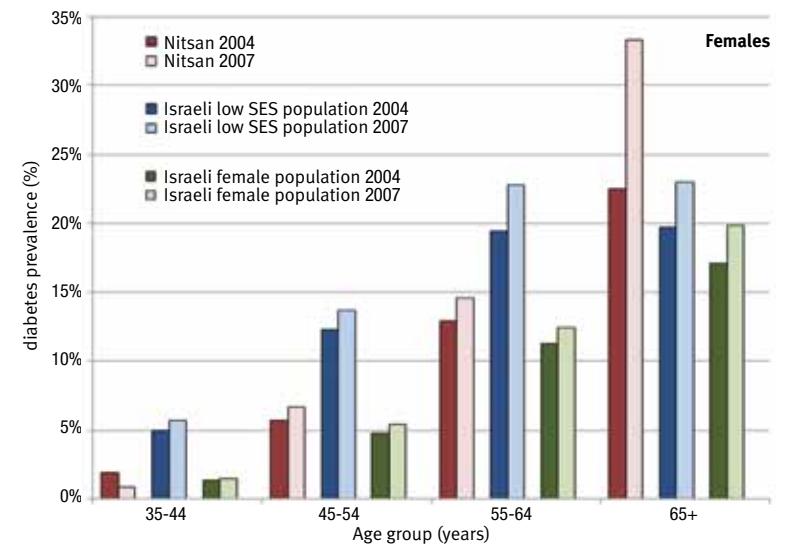
Table 1 shows that Nitsan evacuee males aged 45–65 had higher obesity rates than their general population counterparts in 2004 (Nitsan rates were taken from a random sample of 525 adults over the age of 21 in 2004, and Israeli rates from the Israel Health Ministry, 2004). Nitsan obesity rates for 2010 remained unchanged. Table 2 shows that Nitsan females of all ages had obesity rates higher than their general population counterparts.

Of the 64 respondents to the questionnaire, 36 (56%) were men of whom 34 (94%) were aged 40–70. Twenty-eight respondents (44%) were women of whom 67% were aged 40–70. Diabetes prevalence among the interviewed men was 22% and among the women 11%. Hypertension prevalence was 41.7% among the men and 17.9% among the women. Twenty-six percent responded to the question “what is your occupation?” with the answer “none.” To the question how often one feels anxiety, 51.7% (31 of 60 responders) (both men and women) answered “sometimes” and “often”; whereas

**Figure 1.** Comparison of male diabetes prevalence changes in Nitsan evacuees and other population groups in Israel over the years 2004–2007



**Figure 2.** Comparison of female diabetes prevalence changes in Nitsan evacuees and other population groups in Israel over the years 2004–2007



48.3% responded “seldom” or “never.” There was a statistically significant correlation between anxiety and diabetes (Fischer’s exact test significance 0.008-0.013), as well as between unemployment and diabetes (sig 0.031-0.054) and between unemployment and hypertension (sig 0.001).

**DISCUSSION**

Residents of Gush Katif before the evacuation saw themselves as part of a unique agricultural community making important economic and strategic contributions to the State

of Israel. Many enjoyed material prosperity from agriculture using innovative technologies, and nearly all had a religious-ideological commitment to living in Gush Katif as part of the resettling of biblical Israel. At the same time, they viewed themselves as constituting a body of Jewish settlements, along with the military, guarding the southern border of Israel's shoreline. They withstood the challenges and bravely faced unprecedented terror threats and thousands of mortar and rocket shells. The evacuation brought about a change in lifestyle due to loss of land-attached employment, an ideological upset due to the perceived rejection of the community's commitment and altruism, and neglect of its subsequent rehabilitation. The evacuees feel they went from a status of financially independent pioneers in their society to one of dependent and neglected displaced persons. Thus it is necessary to include emotional as well as physical ramifications of the evacuation in any discussion.

Unlike most displaced populations discussed in the literature, the Gush Katif evacuee population has had continuous access to health care and surveillance. The medical records of the evacuees are computerized and follow-up reports of health development are readily available. Most displaced populations relocated to other countries often have poor pre-displacement health and/or suffer physical injury in the displacement process itself [1]. The Gush Katif evacuees were moved within their home country, and most have had continued medical care with their original health staff. The evacuation event did not in itself involve physical injury to the evacuees. It is thus difficult to derive expected outcomes in this case based on precedents in the literature.

Evacuee males aged 45–65 merit special attention as this is a vulnerable group in many respects and is seen in the literature to have increased morbidity in most displaced populations [2]. This age-gender group universally experiences an increased onset of chronic diseases due to natural aging, regardless of social circumstances. In addition, this group is vulnerable to social upsets such as unemployment due to their age disadvantage when seeking new work and being too young to retire early. On the one hand the individual is still expected to maintain the role of breadwinner but has less flexibility and is highly susceptible to the ill effects of changed environment and vocation on the other. In the Gush Katif community the role of the middle-aged man as achiever and ideological pioneer was prominent particularly among agricultural workers. A loss of work in this community is a blow to self-esteem from a financial, and even more from an ideological point of view. These factors came together in this group of evacuees and appear to have induced a morbidity exceeding parallel groups in the general population and subgroups within.

As seen in the results, the prevalence of both diabetes mellitus and hypertension has increased significantly in the Nitsan evacuee community since 2004. The core of this

increase was experienced by *men aged 45–65*. While diabetes prevalence in that group was already high in 2004 [Figures 1 and 2], the hypertension prevalence at the same time was quite close to that of the general population. It is uncertain whether the Nitsan evacuee male hypertension increase is specific to Nitsan or reflects a general Israeli increase; however, the lack of change in Nitsan female hypertension over the same time period presents a sharp contrast to the male trends and raises questions regarding the reasons for the male increases at this specific time. In addition, males aged 65+ experienced a smaller hypertension increase in the same period, a pattern identical to that seen in the diabetes findings. An explanation of previous under-diagnosis of hypertension is weakened by the high pre-evacuation diabetes prevalence, indicating regular patient-physician contact. In addition, guidelines to screen all diabetics for hypertension were in place before the study period, suggesting that at least those with diabetes were checked for concurrent hypertension and were not under-diagnosed.

Both the men and women in the age group 45–65 had a high prevalence of obesity from 2004. This may explain the high male diabetes prevalence at the outset; however, it is only a partial explanation for the subsequent increase in both diabetes and hypertension only in men [12]. While diabetes and hypertension increased dramatically among males aged 45–65, the obesity level remained stable throughout the past 7 years and was not associated with similar increases in women. This raises concern that other factors may be involved in the hypertension and diabetes increases in men at this specific time. Weight gain upon displacement is not a consistent finding in the literature and therefore it is difficult to predict if either a rise or drop can be expected [2]. Obesity was probably a longstanding risk factor in Gush Katif, but its morbidity in middle-aged males was possibly decreased by the active lifestyle in the original community. Also, each time there was a bombardment of mortars or loudspeaker warnings everyone would literally run to the shelters for safety. Though studies have shown that physical activity improves morbidity profiles in obese subjects, it does not mitigate its risks permanently [13], particularly if the activity ceases later. Upon evacuation, the loss of land-based work caused many to become unemployed and less active. Also, the prolonged and continuing state of temporary housing, with unclear prospects for resettlement, has likely increased anxiety and depression mentioned in the results. These are shown in studies to increase morbidity of chronic disease [14,15]. Finally, the documented high unemployment in the evacuees has been shown to be an independent risk factor for chronic disease independent of smoking, weight gain and physical activity [16,17].

The evacuee community is only now seeing results of the genuine efforts on the part of the authorities to resettle and rehabilitate this population. This was the subject of critical

reports by the Israel state comptroller [8,9]. The questionnaire sample inquired about individuals' lifestyle changes, work status, and subjective perceptions of well-being, and attempted to correlate the replies with medical conditions. Despite the limitations of this questionnaire, which was distributed to a small number of individuals at community centers in the evenings, the diabetes and hypertension rates of interviewees were similar to those found in the medical records. The unemployment rate of 26% was slightly higher than the rate in the state comptroller's report [8] and mildly confirms the bias suspected. Those replying to the question how often they experience anxiety with "sometimes" or "often" as opposed to "never" or "seldom" had a statistically significant correlation with a diagnosis of diabetes (Fischer's exact test significance 0.008-0.013). This correlation has been documented in the literature [14]. Evacuees reported experiencing anxiety due to the continuing state of uncertainty with regard to their ultimate permanent resettlement. Those reporting being unemployed had a statistically significant correlation with both diabetes (Fischer's exact significance 0.031-0.054) and hypertension (Fischer's exact significance 0.001). Unemployment was shown to independently influence all morbidities even when accounting for differences in smoking, weight gain and physical activity [16]. Those reporting being unemployed also had a statistically significant correlation with depression (Fischer's exact test 0.002). Though the chronic conditions and the depression were each respectively correlated with unemployment, the depression and the chronic conditions were not correlated with each other, implying that unemployment may be associated with chronic diseases in some patients and with depression in others.

That ischemic heart disease prevalence was and remained similar to that in the general population is only partly reassuring, as both hypertension and diabetes are risk factors for IHD and usually precede it by several years. It may indicate that both the diabetes and hypertension increases are relatively recent developments but require immediate intervention on a community level to stall progression to IHD. In addition, other illnesses should be explored and screened for in this community.

#### LIMITATIONS

The evacuee sample is used as a cohort based on the findings in 2010, and calculated to 2004 and 2007 by dates of diagnosis and dates of death. There is a possibility that evacuees chose their temporary housing locations based on certain considerations that may be associated with their health and thus created unknown biases and may have limited representation in the Gush Katif community as a whole.

The study of hypertension prevalence was not comparable to the general population since no information for the general population is available after 2004.

Israeli rates for hypertension and ischemic heart disease were available for 2004 only, allowing for pre-evacuation comparison with the general population but making a post-evacuation statistical comparison of findings impossible. The questionnaire sampling was performed in community centers in the early evening hours and may be selection-biased by locating a higher number of unemployed individuals. There may be additional factors that made the particular respondents more available and thus added other unknown biases. The relatively low response rate was explained by some interviewees as a reflection of evacuee distrust of official studies stemming from a lack of satisfaction with their handling thus far. The diabetes and hypertension prevalence in the questionnaire group is moderately similar to that of the entire community studied.

Confounders such as smoking and ethnicity were not available in the grouped computerized medical records and would require reading each patient's medical record, which was beyond the scope of this study.

Could secondary gain have led more examinees to turn for medical care? This may have a borderline influence and may be expected especially after such a social upheaval. This may have occurred on an individual subconscious basis. However, we feel that one may receive a false impression that an increased burden of disease may entitle any one of the uprooted settlers to increased 'reparations' or any sort of monetary advantage. In fact, to date, almost eight years following the pullout there has not been a single claim or ruling for any sort of compensation to anyone ill or dead as a direct or indirect effect of attrition following this event. Furthermore, while residing in the Gush Katif region, even terror victims who were eligible for injury and illness social security payments as a result of their injuries did not significantly turn into over-utilizers of health services. It may not be falsely assumed that health-seeking behavior remained uniform per individual.

The major problem of this study was the lack of a homogeneous control group. The optimal control group may have been a similar group of villages in the vicinity that were not evacuated. However, the different communities in this geographic region are highly heterogeneous. Socioeconomic and demographic differences between populations definitely have an influence on comparisons. This population was much younger than neighboring communities and had one of the highest birth rates in the country. In addition, the fact that over 90% of our studied population was religious does have an impact on chronic disease incidence and individual behavior [18,19]. A thorough study performed in Israel comparing populations of similar composition with different beliefs showed that whereas recent life events adversely relate to health, belonging to a religious community counterbalances the negative health consequences of these events [20]. This may dampen differences of morbidity rates. Accessing data of other populations was beyond the

scope and resources allocated for this study. However, such information may definitely add valuable insight and we would recommend collecting such data if a future study is undertaken. Nevertheless, we feel fully justified in accepting the results observed, analyzing the data received, and using the less ideal tool of subjects serving as their own controls over a time axis.

## CONCLUSIONS

This study suggests that the evacuation and subsequent long-term displacement of the Gush Katif community is associated with an increased prevalence of diabetes and implies an increase in hypertension in middle-aged men. This group should be considered high risk, and an intensive education program should be initiated to inform the patients of the trends in order to minimize progression to heart disease. Most of all, it seems obvious that a continued effort should be made to pursue the permanent resettlement and re-employment of the displaced Gush Katif population as soon as possible.

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## Capsule

### Association of ANXA11 genetic variation with sarcoidosis in African Americans and European Americans

A recent genome-wide association study in a German population and two subsequent studies in European populations found that a non-synonymous single-nucleotide polymorphism (SNP), rs1049550, within the annexin A11 (ANXA11) gene was associated with susceptibility to sarcoidosis. Levin et al. sought to identify additional ANXA11 variants independently associated with sarcoidosis, determine whether any sarcoidosis-associated ANXA11 variants were associated with chest radiographic phenotypes, and explore human leukocyte antigen (HLA) SNP-SNP interactions with ANXA11. A total of 209 SNPs spanning 100 kb including the 5' promoter, coding, and 3' untranslated regions of ANXA11 were genotyped for 1689 sarcoidosis cases and 1252 controls. After adjustment

for rs1049550, two additional novel ANXA11 sarcoidosis associations were identified only in African Americans – rs61860052 (odds ratio (OR) = 0.62, 95% confidence interval (CI) = 0.40–0.97) and rs4377299 (OR=1.31; 95% CI=1.06–1.63). These associations were more pronounced in radiologically classified Scadding stage IV sarcoidosis cases. The authors also identified a significant SNP-SNP interaction between rs1049550 and a sarcoidosis risk SNP (rs9268839) near the HLA-DRA locus. This further genetic dissection of ANXA11 may provide additional insight into the immune dysregulation characteristic of sarcoidosis pathophysiology.

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