

# The role of serum adenosine deaminase levels in determination of disease activity of patients with pulmonary tuberculosis

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*Serum adenosine deaminase (ADA) levels in patients with active pulmonary tuberculosis and in 20 patients with inactive pulmonary tuberculosis were 50 investigated. The values were  $30.7 \pm 15.2$  in active disease group and  $30.2 \pm 13.4$  in patients with inactive disease. There was not any statistically significant difference between two groups ( $p > 0.05$ ). Besides, serum ADA values before treatment and in the first two months of treatment in patients with active pulmonary tuberculosis were studied for the relation of these values to erythrocyte sedimentation rate (ESR) and extent of radiological lesion. Again, there was no statistically significant correlation among these parameters ( $p < 0.05$ ). However, serum ADA values were high at active disease group with PPD over 15 mm. and there was a statistically significant correlation between them ( $p = 0.03$ ). [Turk J Med Res 1995; 13(6):181-184]*

**Key Words:** Adenosine deaminase, Tuberculosis

Adenosine deaminase is an enzyme that catabolizes the transformation of adenosine to inosine and deoxyadenosine to deoxyinosine in purin metabolism (1)-

It exists in all tissues. The presence of ADA activity is much more in lymphocytes than erythrocytes and in T lymphocytes than B lymphocytes (2). ADA has been accepted as a determinant of cellular immunity since it is an enzyme related to the lymphocyte differentiation and proliferation (3).

ADA activity measurements were carried out in pleura, ascites, pericardia and cerebrospinal fluid and its diagnostic value were stated previously (2,4).

Nowadays, there are still difficulties in diagnosis and follow-up of pulmonary tuberculosis despite the developed laboratory techniques. Especially in patients with symptoms and radiological findings which correlate with tuberculosis, but with negative acid fast basilli in sputum, a period of time is required to reach a conclusion about activation of disease, despite the applications of methods like radiological follow-up and sputum culture.

In our study, by comparing serum ADA levels in active and inactive pulmonary tuberculosis, we aimed to detect the role of ADA in activation of disease. Besides, by comparing the ADA levels in first and second months, we aimed to determine the usefulness of ADA level in treatment follow-up.

## MATERIALS AND METHOD

Research was carried out in 50 active and 20 patients with inactive pulmonary tuberculosis patients hospitalized in Atatürk Chest Diseases and Surgery Center between January-August 1994.

The role of serum ADA values in disease activity determination were investigated by means of a comparison between active and inactive disease groups. The merit of serum ADA results before treatment and in first and second months of the treatment were investigated. The relation between serum ADA level and radiological extent of disease was investigated.

All patients were male. Ages of patients with active pulmonary tuberculosis were between 14 and 63 with an average value 34 years. Meanwhile at inactive group age varied between 20 and 70 and average age was 38 years.

PPD was applied to all patients in the active group. Endurations under 5 mm were accepted as negative and those above 15 mm as positive. ESR's

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of patients at the same group recorded before treatment and in first and second months of treatment.

Radiological pathologies of active pulmonary tuberculosis patients were classified as limited and extenuated lesions. In limited lesion group, nodular and reticulonodular lesions were limited by 1/3 pulmonary area and cavity diameter was less than 3 cm. Extended lesion included multiple cavities with various dimensions, extended fibrotic lesions, lungs having one side destructed or too developed tuberculosis lesions such as paranchyma lost covering one lobe. There were 25 patients in both groups having limited and extended lesions.

Blood samples were taken to measure serum ADA from active pulmonary tuberculosis patients before treatment and the first and second months of treatment. There was not any additional pathology that can affect serum ADA values in any patient (2,5).

Serum ADA values were measured via Guisti method. ADA activity was defined as U/L.

Kruskal Wallis variance analysis, Wilcoxon and correlation tests were used in statistical evaluation of results.

## RESULTS

Serum ADA values were  $30.7 \pm 15.2$  U/L in patient group with active pulmonary tuberculosis and  $30.2 \pm 13.4$  U/L in patient group with inactive pulmonary tuberculosis. There was not any statistical difference between two groups ( $p > 0.05$ ).

Serum ADA values before treatment and in the first and second months of the treatment in the patients with active pulmonary tuberculosis in the study have been shown in Table 1.

Serum ADA values before treatment and in the first and second months of the treatment in the radiologically limited and the extended patient groups have been shown in Table 2. Regressions at various levels have been detected at lesions radiologically by means of antituberculosis treatment in all of these patients.

There was a statistically significant difference between the PPD values above 15 mm and serum ADA values. The relation between PPD values and serum ADA values have been displayed on Figure 1.

The relation between erythrocyte sedimentation rates and serum ADA values before treatment and in

**Table 1.** Serum ADA values before treatment and in the first and second months of the treatment

	Before treatment	1 <sup>st</sup> month of treatment	2 <sup>nd</sup> month of treatment	P
Ada Values (mean±SD)	30.7±15.2	26.1±14.3	24.8±11.5	>0.05

first and second months of treatment have been shown in Table 3.

There was no correlation between the ESR and serum ADA values of the patients in this group before treatment and in first and second months of the treatment ( $r=0.005$ ). A regression was observed in ESR's of the same patients in the first and second months of the treatment compared to the values before treatment.

## DISCUSSION

Increase of serum ADA activity shows that T lymphocytes exists in tuberculosis. Not only in locally lung parenchyma but also in systematic activation and proliferation of T.lymphocytes occurs in tuberculosis. In other words, it displays the systematic property of immune response for this reason, it has been accepted as a determinant of cellular immunity by many researchers.

In our study, high levels of serum ADA in patients having PPD values above 15 mm support the role of ADA at cellular immunity.

Lakshmi et al. found the average serum ADA values in 61 active pulmonary tuberculosis patient in their study as follows; Sputum AFB (-); PPD (-) patient group:  $13.13 \pm 5.97$  U/L, Sputum AFB (+); PPD (+/-) patient group:  $33.52 \pm 15.22$  U/L and they stated that serum ADA values in patients that may have active pulmonary tuberculosis, can be helpful for diagnosis (7).

In our study, average serum ADA levels were found as follows: In inactive pulmonary tuberculosis patient group:  $30.2 \pm 13.4$  U/L, in active disease group  $30.2 \pm 15.2$  U/L there was no statistically significant difference between the serum ADA levels of two groups ( $p > 0.05$ ).

**Table 2.** Serum ADA values before treatment and in the first and second months of the treatment in patients with active disease

	Number of patients	Before treatment*	1 <sup>st</sup> month of treatment*	2 <sup>nd</sup> month of treatment*
Limited Lesion	25	30.1 ±11.7	24.8±15.6	22.0±10.6
Extended Lesion	25	31.3±18.3	27.5H3.0	27.1 ±12.2

(mean±SD) \*P>0.05

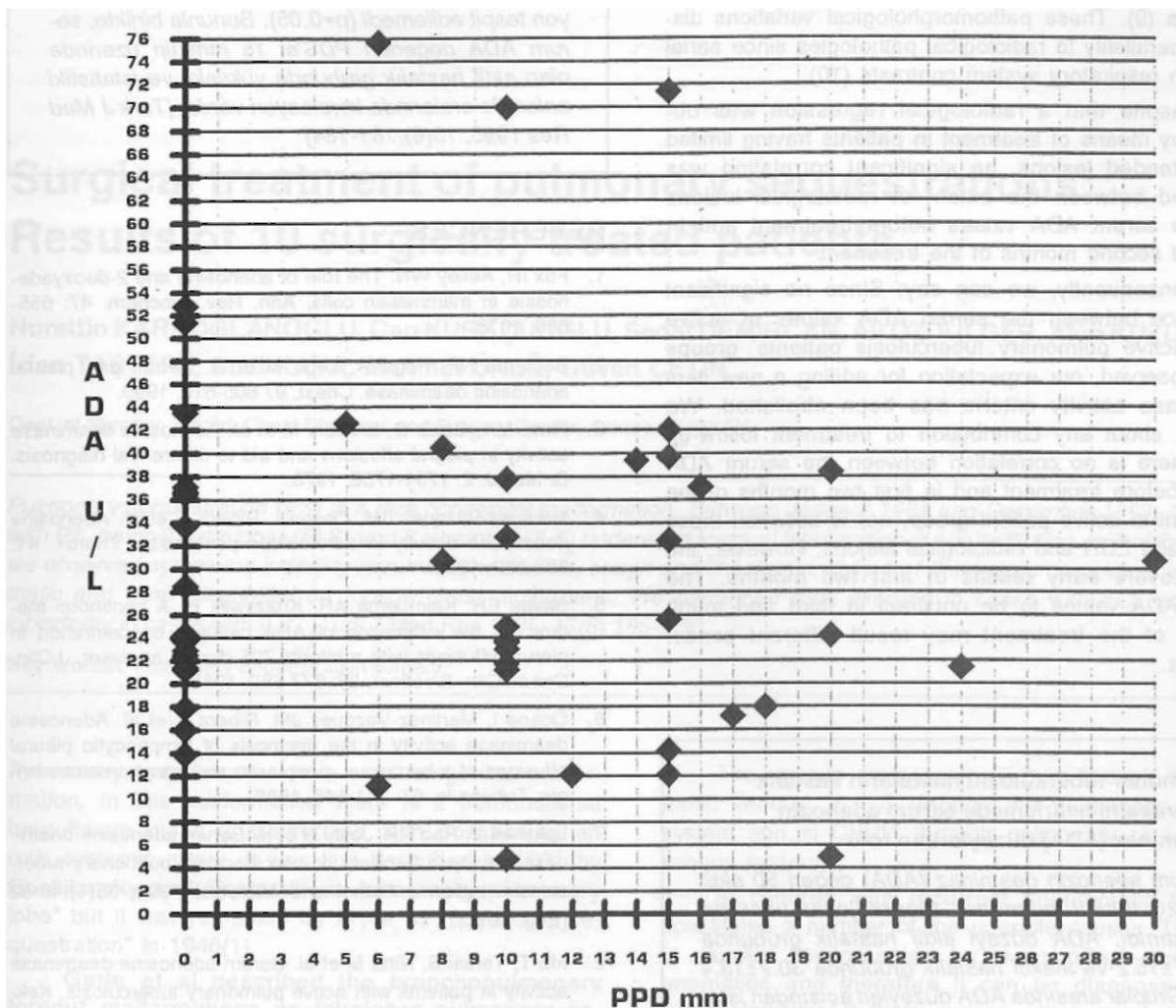


Figure 1. The relationship between PPD values and serum ADA values

Table 3. The relationship between ESR and serum ADA values before treatment and in the first and second months of treatment

	Before treatment	1st month of treatment	2nd month of treatment	p
ESR (mm/hour)	71.8+33.8	48.4±36.7	37.4+26.7	<0.05
ADA(U/L)	30.7+15.2	26.1+14.3	24.8±11.5	>0.05

Ida et al. detected a prominent decrease in serum ADA levels at the end of three months of antituberculous treatment whereas those values were high before treatment in their study on 20 active pulmonary tuberculosis patients ( $p < 0.05$ ). In addition, they observed that there was a positive correlation between serum ADA activity and ESR (8).

In our study, there was no significant difference between serum ADA values before treatment and in first and second months of the treatment. Besides,

there was no correlation between ESR and serum ADA values according to the treatment.

The factor that determines the progress of lesions in tuberculosis depends on the balance of mutual effects of cellular hypersensitivity and cellular immunity facts. Bacteria reproduce unlimitedly in the case of incompetence of general and local immunity factors. So, as the lesion extends by spreading to adjacent tissues, liquefaction and destructive disease progress via contribution of proteolytic enzymes and necrosis

progress (9). These pathomorphological variations display a parallelity to radiological pathologies since aerial tissue in respiratory system contrasts (10).

Despite that a radiological regression was obtained by means of treatment in patients having limited and extended lesions, no significant correlation was observed between the extent of radiological lesions and the serum ADA values before treatment and in first and second months of the treatment.

Consequently, we can say; Since no significant difference between the serum ADA values of active and inactive pulmonary tuberculosis patients' groups were observed, our expectation for adding a new item to disease activity criteria has been abolished. We suspect about any contribution to treatment follow-up since there is no correlation between the serum ADA values before treatment and in first two months of the treatment in active patient group, nor is between those values and ESR and radiological lesions. However, the study covers early results of first two months. The serum ADA values to be obtained in third and fourth months of the treatment may result different consequences.

Pulmoner tüberkülozla hastaların hastalık aktivitesini belirlemede serum adenoazin deaminaz (ADA) düzeylerinin rolü

*Serum adenoazin deaminaz (ADA) değeri 50 aktif ve 20 inaktif pulmoner tüberkülozlu hastada araştırıldı. ADA düzeyi aktif hastalık grubunda  $30.7 \pm 15.2$  ve inaktif hastalık grubunda  $30.2 \pm 13.4$  idi. Gruplar arasında ADA düzeyleri açısından istatistik! fark yoktu ( $p > 0.05$ ). Bunların yanında, tedavi öncesi ve aktif pulmoner tüberkülozlu hastaların tedavisinin ilk iki ayında, eritrosit sedimentasyon hızı ve radyolojik lezyonun yaygınlığı ile ADA düzeyleri arasındaki ilişki çalışıldı. Yine bu parametreler arasında da istatistik! anlamda ciddi korelas-*

*yon tespit edilemedi ( $p=0.05$ ). Bununla birlikte, serum ADA değerleri PDS'si 15 mm'nin üzerinde olan aktif hastalık grubunda yüksekti ve istatistik! anlamda aralarında korelasyon vardı. [Turk J Med Res 1995; 13(6): 181-184]*

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