วารสารวิชาการสาธารณสุข
ปีที่ ๑๕ ฉบับที่ ๖ พฤศจิกายน - ธันวาคม ๒๕๔๙

Journal of Health Science
Vol. 15 No. 6 November - December 2006

*Original Article*

นิพนธ์ต้นฉบับ

# Survival of HIV-infected Patients in the North of Thailand Enrolled on National Antiretroviral Program

**Sakchai Chaiyamahapurk**

*Office of Diseases Prevention and Control 9th, Phitsanulok*

**Abstract** To describe the survival and determine risk factors for survival of HIV-infected patients enrolled on Thai National Antiretroviral Program during the first 12 months of initiating ARV, a cohort of 647 patients, enrolled in the lower north of Thailand between November 2002 and December 2003, was analysed. The median age of patients was 33 years and 55 percent were women. At the time of starting HAART (highly active antiretroviral therapy), the median baseline CD4 cell count was 40 cells/mm$^3$ and more than half of patients had AIDS. Most patients (98 percent) started on first-line antiretroviral regimen of Stavudine, Lamivudine and Nevirapine. At 12 months after initiation of the therapy, of the 647 patients who contributed 573.9 person-years of follow up, 55 patients died accounting for a mortality rate of 9.6 per 100 person-years and first year survival probability of 91 percent. In the univariate analysis, CD4 at baseline, body weight at baseline and clinical staging were associated with survival. In multivariate analysis, CD4 at baseline, body weight at baseline and sex were associated with survival, however interaction of CD4 -body weight at baseline and possible interaction between body weight at baseline and sex were reported. Survival probability at one year was not different from other studies in developing countries, yet lower than those reported in developed countries. CD4 cell count was the strong predictor of survival. Low body weight at starting ARV was also strongly associated with increased mortality and its effect became more significant in group of low CD4 cell count.

*Key words:* **AIDS, Thailand, survival analysis, antiretroviral**

## Introduction

Survival of HIV-infected patients in developed country had been prolonged by antiretroviral therapy.[1-6] Though Highly Active Antiretroviral Therapy (HAART) is recommended for HIV-infected patients who meet medical criteria, the cost of drugs, poor health-care infrastructure and limited financial and human resources were important barriers to access service of antiretroviral therapy (ART) in developing countries. In 2002

the World Health Organization launched the "3 by 5" plan which was aimed to provide HAART for three million people in developing country by 2005.[7]

In 2002, the Government of Thailand launched the "National Access to Antiretroviral Program for People with HIV and AIDS(NAPHA)" which provided free antiretroviral drug for HIV-infected patients who met medical criteria.

The NAPHA has expanded to most government hospitals including district, provincial, regional and university hospitals. As of June 2005, overall there were 849 hospitals participating in "NAPHA" and 73,507 HIV-infected patients had been enrolled on the program and underwent HAART. Of these, 59,936 patients still remained in the program.[8]

To examine the impact of HAART on survival of HIV-infected patients treated with antiretroviral therapy in an implementation programme for middle-income country, the survival and risk factors for survival of HIV-infected patients during the first 12 months of initiating ART were described.

## Methodology

The study population was HIV-positive patients whom were enrolled on the "National Access to Antiretroviral for People with HIV and AIDS Program (NAPHA)" according to the following medical criteria. [9,10]:

- Patient with AIDS defining illness regardless of CD4 cell count
- HIV-infected patients with the following symptoms:
  - Oral thrush
  - Unknown chronic fever
  - Pruritic papular eruption
  - Diarrhoea with unknown cause longer than 14 days
  - Weight loss more than 15 percent within 3 months
- Asymptomatic HIV-infected patients with CD4 less than 200 cells/$mm^3$

The programme started in November 2002. Data in this study was extracted from the computer database of the Regional Office of Diseases Prevention and Control for the Phitsanulok region which contained the data from 60 hospitals in six provinces in the lower northern part of Thailand. Additional data for some patients with incomplete data were collected through onsite visits, telephone interviews with hospital staffs and a postal questionnaire to hospital staffs.

The primary outcome of interest in this study was death related or unrelated to HIV disease after the therapy.

The explanatory variables were CD4 cell count at baseline, HIV disease stage, age of patients at initiation of treatment, sex, body weight at baseline and type of hospital.

The HIV disease stage was recorded as asymptomatic, symptomatic and AIDS. This classification system was modified from CDC (Center for Disease Control) staging for HIV surveillance by Bureau of Epidemiology, Ministry of Public Health.[10]

The CD4 cell counts were determined with a FACScount apparatus. No viral load test were performed.

All explanatory variables were baseline value at starting therapy. Survival analysis was based on time from starting ART to either death, failing to follow-up, termination of treatment, alive one year after starting therapy, whichever occurred first. Estimation of the survival curves of variable associated with survival was examined by Kaplan-Meier method. Cox regression analysis on the follow-

up time scale was used to determine hazard ratios both of unadjusted in univariate analysis and adjusted in multivariate analysis controlled for the other variables. Multivariable Cox's regression model were fitted forwardly. If likelihood ratio test showed p-value less than 0.05, that variable was retained in the model. Backward elimination of model with all variable also were performed and showed the same results as forward fitting. The statistical analyses were performed using Stata release 8.2 (Stata Corporation, Collage station, Texas, USA).

## Results

As of July 2005 a total of 3,380 patients had been enrolled on the program in Phitsanulok region of whom only 1,867 patients have information recorded in the electronic database because of delay of entering patients' data into electronic database. In order to rectify incomplete follow-up data, data analysis was restricted to participants who were enrolled on the programme between November 2002 and December 2003. Of the 1,867 patients recorded in the database, additional exclusions were made further on the following conditions : data inconsistency, incorrect data entry or unmatched merging (80 patients); enrolment on other ART projects (149 patients) or NAPHA program after December 2003 (991 patients). In all, data of only 647 patients remained valid for statistical analysis.

Table 1 shows basic characteristics of the 647 HIV-infected patients in this cohort study who were registered at 48 hospitals in 6 provinces (Phitsanulok, Phichit, Phetchabun, Uttaradit, Phrae and Nan). The number of patients per hospital ranged from 1 to 93. The date of starting ART was from 5 November 2002 to 31 December 2003. The median age of patients was 33 years

**Table 1** Basic Characteristics of HIV-infected patients in this study

| Characteristic | Value (n=647) |
|---|---|
| **Follow-up time** | |
| Total person years | 573.9 |
| Median, range | 1 (0.003-1) |
| Number of follow-up visits : median (range) | 11 (1-25) |
| Number of deaths | 55 |
| **Age (years)** | |
| Mean (standard deviation) | 33.7 (7.0) |
| Median, range, IQR | 33, 15-68, 29-37 |
| Age grouped (years) | |
| <30 | 175 (27.1) |
| 30-34 | 202 (31.2) |
| 35-39 | 171 (26.4) |
| ≥40 | 99 (15.3) |
| **Sex** | |
| Male | 291 (45.0) |
| Female | 356 (55.0) |
| **Weight (kg)** | |
| Mean (standard deviation) | 50 (9.4) |
| Median, range, IQR | 50, 21-81, 44-56 |
| Weight grouped | |
| <40 | 79 (12.2) |
| 40-49 | 235 (36.3) |
| 50-59 | 242 (37.4) |
| ≥60 | 91 (14.1) |
| **Clinical staging** | |
| Asymptomatic | 150 (23.2) |
| Symptomatic | 161 (24.9) |
| AIDS | 336 (51.9) |
| **ARV experience** | |
| None | 640 (98.9) |
| Yes, PMTCT | 7 (1.1) |
| **CD4 count (cells/mm$^3$)** | |
| Median, range, IQR | 40, 0-937, 11-113 |
| Mean | 71 |
| CD4 count grouped (cells/mm$^3$) | |
| <50 | 317 (49.0) |
| 50-99 | 101 (15.6) |
| 100-199 | 136 (21.0) |
| ≥200 | 37 (5.7) |
| Missing | 56 (8.7) |
| **Antiretroviral regime** | |
| d4t+3TC+NVP | 635 (98.2) |
| D4t+3TC+EFV | 12 (1.8) |
| **Hospital type** | |
| Regional or provincial | 246 (38.0) |
| District | 401 (62.0) |

and 55 percent were women. At the time of starting ART the median baseline CD4 cell count was 40 cells/mm$^3$ and more than half of the patients had AIDS. More than 40 percent of patients had body weight at the beginning of the therapy less than 50 kg with the mean body weight in women and men 47.2 and 53.4 kg, respectively. Most of the patients were naive to ART, only 1.1 percent of patients had experienced ART from prevention of mother to child transmission. Most patients (98 percent) started on first-line antiretroviral regimen of Stavudine, Lamivudine and Nevirapine and 62 percent of patients were treated at district hospitals.

Comparison of baseline characteristics by using Chi-square test for categorical variables and t-test for continuous variables show no difference between those who remains in the study at one year or had died and those who were lost during follow-up or withdrawn from the study.

## Survival probability

Of the 647 patients who contributed 573.9 person-years of follow up, 552 (85.3%) patients were still in care; 17(2.6%) were lost during follow-up; 20(3.1%) patients terminated or withdrew from treatment; 3(0.05%) were referred to hospitals outside the region and 55(8.5%) were

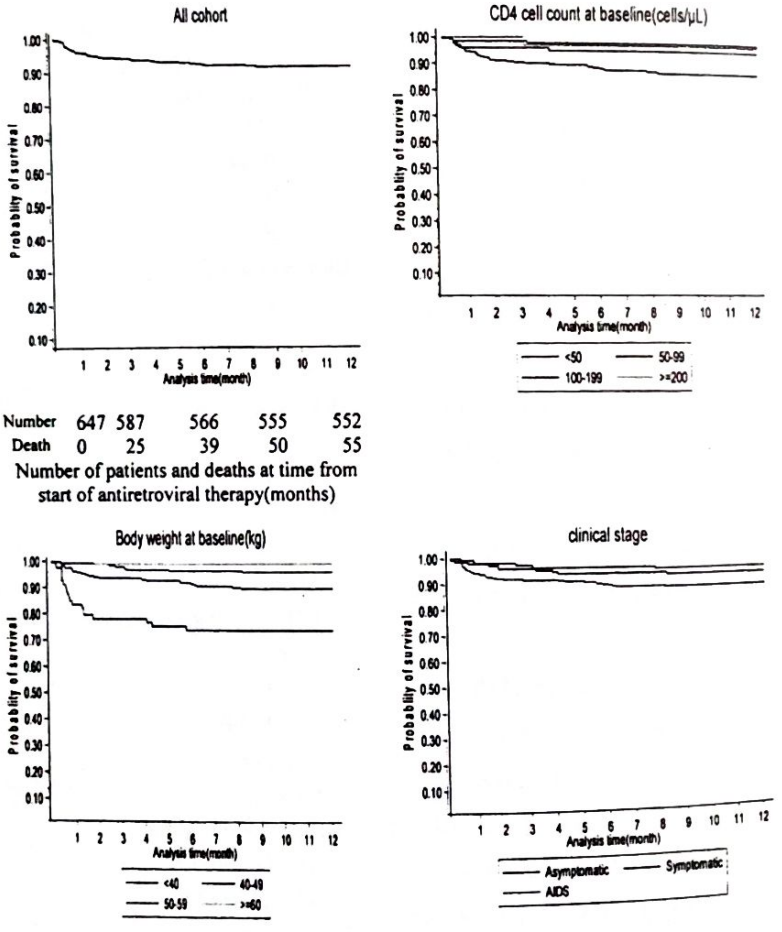


**Figure 1** Kaplan-Meier curves showing probability of survival according to CD4 cell count at baseline, body weight at baseline and clinical staging

known to have died, yielding a mortality rate of 9.6 per 100 person years. Of the 55 deaths, 38(69%) occurred within the first 3 months of the therapy. Of those who died, 47 died of causes related to AIDS and 8 died of causes unrelated to AIDS.

Figure 1 shows the 12-month Kaplan-Meier survival estimates which shows different survivals according to CD4 cell count, body weight, clinical staging and sex. Over all first year survival rate was 91 percent. The lowest estimated probability of first year survival is 86 percent in patient with CD4 cell count less than 50 cells/μL.

**Cox proportional hazard analysis**

Results of the Cox proportional hazard analysis for identifying risk factors for mortality are summarised in tables 2 and 3. In the univariate analysis, CD4 at baseline, body weight at baseline and clinical staging were associated with mortality. In comparison with patients with a baseline CD4 cell count < 50 cell/$mm^3$, the hazard ratio for death was 0.36 (95% CI,0.14-0.92), 0.16 (0.05-0.51) and 0.20 (0.03-1.46) for patients with a baseline CD4 cell count 50-99, 100-199 and >200 cell/$mm^3$, respectively. For body weight, in comparison with patients with a baseline body weight < 40kg, the hazard ratio for death was 0.35 (0.19-0.62), 0.14 (0.06-0.29) and 0.04 (0.01-0.26) for patients with a baseline body weight 40-49, 50-59 and > 60 kg, respectively. For clinical staging, in comparison with patient with AIDS, the hazard ratio for death was 0.37 (0.16-0.82) and 0.56 (0.28-1.12) for symptomatic patients and asymptomatic patients, respectively.

Age, gender, starting HAART regime and type of hospital were not associated with survival both at the univariate analysis and the bivariate analysis adjusted by CD4 cell count.

For multivariate analyses, after adjustment for CD4 cell count at baseline, clinical staging was no longer significantly associated with survival of patients while body weight at baseline still associated with survival. Sex became significantly associated with survival at the presence of body weight at baseline in the model. The interaction between CD4 cell count and body weight was found with p-value of 0.06. As shown in table 3, the effect of high body weight was protective against mortality and more significant among patients whose CD4 were less than 100 cells/$mm^3$ with the hazard ratio of 0.10 (0.04-0.25). Amongst patients whose CD4 were more than 100 cells/$mm^3$, weight was not associated with mortality, the hazard ratio was 0.80 (95%CI, 0.08-8.53). Interaction between sex and body weight was investigated but likelihood ratio test for interaction show no statistically significant. (p-value = 0.39, model not shown in the table)

## Discussion

The results of this study describe mortality of HIV-infected patients treated with HAART in implementation project of a middle-income country. First year probability of survival was 91 percent (95%CI,89-93). The mortality rate was 9.6 (7.4-12.5) per 100 person-years. Table 4 shows comparison between different studies on survival of HIV-infected patients who were treated with HAART. Comparing with the other studies in developing countries, survival in this study is similar to a study in South Africa[11] which showed mortality rate 8.5 per 100 person-years with median follow-up time 1.3 year and Senegal[12] with probability of survival at one year 85percent (95%CI,72-92). Likewise, the study in Uganda[13] and Botswana[14] showed lower first year survival probability of 74 percent (95%CI,67%-79%) and 70

**Table 2** Univariate and multivariate analysis results show hazard ratio of death outcome, 95% CI and p-value calculated from Cox 's proportional hazard model

| Variable | n (events) 647(54) | Univariate Hazard ratio N=591 | 95% CI | p-value* | Multivariate Hazard ratio** N=591 | 95% CI | p-value* |
|---|---|---|---|---|---|---|---|
| **Age (years)** | | | | 0.80 | | | |
| <30 | 175(14) | 1 | | | | | |
| 30-34 | 202(15) | 0.93 | 0.45-1.9 | | | | |
| 35-39 | 171(17) | 1.29 | 0.64-2.6 | | | | |
| ≥40 | 99(9) | 1.15 | 0.49-2.7 | | | | |
| **Sex** | | | | 0.38 | | | |
| Male | 291(28) | 1 | | | 1 | | 0.01 |
| Female | 356(27) | 0.79 | 0.46-1.34 | | 0.47 | 0.25-0.85 | |
| **Weight (kg)** | | | | <0.0001 | | | |
| <40 | 80(20) | 1 | | | 1 | | 0.01 |
| 40-49 | 234(24) | 0.35 | 0.19-0.64 | | 0.38 | 0.19-0.74 | |
| 50-59 | 242(10) | 0.14 | 0.06-0.29 | | - | - | |
| ≥60 | 91(1) | 0.04 | 0.01-0.26 | | 0.26 | 0.03-2.11 | |
| **Clinical staging** | | | | 0.02 | | | |
| AIDS | 336(38) | 1 | | | | | |
| Symptomatic | 161(7) | 0.37 | 0.16-0.82 | | | | |
| Asymptomatic | 150(10) | 0.56 | 0.28-1.12 | | | | |
| **CD4 count** (cells/mm$^3$) | | | | 0.0001 | | | 0.25 |
| <50 | 317(42) | 1 | | | 1 | | |
| 50-99 | 101(5) | 0.36 | 0.14-0.92 | | 0.49 | 0.19-1.25 | |
| 100-199 | 136(3) | 0.16 | 0.05-0.51 | | 0.76 | 0.08-7.35 | |
| ≥200 | 37(1) | 0.20 | 0.03-1.46 | | 0.23 | - | |
| Missing | 56(4) | | | | | | |
| **High body weight at baseline(kg)** | | | | | | | |
| <50 | | | | | 1 | | |
| ≥50 | | | | | 0.10 | 0.04-0.25 | |
| **High CD4 cell count at baseline** (cells/mm$^3$) | | | | | | | |
| <100 | | | | | 1 | | |
| ≥100 | | | | | 0.13 | 0.01-1.80 | |
| **Interaction term for weight and CD4 cell count** | | | | 8.34 | 0.75-93.13 | 0.06 | |
| Antiretroviral regimen | | | | 0.38 | | | |
| d4t+3TC+NVP | 635(52) | 1 | | | | | |
| d4t+3TC+EFV | 12(2) | 2.00 | 0.49-8.2 | | | | |
| **Hospital type** | | | | 0.89 | | | |
| Regional or provincial | 246(20) | 1 | | | | | |
| District | 401(34) | 1.00 | 0.57-1.72 | | | | |

**p-value of log likelihood ratio test comparing between model with that variable and without that variable.*

***Model consisted of CD4 cell count at baseline, body weight at baseline, sex, high body weight at baseline, high CD4 at baseline plus interaction term between high body weight and high CD4. High body weight at baseline was defined as weight more than 50 kg. High CD4 cell count at baseline was defined as CD4 cell more than 100 cell/mm$^3$*

Table 3 Interpretation of interaction in multivariate model

| Variable | Stratified by | Rate per 100 person-years | Hazard ratio* | 95% CI |
|---|---|---|---|---|
| **Sex** | | | | |
| Male | | 11.36 | 1 | |
| Female | | 8.47 | 0.47 | 0.25-0.85 |
| **Body weight (kg)** | | | | |
| <50 | CD4 <100 | 21.98 | 1 | |
| ≥50 | | 3.90 | 0.10 | 0.04-0.25 |
| <50 | CD4 ≥100 | 1.74 | 1 | |
| ≥50 | | 2.93 | 0.80 | 0.08-8.53 |
| **CD4 cell** (cells/mm$^3$) | | | | |
| <100 | Weight <50 kg | 21.98 | 1 | |
| ≥100 | | 1.74 | 0.13 | 0.01-1.80 |
| <100 | Weight ≥50kg | 3.90 | 1 | |
| ≥100 | | 2.93 | 1.10 | 0.12-9.84 |

**Model included sex, body weight and CD4 cell count and the interaction term between body weight and CD4 cell count (both as binary variables). Also see table 2*

**Table 4** Probability of first year survival in cohort studies of HIV-infected patients treated with HAART

| Reference | Setting | Median CD4 cell count at baseline | Survival at one year or mortality rate (%) |
|---|---|---|---|
| Egger et al[15] | Developed country | 250(IQR,100-402) | 96.6 (95.6-97.3)# |
| n=12,574 | | | |
| Dabis et al | Developed country | CD4<25 | 96.1 (94.8-98.0) |
| n=12,574+3,048 | Developing country | CD4<25 | 88.1 (84.9-91.7) |
| | Developed country | CD4>350 | 99.6 (99.4-99.8) |
| | Developing country | CD4<350 | 98.5 (96.1-99.4) |
| Weidle et al[13] | Developing country | 37(IQR,0-81) | 74 (67-79)* |
| n=476 | Uganda | | |
| Laurent et al[12] | Developing country | 41.5(IQR,30-46) | 85 (72-92) |
| n=58 | Senegal | | |
| Grant et al[11] | Developing country | 145 | *Mortality rate 8.5* |
| n=780 | South Africa | | *per 100 persons-year* |
| This Study | Developing country | Overall | |
| n=647 | Thailand | 40(11-113) | 91 (89-96) |
| | | CD4 category | |
| | | 0-49 | 86 (82-90) |
| | | 50-99 | 95 (88-98) |
| | | 100-199 | 98 (93-99) |
| | | ≥200 | 97 (80-99) |
| | | | *Mortality rate 9.6* |
| | | | *per 100 persons-year* |

*#For patient with age less than 50 years, CD4 <50, Viral load ≥5 log copies/ml, CDC stage C and no history of IDU*
** ART:HAART 51%, 2NRTI 47%, Monotherapy 2%*

percent (95%CI:63%-78%), respectively. The survival of patients in this study can also be compared with survival of patients in the ART Cohort Collaboration (developed country data). In ART cohort collaboration amongst patients with age less than 50 years, CD4 less than 50 cells/mm$^3$, CDC stage 4 and no history of IDUs, the probability of survival at one year in ART collaboration was 96.6 percent (95% CI:95.6-97.3).[15] In this study, amongst patients with CD4 less than 50 cells/mm$^3$, the probability of survival at one year was 86 percent (95% CI: 82-90).

This is consistent with the results of a study which evaluated and compared HAART in developing country and developed country which showed the probability of survival at one year for patient with CD4 less than 25 cells/mm$^3$ were 88 percent (85-92) for developing countries and 96 percent (95-98) for developed countries. For given CD4 baseline, mortality was higher in the developing countries, possibly because larger proportion of patients with severe opportunistic infections.[16]

The CD4 cell count is the strong predictor of survival consistent with many previous studies. Patients in group CD4 cell count 100-199 have hazard ratio less than group CD4 cell count ≥ 200. This could be by chance since there were few subjects in CD4 cell count ≥ 200.

Clinical staging was associated with survival in the univariate analysis. There was no evidence to suggest that asymptomatic had different survival to symptomatic patients,though the comparison was based on a small sample size and so lacks power. Other explanation might be that the clinical criteria for differentiating between asymptomatic patient and symptomatic patients is not sensitive enough to differentiate and predict the survival among this two groups of patients.

Low weight at starting ART was strongly associated with increased mortality even after adjustment for CD4 cell count. An interaction between body weight at baseline and CD4 count at baseline was found. Patients whose CD4 cell count at baseline are less than 100 cells/mm$^3$ and whose body weight are less than 50 kg have high risk of death. It would also indicate something such as undiagnosed opportunistic infections that might contribute to low body weight and then increase mortality.

Sex was not associated with survival in the univariate analysis, however in multivariale analysis, after adjustment for body weight, there was evidence that sex may be associated with mortality. Men seem two times more prone to fatality than women. This finding is not consistent with previous studies which show no difference in survival by sex[15, 17-19] or even some evidence to suggest men showing higher survival rate than women.[20] Therefore it should be cautiously interpreted since interaction between body weight at baseline and sex was suspected, although the interaction test was not statistically significant with p-value of 0.39. Body mass index has been found to be associated with mortality in HIV-infected patients without ART.[21] It would be interesting to look at the effect of body mass index(BMI) on survival in patients treated with HAART and to assess if there is an interaction with sex.

Though the second-line regimen of Stavudine, Lamivudine and Efavirenze reportedly show higher mortality rate than the first-line regimen, this was not statistically significant associated with the survival due to the very small number of patients in the second-line regimen. This could also be bias from the fact that this regimen was prescribed as alternative regimen when patients have adverse reactions, contraindication to first-

line regimen such as concurrent tuberculosis, therefore these patients should have poorer prognosis.

### Limitation and potential bias of the study

Of 3,380 patients enrolled in this region, data of 1,867 of them was retrieved from electronic database and analysis was restricted to 647 patients who early started ART. This would not introduce selection bias since it was believed that availability and selection process of electronic data was not associated with characteristics and outcome of patients. Loss follow-up rate and termination of treatment were low, only 2.6 percent and 3.1 percent, respectively and comparison of baseline characteristics show no difference between those who remains in the study or had died and those who did not remain in the study.

### Conclusion and recommendation

Sustainability of therapy at one year was high. CD4 cell count is the strong predictor of survival. Low body weight at starting ARV was also strongly associated with increased mortality an its effect was more significant in group of low CD4 cell count.

Survival is less than what having been witnessed in developed country and might be improved by enrolment of patients with early HIV-diseases and strengthening opportunistic infections prophylaxis, diagnosis and treatment.

## Acknowledgement

*This study was a part of dissertation for Msc. Epidemiology at London School of Hygiene and Tropical Medicine (LSHTM) which fellowship for S. Chaiyamahapurk was granted by the World Health Organization. Department of Diseases Control, Ministry of Public Health, Thailand permitted the usage of data from National Antiretroviral Programme for this study. Special thanks must go to all doctors, nurses and all staffers who were involved in the Thailand National Antiretroviral Programme and Dr. Katherine Fielding of LSHTM who provide many valuable advice. The statements made and the opinions expressed were from the author not those of the organizations.*

### References

1. Egger M, Hirschel B, Francioli P, Sudre P, Wirz M, Flepp M, et al. Impact of new antiretroviral combination therapies in HIV infected patients in Switzerland: prospective multicentre study. Swiss HIV Cohort Study. BMJ 1997; 315:1194-9.
2. Mocroft A, Vella S, Benfield TL, Chiesi A, Miller V, Gargalianos P, et al. Changing patterns of mortality across Europe in patients infected with HIV-1. EuroSIDA Study Group. Lancet 1998; 352:1725-30.
3. Murphy EL, Collier AC, Kalish LA, Assmann SF, Para MF, Flanigan TP, et al. Highly active antiretroviral therapy decreases mortality and morbidity in patients with advanced HIV disease. Ann Intern Med 2001; 135:17-26.
4. Forrest DM, Seminari E, Hogg RS, Yip B, Raboud J, Lawson L, et al. The incidence and spectrum of AIDS-defining illnesses in persons treated with antiretroviral drugs. Clin Infect Dis 1998; 27:1379-85.
5. Porta D, Rapiti E, Forastiere F, Pezzotti P, Perucci CA. Changes in survival among people with AIDS in Lazio, Italy from 1993 to 1998. Lazio AIDS Surveillance Collaborative Group. AIDS 1999; 13:2125-31.
6. Palella FJ, Jr., Delaney KM, Moorman AC, Loveless MO, Fuhrer J, Satten GA, et al. Declining morbidity and mortality among patients with advanced human immunodeficiency virus infection. HIV outpatient study investigators. N Engl J Med 1998; 338:853-60.
7. World Health Organization. Progress on Global access to HIV antiretroviral therapy, June 2005. [cited 2005 Aug 16]; Available from: http://www.who.int/hiv/pub/progressreports/3by5%20Progress%20Report_E_light.pdf
8. Bureau of AIDS, TB and STI, Thai Ministry of Public Health. Progress of National Antiretroviral Program. 2005 [cited 2005 Aug 17]; Available from: http://www.aidsthai.org/arrv03.html

9. Panel for Clinical Guideline for Treatment of HIV Infection. Guideline for clinical management of HIV-infected patients. Nonthaburi: Ministry of Public Health; 2002.
10. Bureau of AIDS TB and STI. Guideline for National Antiretroviral Programme. Bangkok: Ministry of Public Health, Thailand; 2002:16-7.
11. Grant A, Fielding K, Charalambous S, Innes C, Pemba L, Stenson A, et al. Risk factor for mortality among HIV-infected adults starting antiretroviral therapy in South Africa. Proceeding of the 3rd IAS Conference on HIV Pathogenesis and Treatment; 24-27 July 2005 Rio de Janeiro. Brazil: 2005.
12. Laurent C, Diakhate N, Gueye NF, Toure MA, Sow PS, Faye MA, et al. The Senegalese government's highly active antiretroviral therapy initiative: an 18-month follow-up study. AIDS 2002; 16:1363-70.
13. Weidle PJ, Malamba S, Mwebaze R, Sozi C, Rukundo G, Downing R, et al. Assessment of a pilot antiretroviral drug therapy programme in Uganda: patients' response, survival, and drug resistance. Lancet 2002; 360:34-40.
14. Mujugira A, Wester W, Kim S, Ndwapi N, Gaolathe T, Bussmann G. Antiretroviral treatment among ARV naive HIV-1 subtype C infected adults with CD4<50 cell/mm$^3$ at treatment initiation. In: Mark AW, George DL, Craig S, editors. Proceeding of the XV International AIDS Conference. 13-16 July 2004; Impact Exhibition and Convention Center. Nonthaburi: International AIDS Society; 2004.
15. Egger M, May M, Chene G, Phillips AN, Ledergerber B, Dabis F, et al. Prognosis of HIV-1-infected patients starting highly active antiretroviral therapy: a collaborative analysis of prospective studies. Lancet 2002; 360:119-29.
16. Dabis F, Schechter M, Egger M. Response to highly active antretroviral therapy in low- and high-income countries:analysis of clinical databases from 4 continents. Proceeding of the 12th Conference on Retroviruses and Opportunistic Infections; 22-25 Febuary 2005; Boston, USA; 2005.
17. Nicastri E, Angeletti C, Palmisano L, Sarmati L, Chiesi A, Geraci A, et al. Gender differences in clinical progression of HIV-1-infected individuals during long-term highly active antiretroviral therapy. AIDS 2005; 19:577-83.
18. Junghans C, Low N, Chan P, Witschi A, Vernazza P, Egger M. Uniform risk of clinical progression despite differences in utilization of highly active antiretroviral therapy: Swiss HIV Cohort Study. AIDS 1999; 13: 2547-54.
19. Hogg RS, Yip B, Chan KJ, Wood E, Craib KJ, O'Shaughnessy MV, et al. Rates of disease progression by baseline CD4 cell count and viral load after initiating triple-drug therapy. JAMA 2001; 286:2568-77.
20. Poundstone KE, Chaisson RE, Moore RD. Differences in HIV disease progression by injection drug use and by sex in the era of highly active antiretroviral therapy. AIDS 2001; 15:1115-23.
21. Van der Sande MA, Schim van der Loeff MF, Bennett RC, Dowling M, Aveika AA, Togun TO, et al. Incidence of tuberculosis and survival after its diagnosis in patients infected with HIV-1 and HIV-2. AIDS 2004; 18:1933-41.

บทคัดย่อ **การรอดชีวิตของผู้ติดเชื้อเอชไอวีในโครงการยาต้านไวรัสเอดส์เขตภาคเหนือตอนล่าง**

**สักดิ์ชัย ไชยมหาพฤกษ์**
สำนักงานป้องกันควบคุมโรคที่ 9, พิษณุโลก

*วารสารวิชาการสาธารณสุข* **2549; 15:855-65.**

การศึกษามีวัตถุประสงค์เพื่อศึกษาการรอดชีวิตของผู้ติดเชื้อเอชไอวีที่ 12 เดือนหลังการรักษาด้วยยาต้านไวรัสเอดส์ และปัจจัยที่มีผลต่อการรอดชีวิตโดยได้วิเคราะห์ข้อมูลผู้ป่วยทั้งสิ้น 647 คน ค่ามัธยฐานของอายุคือ 33 ปี ร้อยละ 54 เป็นเพศหญิง มีค่ามัธยฐานเท่ากับ 40 เซลล์/มม.$^3$ และมากกว่าครึ่งหนึ่งเป็นผู้ป่วยระยะเอดส์ ร้อยละ 98 ได้รับการรักษาด้วยยา Stavudine, Lamivudine และ Nevirapine ภายในหนึ่งปีของการรักษามีผู้เสียชีวิต 55 ราย คิดเป็นอัตราตาย 9.6 ราย/100 คน-ปี การรอดชีวิตเมื่อหนึ่งปีเท่ากับ ร้อยละ 91 การวิเคราะห์แบบ Cox regression analysis แบบตัวแปรตัวเดียว (univariate analysis) พบว่าเม็ดเลือดขาวชนิดซีดี 4 เมื่อเริ่มการรักษา, น้ำหนักตัวแรกเริ่ม และระยะของโรคมีความสัมพันธ์กับการรอดชีวิต แต่เมื่อวิเคราะห์แบบตัวแปรหลายตัว (multivariate analysis) พบว่าเม็ดเลือดขาวชนิดซีดี 4 น้ำหนักตัว และเพศ มีความสัมพันธ์กับการรอดชีวิต แต่พบว่ามีปฏิกิริยา (interaction) ระหว่างเม็ดเลือดขาวชนิดซีดี 4 และน้ำหนัก และอาจมีปฏิกิริยาระหว่างเม็ดเลือดขาวชนิดซีดี 4 และเพศ จะเห็นว่าการรอดชีวิตที่หนึ่งปีต่ำกว่าเมื่อเปรียบเทียบกับประเทศที่พัฒนาแล้ว เม็ดเลือดขาวชนิดซีดี 4 เป็นตัวพยากรณ์การรอดชีวิตที่ดี ผู้ป่วยที่น้ำหนักตัวน้อยมีการเสียชีวิตมากขึ้น และชัดเจนมากขึ้นในกลุ่มที่มีเม็ดเลือดขาวชนิดซีดี 4 ต่ำ

*คำสำคัญ:* **เอดส์, ประเทศไทย, การวิเคราะห์การรอดชีวิต, ยาต้านไวรัส**