



Prevalence of long QT interval in Thailand and its association with all cause and cardiovascular mortality from a long-term cohort study : 18 years follow-up

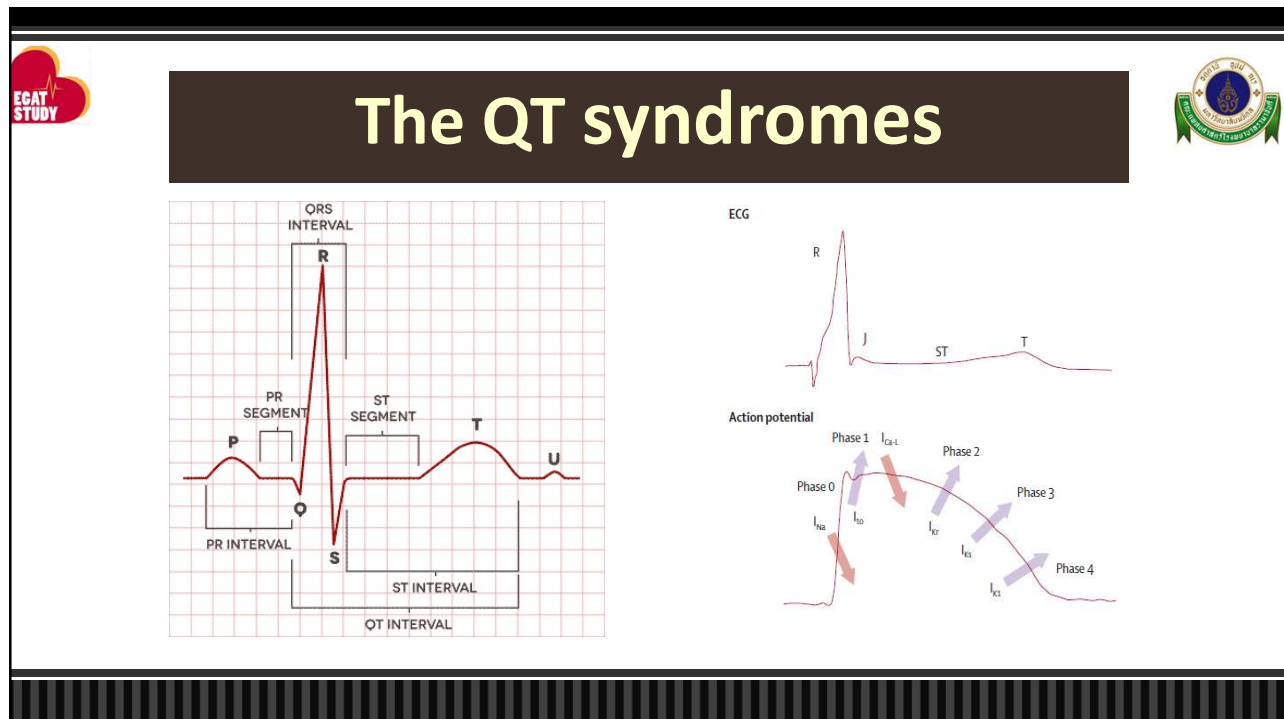
Sasinipa Trithiphen M.D.

Advisor: Prin Vathesatogkit M.D. ,Tachapong Ngarmukos M.D.

,Sirin Apiyasawat M.D. ,Pakorn Chandanamatta M.D.

Department of Internal Medicine, Faculty of Medicine
Ramathibodi Hospital, Mahidol university, Thailand

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Backgrounds: The QT syndromes

- Long QT interval increases total and cardiovascular mortality due to arrhythmias and sudden cardiac death
- Most studies come from hospitalized or elderly patient with high cardiovascular risks
- In healthy population data on association between long QT and cardiovascular and total mortality are still conflict
- **Whether this risk association persist in a Thai general adult population is unknown.**

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REVIEW ARTICLE

Prolonged QTc Interval and Risks of Total and Cardiovascular Mortality and Sudden Death in the General Population

A Review and Qualitative Overview of the Prospective Cohort Studies

Alicia Montanez, MD; Jeremy N. Ruskin, MD; Patricia R. Hebert, PhD;
Gervasio A. Lamas, MD; Charles H. Hennekens, MD, DrPH

- 2677(8.7%) individuals with prolonged QTc interval, defined as 440 msec
- 1 study reported no association between prolonged QTc interval and mortality(RR, 1.02; 95%CI, 0.7-1.49)
- Other 6 reported inconsistent associations overall as well as across subgroups defined by various characteristics.

- In the general population, if QTc interval prolongation ins associated with any increase in mortality, that risk is likely to be small and difficult to detect.

- Meta analysis from 7 prospective cohort studies
- 36031 individuals

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RESEARCH ARTICLE

Longitudinal Community-Based Study of QT Interval and Mortality in Southeast Asians

Jonathan Yap¹, Ai Zhen Jin², Shwe Zin Nyunt³, Tze Pin Ng³, A. Mark Richards^{4,5,6}, Carolyn S. P. Lam^{1,3,4,7*}

1 Department of Cardiology, National Heart Centre Singapore, Singapore, Singapore, **2** National Registry of Diseases Office, Health Promotion Board, Singapore, Singapore, **3** National University of Singapore, Singapore, Singapore, **4** Department of Cardiology, National University Heart Centre, Singapore, Singapore, **5** Cardiovascular Research Institute, National University Health System, Singapore, Singapore, **6** Christchurch Heart Institute, University of Otago, Christchurch, New Zealand, **7** Duke-NUS Graduate Medical School, Singapore, Singapore


* carolyn.lam@duke-nus.edu.sg

- Mix of ethnic groups mostly Chinese(74%) from community-living adults in the Singapore Longitudinal Aging Study (SLAS)
- N 2536 (825men, mean age65.7±7.5years)
- Means 7.78 years of F/U

QTc prolongation remained

- Independently associated with increased all-cause mortality, (HR1.27(1.10–1.48), p=0.0015)
- Increased risk of cardiovascular events(HR1.20(1.01–1.43),p= 0.0415)
- Not cardiovascular mortality alone(HR1.05(0.77–1.44),p=0.7562)

Yap, J., Jin, A. Z., Nyunt, S. Z., Ng, T. P., Richards, A. M., & Lam, C. S. P. (2016). Longitudinal Community-Based Study of QT Interval and Mortality in Southeast Asians. *PloS one*, 11(5), e0154901. doi:10.1371/journal.pone.0154901




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ECAT STUDY

Research questions

- What is the prevalence of QTc prolong in Thai general population
- Does QTc prolong associate with long term cardiovascular risk included all-cause mortality in a Thai general population



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Primary outcomes

- To identify the prevalence of abnormal long QT interval in the Thai general population without prior cardiovascular disease.

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Secondary outcomes

- Study the association of long QT interval with long-term cardiovascular risk, cardiac and also all-cause mortality.

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Research methodology

- Retrospective cohort study

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Inclusion criteria

- A total of 2756 participants in the Electricity Generating Authority of Thailand (EGAT) study from 1997 to 2015 , age 35–65 years olds and underwent 12 leads standard EKG.

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Exclusion criteria

- Unreadable EKGs
- Incomplete baseline risk factor profile
- Prior cardiovascular disease

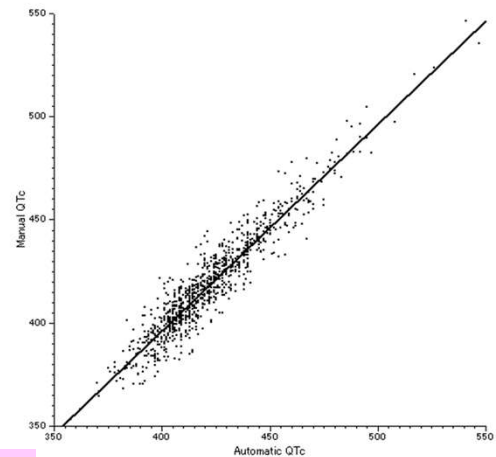
300 participants were excluded

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Clinical and electrocardiographic characteristics of patients with short QT interval in a large hospital-based population



Akashi Miyamoto, MD, PhD,* Hideki Hayashi, MD, PhD,* Tomohide Yoshino, MD,*
Tamiro Kawaguchi, MD,* Atsushi Taniguchi, MD,* Hideki Itoh, MD, PhD,*
Yoshihisa Sugimoto, MD, PhD,* Makoto Itoh, MD, PhD,* Takeru Makiyama, MD, PhD,[†]
Joel Q. Xue, PhD,[‡] Yoshitaka Murakami, PhD,[§] Minoru Horie, MD, PhD*

From the *Department of Cardiovascular and Respiratory Medicine, Shiga University of Medical Science, Otsu, Shiga, Japan, [†]Department of Cardiovascular Medicine, Kyoto University Graduate School of Medicine, Kyoto, Kyoto, Japan, [‡]General Electric Healthcare, Milwaukee, Wisconsin, [§]Department of Health Science, Shiga University of Medical Science, Otsu, Shiga, Japan.

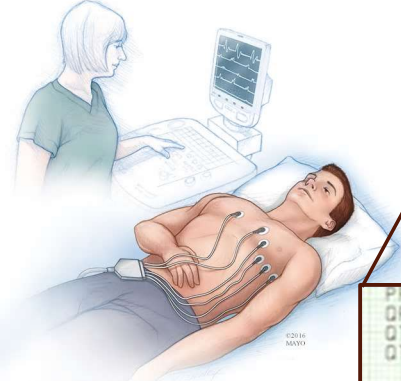


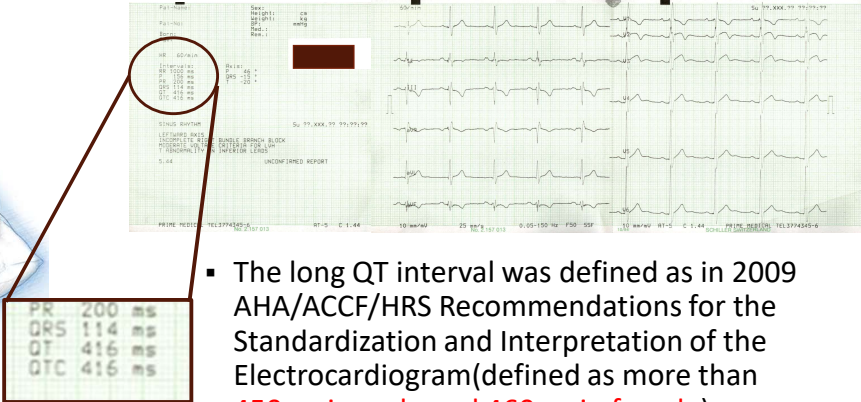
- From a larged cohort study in japan
- There was a significant linear correlation($r=0.95$, $P< 0.00001$) between the manual and autonomic measure of QTc interval, Indicating the accuracy of the computer assessed measure of the QT interval

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Measurement







- The long QT interval was defined as in 2009 AHA/ACCF/HRS Recommendations for the Standardization and Interpretation of the Electrocardiogram (defined as more than **450ms in male and 460ms in female**)

<https://www.mayoclinic.org/tests-procedures/ekg/about/pac-20384983>

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Measurement

Baseline assessment were record for

- age, sex, educational level, occupation, tobacco smoking, alcohol drinking
- blood pressure, heart rate, weight, height and waist and hip circumference
- Laboratory tests : blood glucose, total cholesterol, low-density lipoprotein (LDL), high-density lipoprotein (HDL) and triglycerides, creatinine.

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Statistics

- Continuous variables : Mean \pm SD , t-test
- Chi-square test (hazard ratios and 95% confidence intervals)
- Cox-proportional hazards models.

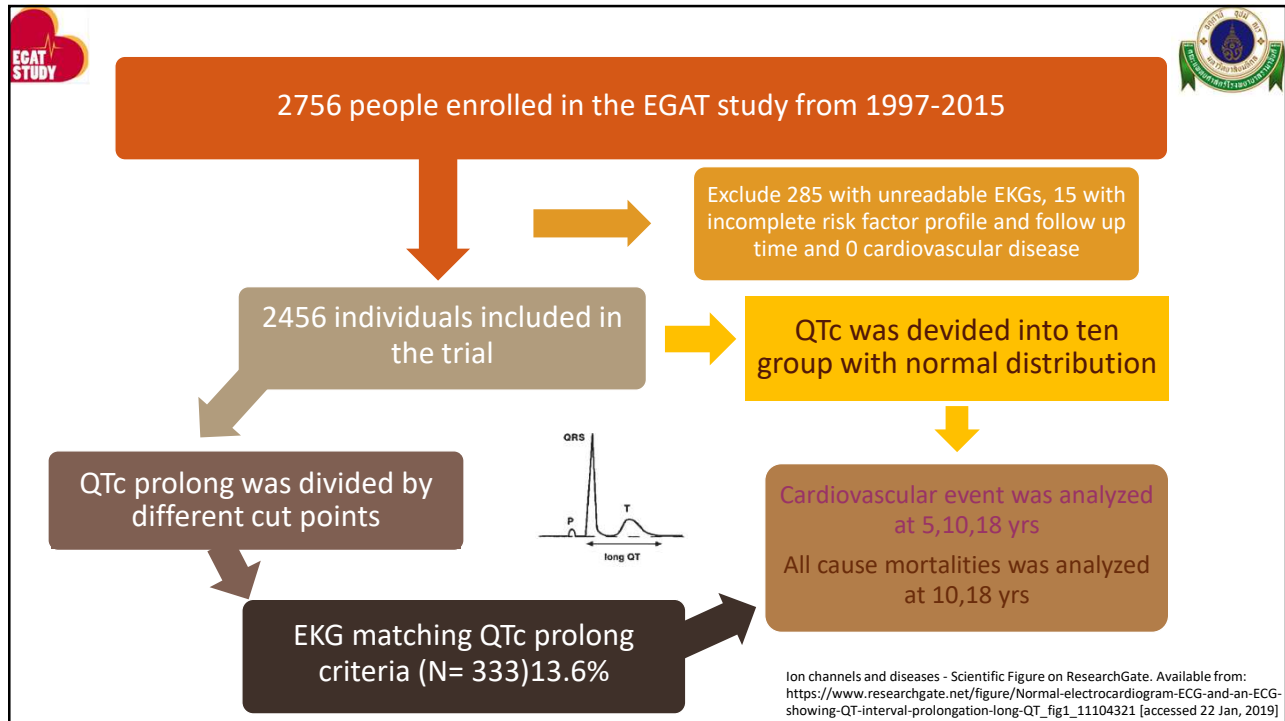
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Analysis plan

- We analyzed the association between 10 and 18-year mortalities and
 - QTc
 - decile of QTc
 - QT prolong by different cut points
- Mortality endpoint included cardiovascular event, cardiovascular death and all-cause mortality was analyzed after 10 and 18-year follow up.
- All mortality endpoint with relative risk ratios adjusted for sex, age, diabetes mellitus, LDL level, smoking status and mean SBP.

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Baseline characteristics

Factor	QT male(N=1941)			QT female(N=515)			Total (N=2456)		
	<450 msec (N=1699)	≥450 msec (N=242)	P value	<460 msec (N=424)	≥460 msec (N=91)	P value	No Prolong QTc (N=2123)	Prolong QTc (N=333)	P value
Age	55 ± 5	56 ± 5	<0.001	54 ± 4	53 ± 4	0.294	55 ± 5	55 ± 5	0.003
BMI	24.6 ± 3.2	25.2 ± 3.7	0.014	24.8 ± 3.6	24.3 ± 4.2	0.302	24.6 ± 3.3	24.9 ± 3.8	0.142
SBP	138 ± 20	147 ± 24	<0.001	126 ± 20	131 ± 23	0.035	135 ± 21	142 ± 25	<0.001
DBP	83 ± 13	87 ± 15	<0.001	76 ± 12	78 ± 14	0.1	81 ± 13	85 ± 15	<0.001
HR	72 ± 11	81 ± 13	<0.001	73 ± 9	81 ± 13	<0.001	72 ± 10	81 ± 13	<0.001
Total cholesterol	237 ± 40.	235 ± 45	0.577	245 ± 42	239 ± 37	0.179	239 ± 41	236 ± 43	0.352
LDL	153 ± 40	148 ± 39	0.074	162 ± 42	156 ± 37	0.18	155 ± 40	150 ± 38	0.052
HDL	52 ± 11	50 ± 11	0.032	57 ± 11	57 ± 11	0.954	53 ± 11	52 ± 11	0.273
	% (total N)			% (total N)			% (total N)		
T2DM	16.05(270/1682)	24.06(58/241)	0.002	8.89(37/416)	20(18/90)	0.002	14.63(307/2098)	22.96(76/331)	<0.001
Smoking	27.89(467/1674)	29.53(70/237)	0.6	3.37(14/415)	3.33(3/90)	0.985	23.02(481/2089)	22.32(73/327)	0.779
Alcohol	44.76%(747/1669)	44.02(103/234)	0.83	5.06(21/415)	4.49(4/89)	0.824	36.85(768/2084)	33.12(107/323)	0.195

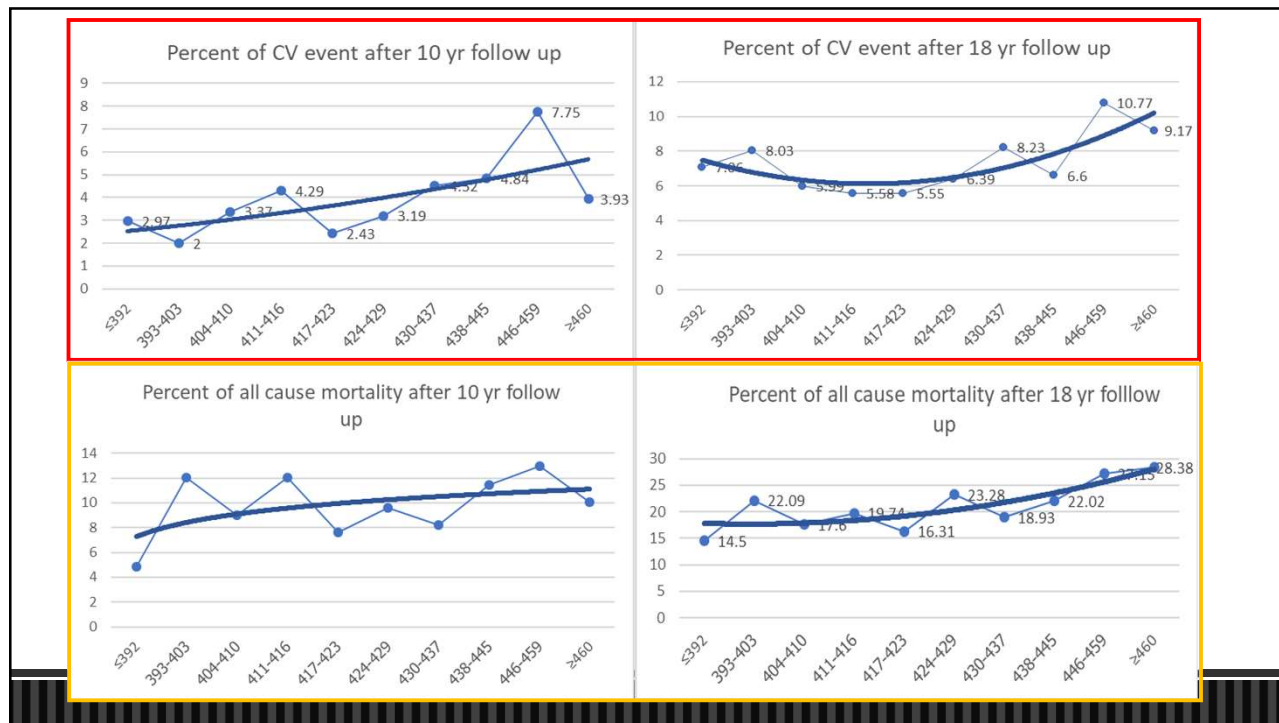
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QT deciles and outcomes

QT decile	no./total no. (%)	CV events 10 yr total no. (%)		CV events 18 yr total no. (%)		All cause death 10 yr total no. (%)		All cause death 18 yr total no. (%)	
		yes	no	yes	no	Death	no	Death	no
≤392	269/2456(11)	8(2.97)	261(97.02)	19(7.06)	250(92.93)	13(4.83)	256(95.16)	39(14.50)	230(85.50)
392.01-403	249/2456(10.1)	15(2)	234(98)	20(8.03)	229(91.96)	30(12.05)	219(87.95)	55(22.09)	194(77.91)
403.01-410	267/2456(10.9)	9(3.37)	258(96.63)	16(5.99)	251(94.00)	24(8.99)	243(91.01)	47(17.6)	220(82.39)
410.01-416	233/2456(9.5)	10(4.29)	223(95.7)	13(5.58)	220(94.42)	28(12.01)	205(87.98)	46(19.74)	187(80.26)
416.01-423	288/2456(11.7)	7(2.43)	281(97.57)	16(5.55)	272(94.44)	22(7.64)	266(92.36)	47(16.31)	241(83.68)
423.01-429	219/2456(8.9)	7(3.19)	212(96.8)	14(6.39)	205(93.60)	21(9.59)	198(90.4)	51(23.28)	168(76.71)
429.01-437	243/2456(9.9)	11(4.52)	232(95.47)	20(8.23)	223(91.76)	20(8.23)	223(91.77)	46(18.93)	197(81.07)
437.01-445	227/2456(9.2)	11(4.84)	216(95.15)	15(6.60)	212(93.39)	26(11.45)	201(88.54)	50(22.02)	177(77.97)
445.01-459	232/2456(9.4)	18(7.75)	214(92.24)	25(10.77)	207(89.22)	30(12.93)	202(87.07)	63(27.15)	169(72.84)
≥459.01	229/2456(9.3)	9(3.93)	220(96.07)	21(9.17)	208(90.83)	23(10.04)	206(89.95)	65(28.38)	164(61.61)
Total	2456/2456(100)	105(4.3)	2351(95.7)	179(7.3)	2277(92.7)	237(9.6)	2219(90.4)	509(20.7)	1947(79.3)


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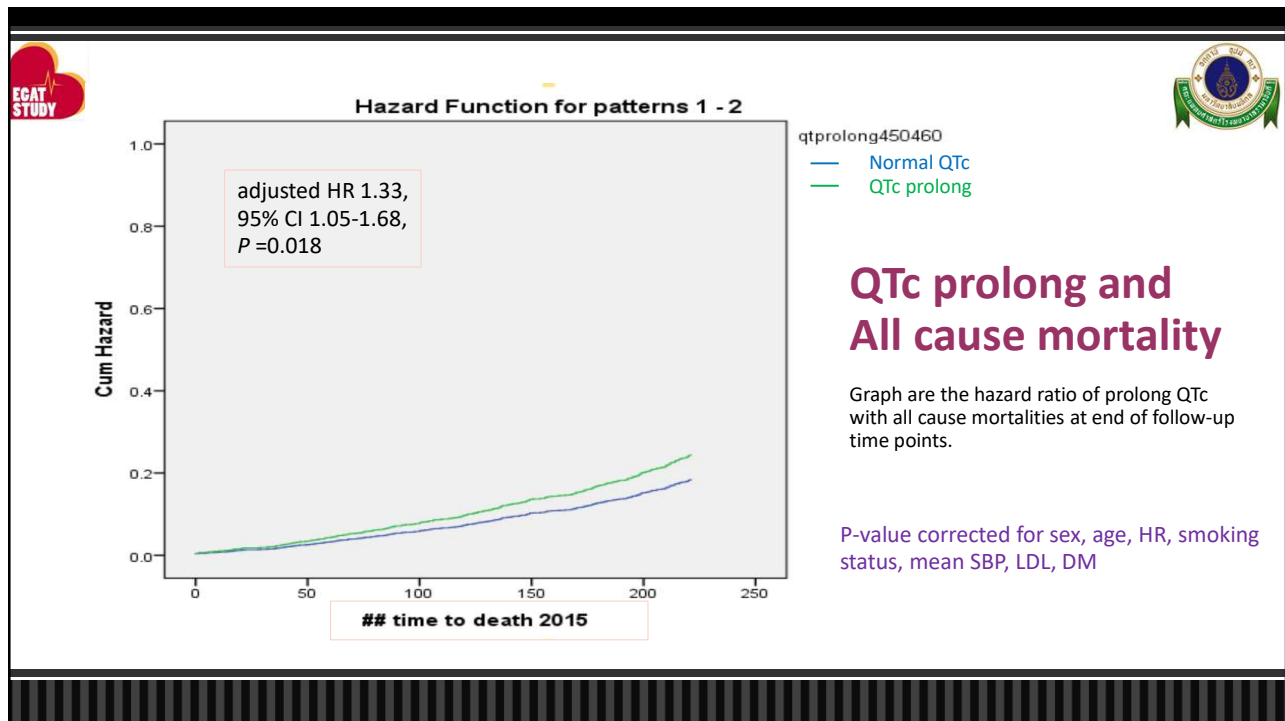
Main outcomes parameter



	No Prolong QTc(N=2123) <small>< 450 msec in male < 460 msec in female</small>	Prolong QTc(N=333) <small>≥ 450 msec in male ≥ 460 msec in female</small>	P-value
CV event 5 yr	<i>total no./2123(%)</i>	<i>total no./333(%)</i>	0.383
yes	44 (2.07)	11 (3.30)	
no	2079 (97.92)	322 (96.69)	
CV event 10 yr	87 (4.1)	18 (5.41)	0.69
no	2036 (95.9)	315 (94.59)	
CV event 18 yr	144 (6.78)	35 (10.51)	0.091
no	1979 (93.21)	298 (89.49)	
All cause death 10 yr	198 (9.33)	39 (11.71)	0.764
no	1925 (90.67)	294 (88.29)	
All cause death 18 yr	409 (19.26)	100 (30.03)	0.018 ★
no	1714 (80.73)	233 (69.97)	

P-value corrected for sex, age, smoking status, mean SBP, LDL, DM

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Conclusion

- The prevalence of prolonged QT in this cohort is 14% compare to 8.7% from metaanalysis in Caucasians.
- But In Thai general population, The prevalence of prolong QTc was less than in Singapore(Chinese people) despite a lower cutpoint(14% when QTc cutpoint at 450-460 msec compare with 25% when QTc cutpoint at 470 msec)
- During 18 years follow up, prolongation of QT interval is an independent risk factor for all-cause mortalities but not cardiovascular mortality

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Limitations

- Due to large sample size and we collected death cause from National registry, we can't specified cause of cardiac death

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Thank you for your attention



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