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Main Issues Behind our Ongoing Failure against Tuberculosis

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Despite the availability of effective therapy and many recent developments in tuberculosis diagnostic tools, but still the war against tuberculosis infection is far away from success. WHO estimates that around 8.6 million people in 2012 developed tuberculosis and 1.3 million died from this diseases [1]. Tuberculosis cases are higher in developing country where access to health facility far from adequate, resulting in delaying of diagnosis and therapy. In our opinion, there are 3 keyproblems that hampered the successful of tuberculosis program: availability a simple, reliable and affordable diagnostic tools, effective vaccine against tuberculosis and increasing trend of multi-drug resistant *Mycobacterium tuberculosis*.

How Powerful of our Gold Standard Diagnostic Tools?

Till today, acid fast staining and conventional culture method is still the "gold standard" in *Mycobacterium tuberculosis* identification. Mainly because these tests are far more affordable compare with the newest diagnostic tools. Despite their simplicity, these old techniques have low sensitivity and specificity rates and also very subjective and time consuming [2,3]. As shown by our previous study, one of the more advanced diagnostic technique, Multiplex PCR reverse cross blot hybridization assay has sensitivity 86.03% comparing to culture method 2,3. But the problem with all newest *Mycobacterium tuberculosis* identification technique is that they are not affordable enough to be applied in most tuberculosis endemic areas where economic problem is the main issue. Therefore future research and development of tuberculosis diagnostic tools should not only to rely on how powerful the technique in identification of *Mycobacteria* but they have to be more simply and cost-efficiently to be applied in endemic areas.

How Effective is our Vaccination Program and how Effective is the Vaccine?

Almost 100 years since Bacille Calmette Guerin (BCG) first used as tuberculosis vaccine in 1921, not so many changes in tuberculosis vaccination program, in fact we can say that BCG still "the only" tuberculosis vaccine that widely used till today. Despite having wide coverage, the efficacy of BCG seems highly variable [4]. One study result in 2012 show BCG effectiveness after its first administration among school age children was 25% (3-43%) [5]. The question is why we still using this vaccine if the efficacy is that low? Or is there any new better vaccine available? There are many ongoing researches in tuberculosis vaccine development, one of the most promised is a recombinant BCG vaccine which over expressing the 30 kDa major secretory protein of *Mycobacterium tuberculosis* which is known as rBCG30 (Tice® strain) [6,7]. Study on animal show that animal which were immunized with rBCG30 were able to survive significantly long enough comparing with conventional BCG-immunized animal group after a challenge to highly pathogenic strain of *Mycobacterium tuberculosis* [6]. Even maybe after successful results on its current clinical phases, the real challenge of this vaccine would be the "packing" issue during distribution. As we know that majority of the 22 high tuberculosis-burden countries are in the tropic and dry region where lack of sustainable "optimal temperature"

for vaccine is well known issue. Since poor temperature management can damage vaccines and reduce their effectiveness, therefore we need to solve that problem when developing a new tuberculosis vaccine.

Better Strategy to Prevent Drug Resistant of *Mycobacterium tuberculosis*

WHO reported that in 2012, almost half a million people worldwide developed multi-drug resistant tuberculosis (MDR-TB) and around 9.6% of those MDR-TB cases had extended drug resistant tuberculosis (XDR-TB) [1]. This surely will become an extra burden to existing tuberculosis management programs that still being hampered by difficulty in early tuberculosis identification [2,3] and highly variable vaccination efficacy [4,5]. In our opinion, the main problem of tuberculosis treatment program in many tuberculosis endemic countries is not how to treat the drug-resistant *Mycobacteria* in the first place but how to prevent this happened. The current packing of combination of widely free distributed of anti-tuberculosis drug do not helping when we want to prevent loose-therapy patients. Four to five different drugs at once daily are too complicated for most patients. Therefore we need to simplify the drug combination to reduce the case of patients missing doses or failing to complete their treatment which we believe as the main factors that lead to increasing rate of multi-drug resistant among mycobacteria. But we have to realize also that in pharmacy industries, the simplifying doses come with more pricey result and we have to pay attention to this matter if we want the drugable to cover more patients.

Last, we have to make sure that in fight against the tuberculosis, all identification methods, vaccination strategy and treatment approaches to reduce the incidence of tuberculosis cannot be separated from economic issue. An affordable strategy will extend the coverage and eventually the effectiveness of the program to fight the spread of tuberculosis.

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