

- [334] Dye C, Scheele S, Dolin P, Pathania V, Raviglione MC. Consensus statement. Global burden of tuberculosis: estimated incidence, prevalence, and mortality by country. WHO Global Surveillance and Monitoring Project. *JAMA* 1999;282:677-86.
- [335] Enarson DA, Chretien J. Epidemiology of respiratory infectious diseases. *Curr Opin Pulm Med* 1999;5:128-35.
- [336] Dye C, Espinal MA, Watt CJ, Mbiaga C, Williams BG. Worldwide incidence of multidrug-resistant tuberculosis. *J Infect Dis* 2002;185:1197-202.
- [337] Orege PA, Fine PE, Lucas SB, Obura M, Okelo C, Okuku P. Case-control study of BCG vaccination as a risk factor for leprosy and tuberculosis in western Kenya. *Int J Lepr Other Mycobact Dis* 1993;61:542-9.
- [338] Rodrigues LC, Diwan VK, Wheeler JG. Protective effect of BCG against tuberculous meningitis and miliary tuberculosis: a meta-analysis. *Int J Epidemiol* 1993;22:1154-8.
- [339] Colditz GA, Brewer TF, Berkey CS, Wilson ME, Burdick E, Fineberg HV, et al. Efficacy of BCG vaccine in the prevention of tuberculosis. Meta-analysis of the published literature. *JAMA* 1994;271:698-702.
- [340] Fine PE. The BCG story: lessons from the past and implications for the future. *Rev Infect Dis* 1989;11 Suppl 2:S353-9.
- [341] Brandt L, Feino Cunha J, Weinreich Olsen A, Chilima B, Hirsch P, Appelberg R, et al. Failure of the *Mycobacterium bovis* BCG vaccine: some species of environmental mycobacteria block multiplication of BCG and induction of protective immunity to tuberculosis. *Infect Immun* 2002;70:672-8.
- [342] Reed SG, Alderson MR, Dalemans W, Lobet Y, Skeiky YA. Prospects for a better vaccine against tuberculosis. *Tuberculosis (Edinb)* 2003;83:213-9.
- [343] McShane H, Pathan AA, Sander CR, Goonetilleke NP, Fletcher HA, Hill AV. Boosting BCG with MVA85A: the first candidate subunit vaccine for tuberculosis in clinical trials. *Tuberculosis (Edinb)* 2005;85:47-52.
- [344] World Health Organization. *Global Tuberculosis Control*. Geneva, Switzerland; 2006.
- [345] Dye C. Global epidemiology of tuberculosis. *Lancet* 2006;367:938-40.
- [346] Smith KC, Orme IM, Starke JR. Tuberculosis vaccines. In: Plotkin SA, Orenstein WA, Offrit PA, editors. *Vaccine* 5th ed Saunders-Elsevier 2008: 857-85.
- [347] Andrews JR, Shah NS, Gandhi N, Moll T, Friedland G. Multidrug-resistant and extensively drug-resistant tuberculosis: implications for the HIV epidemic and antiretroviral therapy rollout in South Africa. *J Infect Dis* 2007;196 Suppl 3:S482-90.
- [348] Koenig R. Drug-resistant tuberculosis. In South Africa, XDR TB and HIV prove a deadly combination. *Science* 2008;319:894-7.
- [349] Jain A, Mondal R. Extensively drug-resistant tuberculosis: current challenges and threats. *FEMS Immunol Med Microbiol* 2008;53:145-50.
- [350] Shah SJ, Gheorghide M. Heart failure with preserved ejection fraction: treat now by treating comorbidities. *JAMA* 2008;300:431-3.
- [351] Extensively drug-resistant tuberculosis--United States, 1993-2006. *MMWR Morb Mortal Wkly Rep* 2007;56:250-3.
- [352] Trends in tuberculosis incidence--United States, 2006. *MMWR Morb Mortal Wkly Rep* 2007;56:245-50.
- [353] Bégué P, Denis F, Girard MP, Frottier J. Faut-il continuer à vacciner par le BCG en France? *Bull Acad Natle Med* 2005;189:1305-18.
- [354] Vordermeier HM, Rhodes SG, Dean G, Goonetilleke N, Huygen K, Hill AV, et al. Cellular immune responses induced in cattle by heterologous prime-boost vaccination using recombinant viruses and bacille Calmette-Guerin. *Immunology* 2004;112:461-70.
- [355] Scanga CA, Mohan VP, Yu K, Joseph H, Tanaka K, Chan J, et al. Depletion of CD4(+) T cells causes reactivation of murine persistent tuberculosis despite continued expression of interferon gamma and nitric oxide synthase 2. *J Exp Med* 2000;192:347-58.
- [356] Villarreal-Ramos B, McAulay M, Chance V, Martin M, Morgan J, Howard CJ. Investigation of the role of CD8+ T cells in bovine tuberculosis in vivo. *Infect Immun* 2003;71:4297-303.

- [357] Surcel HM, Troye-Blomberg M, Paulie S, Andersson G, Moreno C, Pasvol G, et al. Th1/Th2 profiles in tuberculosis, based on the proliferation and cytokine response of blood lymphocytes to mycobacterial antigens. *Immunology* 1994;81:171-6.
- [358] Orme IM. Prospects for new vaccines against tuberculosis. *Trends Microbiol* 1995;3:401-4.
- [359] Park JS, Tamayo MH, Gonzalez-Juarrero M, Orme IM, Ordway DJ. Virulent clinical isolates of *Mycobacterium tuberculosis* grow rapidly and induce cellular necrosis but minimal apoptosis in murine macrophages. *J Leukoc Biol* 2006;79:80-6.
- [360] Bénévolo-de-Andrade TC, Monteiro-Maia R, Cosgrove C, Castello-Branco LR. BCG Moreau Rio de Janeiro- An oral vaccine against tuberculosis-Review *Mem Inst Oswaldo Cruz Rio de Janeiro* 2005 100:459-65.
- [361] Revised BCG vaccination guidelines for infants at risk for HIV infection. *Wkly Epidemiol Rec* 2007;82:193-6.
- [362] Hesseling AC, Marais BJ, Gie RP, Schaaf HS, Fine PE, Godfrey-Faussett P, et al. The risk of disseminated Bacille Calmette-Guerin (BCG) disease in HIV-infected children. *Vaccine* 2007;25:14-8.
- [363] Mak TK, Hesseling AC, Hussey GD, Cotton MF. Making BCG vaccination programmes safer in the HIV era. *Lancet* 2008;372:786-7.
- [364] Philipp WJ, Nair S, Guglielmi G, Lagranderie M, Gicquel B, Cole ST. Physical mapping of *Mycobacterium bovis* BCG pasteur reveals differences from the genome map of *Mycobacterium tuberculosis* H37Rv and from *M. bovis*. *Microbiology* 1996;142 (Pt 11):3135-45.
- [365] Mustafa AS, Cockle PJ, Shaban F, Hewinson RG, Vordermeier HM. Immunogenicity of *Mycobacterium tuberculosis* RD1 region gene products in infected cattle. *Clin Exp Immunol* 2002;130:37-42.
- [366] Lewis KN, Liao R, Guinn KM, Hickey MJ, Smith S, Behr MA, et al. Deletion of RD1 from *Mycobacterium tuberculosis* mimics bacille Calmette-Guerin attenuation. *J Infect Dis* 2003;187:117-23.
- [367] Liu XQ, Dosanjh D, Varia H, Ewer K, Cockle P, Pasvol G, et al. Evaluation of T-cell responses to novel RD1- and RD2-encoded *Mycobacterium tuberculosis* gene products for specific detection of human tuberculosis infection. *Infect Immun* 2004;72:2574-81.
- [368] Brosch R, Gordon SV, Garnier T, Eiglmeier K, Frigui W, Valenti P, et al. Genome plasticity of BCG and impact on vaccine efficacy. *Proc Natl Acad Sci U S A* 2007;104:5596-601.
- [369] Weir RE, Gorak-Stolinska P, Floyd S, Lalor MK, Stenson S, Branson K, et al. Persistence of the immune response induced by BCG vaccination. *BMC Infect Dis* 2008;8:9.
- [370] Brewer TF, Colditz GA. Relationship between bacille Calmette-Guerin (BCG) strains and the efficacy of BCG vaccine in the prevention of tuberculosis. *Clin Infect Dis* 1995;20:126-35.
- [371] Fine PE. Variation in protection by BCG: implications of and for heterologous immunity. *Lancet* 1995;346:1339-45.
- [372] Doherty TM, Andersen P. Vaccines for tuberculosis: novel concepts and recent progress. *Clin Microbiol Rev* 2005;18:687-702.
- [373] Girard MP, Fruth U, Kieny MP. A review of vaccine research and development: tuberculosis. *Vaccine* 2005;23:5725-31.
- [374] Young D, Dye C. The development and impact of tuberculosis vaccines. *Cell* 2006;124:683-7.
- [375] Ly LH, McMurray DN. Tuberculosis: vaccines in the pipeline. *Expert Rev Vaccines* 2008;7:635-50.
- [376] Horwitz MA, Harth G, Dillon BJ, Maslesa-Galic S. Recombinant bacillus calmette-guerin (BCG) vaccines expressing the *Mycobacterium tuberculosis* 30-kDa major secretory protein induce greater protective immunity against tuberculosis than conventional BCG vaccines in a highly susceptible animal model. *Proc Natl Acad Sci U S A* 2000;97:13853-8.
- [377] Horwitz MA. Recombinant BCG expressing *Mycobacterium tuberculosis* major extracellular proteins. *Microbes Infect* 2005;7:947-54.
- [378] Hoft DF, Blazevic A, Abate G, Hanekom WA, Kaplan G, Soler JH, et al. A new recombinant bacille Calmette-Guerin vaccine safely induces significantly enhanced tuberculosis-specific immunity in human volunteers. *J Infect Dis* 2008;198:1491-501.

- [379] Pym AS, Brodin P, Majlessi L, Brosch R, Demangel C, Williams A, et al. Recombinant BCG exporting ESAT-6 confers enhanced protection against tuberculosis. *Nat Med* 2003;9:533-9.
- [380] Grode L, Seiler P, Baumann S, Hess J, Brinkmann V, Nasser Eddine A, et al. Increased vaccine efficacy against tuberculosis of recombinant *Mycobacterium bovis* bacille Calmette-Guerin mutants that secrete listeriolysin. *J Clin Invest* 2005;115:2472-9.
- [381] Skeiky YA, Sadoff JC. Advances in tuberculosis vaccine strategies. *Nat Rev Microbiol* 2006;4:469-76.
- [382] Abebe F, Bjune G. The emergence of Beijing family genotypes of *Mycobacterium tuberculosis* and low-level protection by bacille Calmette-Guerin (BCG) vaccines: is there a link? *Clin Exp Immunol* 2006;145:389-97.
- [383] Guleria I, Teitelbaum R, McAdam RA, Kalpana G, Jacobs WR, Jr., Bloom BR. Auxotrophic vaccines for tuberculosis. *Nat Med* 1996;2:334-7.
- [384] Collins DM. New tuberculosis vaccines based on attenuated strains of the *Mycobacterium tuberculosis* complex. *Immunol Cell Biol* 2000;78:342-8.
- [385] Martin C, Williams A, Hernandez-Pando R, Cardona PJ, Gormley E, Bordat Y, et al. The live *Mycobacterium tuberculosis* phoP mutant strain is more attenuated than BCG and confers protective immunity against tuberculosis in mice and guinea pigs. *Vaccine* 2006;24:3408-19.
- [386] Williams A, Hatch GJ, Clark SO, Gooch KE, Hatch KA, Hall GA, et al. Evaluation of vaccines in the EU TB Vaccine Cluster using a guinea pig aerosol infection model of tuberculosis. *Tuberculosis (Edinb)* 2005;85:29-38.
- [387] Sampson SL, Dascher CC, Sambandamurthy VK, Russell RG, Jacobs WR, Jr., Bloom BR, et al. Protection elicited by a double leucine and pantothenate auxotroph of *Mycobacterium tuberculosis* in guinea pigs. *Infect Immun* 2004;72:3031-7.
- [388] Rosada RS, de la Torre LG, Frantz FG, Trombone AP, Zarate-Blades CR, Fonseca DM, et al. Protection against tuberculosis by a single intranasal administration of DNA-hsp65 vaccine complexed with cationic liposomes. *BMC Immunol* 2008;9:38.
- [389] Andersen P. TB vaccines: progress and problems. *Trends Immunol* 2001;22:160-8.
- [390] Izzo A, Brandt L, Lasco T, Kipnis AP, Orme I. NIH pre-clinical screening program: overview and current status. *Tuberculosis (Edinb)* 2005;85:25-8.
- [391] Hope JC, Villarreal-Ramos B. Bovine TB and the development of new vaccines. *Comp Immunol Microbiol Infect Dis* 2008;31:77-100.
- [392] Dillon DC, Alderson MR, Day CH, Lewinsohn DM, Coler R, Bement T, et al. Molecular characterization and human T-cell responses to a member of a novel *Mycobacterium tuberculosis* mtb39 gene family. *Infect Immun* 1999;67:2941-50.
- [393] Brandt L, Elhay M, Rosenkrands I, Lindblad EB, Andersen P. ESAT-6 subunit vaccination against *Mycobacterium tuberculosis*. *Infect Immun* 2000;68:791-5.
- [394] Skeiky YA, Owendale PJ, Jen S, Alderson MR, Dillon DC, Smith S, et al. T cell expression cloning of a *Mycobacterium tuberculosis* gene encoding a protective antigen associated with the early control of infection. *J Immunol* 2000;165:7140-9.
- [395] Skjot RL, Brock I, Arend SM, Munk ME, Theisen M, Ottenhoff TH, et al. Epitope mapping of the immunodominant antigen TB10.4 and the two homologous proteins TB10.3 and TB12.9, which constitute a subfamily of the *esat-6* gene family. *Infect Immun* 2002;70:5446-53.
- [396] Alderson MR, Bement T, Day CH, Zhu L, Molesh D, Skeiky YA, et al. Expression cloning of an immunodominant family of *Mycobacterium tuberculosis* antigens using human CD4(+) T cells. *J Exp Med* 2000;191:551-60.
- [397] Olsen AW, Williams A, Okkels LM, Hatch G, Andersen P. Protective effect of a tuberculosis subunit vaccine based on a fusion of antigen 85B and ESAT-6 in the aerosol guinea pig model. *Infect Immun* 2004;72:6148-50.
- [398] Langermans JA, Doherty TM, Vervenne RA, van der Laan T, Lyashchenko K, Greenwald R, et al. Protection of macaques against *Mycobacterium tuberculosis* infection by a subunit vaccine based on a fusion protein of antigen 85B and ESAT-6. *Vaccine* 2005;23:2740-50.
- [399] Dietrich J, Aagaard C, Leah R, Olsen AW, Stryhn A, Doherty TM, et al. Exchanging ESAT6 with TB10.4 in an Ag85B fusion molecule-based tuberculosis subunit vaccine: efficient protection and ESAT6-based sensitive monitoring of vaccine efficacy. *J Immunol* 2005;174:6332-9.

- [400] Skeiky YA, Alderson MR, Ovendale PJ, Guderian JA, Brandt L, Dillon DC, et al. Differential immune responses and protective efficacy induced by components of a tuberculosis polyprotein vaccine, Mtb72F, delivered as naked DNA or recombinant protein. *J Immunol* 2004;172:7618-28.
- [401] McShane H, Pathan AA, Sander CR, Keating SM, Gilbert SC, Huygen K, et al. Recombinant modified vaccinia virus Ankara expressing antigen 85A boosts BCG-primed and naturally acquired antimycobacterial immunity in humans. *Nat Med* 2004;10:1240-4.
- [402] Hawkrige T, Scriba TJ, Gelderbloem S, Smit E, Tameris M, Moyo S, et al. Safety and Immunogenicity of a New Tuberculosis Vaccine, MVA85A, in Healthy Adults in South Africa. *J Infect Dis* 2008;198:544-52.
- [403] Vordermeier HM, Simsova M, Wilkinson KA, Wilkinson RJ, Hewinson RG, Sebo P, et al. Recognition of mycobacterial antigens delivered by genetically detoxified *Bordetella pertussis* adenylate cyclase by T cells from cattle with bovine tuberculosis. *Infect Immun* 2004;72:6255-61.
- [404] Pathan AA, Sander CR, Fletcher HA, Poulton I, Alder NC, Beveridge NE, et al. Boosting BCG with recombinant modified vaccinia ankara expressing antigen 85A: different boosting intervals and implications for efficacy trials. *PLoS ONE* 2007;2:e1052.
- [405] Vordermeier HM, Huygen K, Singh M, Hewinson RG, Xing Z. Immune responses induced in cattle by vaccination with a recombinant adenovirus expressing Mycobacterial antigen 85A and *Mycobacterium bovis* BCG. *Infect Immun* 2006;74:1416-8.
- [406] Sander C, McShane H. Translational mini-review series on vaccines: Development and evaluation of improved vaccines against tuberculosis. *Clin Exp Immunol* 2007;147:401-11.