

Synthesis and Study of 5 – [(Phenylsulfonyl)Amino] – 1,3,4 – Thiadiazole – 2 – Sulfonamide as Potential Anti – Pertussis Drug Using Chromatography and Spectroscopy Techniques

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Editorial

Pertussis is a respiratory transmitted disease affecting approximately 23% of the world's population. It is caused by *Bordetella Pertussis* [1-23]. The emergence of Multiple-Drug-Resistant (MDR) *Pertussis* has focused the attention of the scientific community on the urgent need for new anti-*Pertussis* drugs. In pursuit of this goal, our research efforts are directed toward the discovery of new chemical entities that are effective as anti-*Pertussis* drugs. During recent years, there have been intense investigations of different classes of 1,3,4-thiadiazole-2-sulfonamide compounds and derivatives such as 5-[(Phenylsulfonyl)amino]-1,3,4-thiadiazole-2-sulfonamide many of which are known to possess interesting pharmaceutical, biological, biochemical and biomedical properties such as anti-microbial, anti-*Pertussis* and anti-inflammatory activities. It should be noted that the purity of the synthesized compound was confirmed by High Performance Liquid Chromatography (HPLC) and also Thin-Layer Chromatography (TLC). Furthermore, the molecular and chemical structure of the compound was characterized by ¹H NMR, ¹³C NMR, Attenuated Total Reflectance Fourier Transform Infrared (ATR-FTIR), FT-Raman and HR Mass spectra.

On the other hand, *Bordetella Pertussis* remains a leading infectious cause of death in the world today [23-43]. The emergence of *Pertussis* is increasing worldwide, partly due to poverty, inequity and rather to the HIV/AIDS pandemic, which greatly increases the risk of infection proceeding to overt disease. In particular, the appearance of Multi-Drug-Resistant (MDR) strains of *Bordetella Pertussis*, which exhibit *in vitro* resistance to at least three major anti-*Pertussis* drugs (usually Azithromycin, Erythromycin and Clarithromycin) and cause intractable *Pertussis*, has greatly contributed to the increased incidence of *Pertussis*. In addition, the development of drug-resistant strains of *Bordetella Pertussis* species has contributed to the inefficiency of the conventional anti-*Pertussis* therapy. Therefore, it seems that it is still necessary to research for novel anti-*Pertussis* drugs. In continuation of our research plan to discover, synthesize and study on a new anti-*Pertussis* drug, here we would like to report the synthesis of the 5-[(Phenylsulfonyl)amino]-1,3,4-thiadiazole-2-sulfonamide as a potential anti-*Pertussis* drug using chromatography and spectroscopy techniques.

References

1. Brotons P, de Paz HD, Toledo D, Villanova M, Plans P, et al. (2016) Differences in *Bordetella pertussis* DNA load according to clinical and epidemiological characteristics of patients with whooping cough. *J Infect* 72: 460-467.
2. Bottero D, Gaillard ME, Zurita E, Moreno G, Martinez DS, et al. (2016) Characterization of the immune response induced by pertussis OMV-based vaccine. *Vaccine* 34: 3303-3309.
3. Chen Z, Zhang J, Cao L, Zhang N, Zhu J, et al. (2016) Seroprevalence of pertussis among adults in China where whole cell vaccines have been used for 50 years. *J Infect* 73: 38-44.
4. Blackwood JC, Cummings DAT, Iamsirithaworn S, Rohani P (2016) Using age-stratified incidence data to examine the transmission consequences of pertussis vaccination. *Epidemics* 16: 1-7.
5. Fitzpatrick MC, Wenzel NS, Scarpino SV, Althouse BM, Atkins KE, et al. (2016) Cost-effectiveness of next-generation vaccines: The case of pertussis. *Vaccine* 34: 3405-3411.
6. van Hoek AJ, Campbell H, Amirthalingam G, Andrews N, Miller E (2016) Cost-effectiveness and programmatic benefits of maternal vaccination against pertussis in England. *J Infect* 73: 28-37.
7. Sealey KL, Belcher T, Preston A (2016) *Bordetella pertussis* epidemiology and evolution in the light of pertussis resurgence. *Infect Genet Evol* 40: 136-143.
8. Shivanandappa KC, Jagannathan S, Pandiyarajan S, Tamilvanan P, Umadevi T, et al. (2016) Purification of heat labile toxin from *Bordetella pertussis* vaccine strain 134 employed indigenous technology. *Alexandria J Med* 52: 107-113.
9. Bancroft T, Dillon MBC, Antunes RS, Paul S, Peters B, et al. (2016) Th1 versus Th2 T cell polarization by whole-cell and acellular childhood pertussis vaccines persists upon re-immunization in adolescence and adulthood. *Cell Immunol* 304-305: 35-43.
10. Terranella A, Rea V, Griffith M, Manning S, Sears S, et al. (2016) Vaccine effectiveness of tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine during a pertussis outbreak in Maine. *Vaccine* 34: 2496-2500.
11. Regan AK, Tracey LE, Blyth CC, Richmond PC, Effler PV (2016) A prospective cohort study assessing the reactogenicity of pertussis and influenza vaccines administered during pregnancy. *Vaccine* 34: 2299-2304.
12. Gao ZG, Jacobson KA (2016) On the selectivity of the Gαq inhibitor UBO-QIC: A comparison with the Gαi inhibitor pertussis toxin. *Biochem Pharmacol* 107: 59-66.
13. Rubin K, Glazer S (2016) The potential role of subclinical *Bordetella* colonization in the etiology of multiple sclerosis. *Immunobiology* 221: 512-515.
14. Yuen CT, Asokanathan C, Cook S, Lin N, Xing D (2016) Effect of different detoxification procedures on the residual pertussis toxin activities in vaccines. *Vaccine* 34: 2129-2134.
15. Kamiya H, Cho BH, Messonnier ML, Clark TA, Liang JL (2016) Impact and cost-effectiveness of a second tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis (Tdap) vaccine dose to prevent pertussis in the United States. *Vaccine* 34: 1832-1838.
16. Lamberti Y, Cafiero JH, Surmann K, Valdez H, Holubova J, et al. (2016) Proteome analysis of *Bordetella pertussis* isolated from human macrophages. *J Proteomics* 136: 55-67.

17. Sartori AMC, de Soárez PC, Fernandes EG, Gryninger LCF, Viscondi JYK, et al. (2016) Cost-effectiveness analysis of universal maternal immunization with tetanus-diphtheria-acellular pertussis (Tdap) vaccine in Brazil. *Vaccine* 34: 1531-1539.
18. Curran T, Coyle PV (2016) Understanding the true burden and infection dynamics of *Bordetella pertussis* using molecular diagnostics. *J Infection* 72: 504-505.
19. Feunou PF, Mielcarek N, Loch C (2016) Reciprocal interference of maternal and infant immunization in protection against pertussis. *Vaccine* 34: 1062-1069.
20. Pinta MLR, Lareo MIC, Torrell JMR, de Lomas JG, Devadiga R, et al. (2016) Seroprevalence of pertussis amongst healthcare professionals in Spain. *Vaccine* 34: 1109-1114.
21. Clarke M, McIntyre PB, Blyth CC, Wood N, Octavia S, et al. (2016) The relationship between *Bordetella pertussis* genotype and clinical severity in Australian children with pertussis. *J Infection* 72: 171-178.
22. Varan AK, Harriman KH, Winter K, Thun MD, McDonald EC (2016) Economic and Social Impact of Pertussis Among Adolescents in San Diego County. *J Adolescent Health* 58: 241-244.
23. Agnolon V, Bruno C, Galletti B, Mori E, Ugozzoli M (2016) Multiplex immunoassay for in vitro characterization of acellular pertussis antigens in combination vaccines. *Vaccine* 34: 1040-1046.
24. Hannuksela KGY, Kauko L, Meeren OVD, Mertsola J, He Q (2016) Pertussis specific cell-mediated immune responses ten years after acellular pertussis booster vaccination in young adults. *Vaccine* 34: 341-349.
25. Hoang HTT, Leuridan E, Maertens K, Nguyen TD, Hens N, et al. (2016) Pertussis vaccination during pregnancy in Vietnam: Results of a randomized controlled trial Pertussis vaccination during pregnancy. *Vaccine* 34: 151-159.
26. Bittenheim AM, Fiks AG, Burson RC, Wang E, Coffin SE, et al. (2016) A behavioral economics intervention to increase pertussis vaccination among infant caregivers: A randomized feasibility trial. *Vaccine* 34: 839-845.
27. Maertens K, Caboré RN, Huygen K, Hens N, Damme PV, et al. (2016) Pertussis vaccination during pregnancy in Belgium: Results of a prospective controlled cohort study. *Vaccine* 34: 142-150.
28. Ibrahim NM, El-kady EM, Eissa SA, Wahby AF (2016) Assessment of antibody level and avidity against *Bordetella pertussis* in a cohort of Egyptian individuals aged 1-18 years. *J Adv Res* 7: 105-111.
29. Mançaneira JF, Benedetti JR, Zhang L (2016) Hospitalizations and deaths due to pertussis in children from 1996 to 2013. *J Pediatr (Rio J)* 92: 40-45.
30. Romero RV, Hasan S, Faé K, Holubova J, Geurtsen J, et al. (2016) *Bordetella pertussis* filamentous hemagglutinin itself does not trigger anti-inflammatory interleukin-10 production by human dendritic cells. *Int J Med Microbiol* 306: 38-47.
31. Sadoh AE, Nwaneri DU, Ogboghodo BC, Sadoh WE (2016) Effect of introduction of pentavalent vaccine as replacement for Diphtheria-Tetanus-Pertussis and Hepatitis B vaccines on vaccination uptake in a health facility in Nigeria. *Vaccine* 34: 2722-2728.
32. Moro PL, Cragan J, Tepper N, Zheteyeva Y, Museru O, et al. (2016) Enhanced surveillance of tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis (Tdap) vaccines in pregnancy in the Vaccine Adverse Event Reporting System (VAERS), 2011-2015. *Vaccine* 34: 2349-2353.
33. Hale S, Quinn HE, Kesson A, Wood NJ, McIntyre PB (2016) Changing Patterns of Pertussis in a Children's Hospital in the Polymerase Chain Reaction Diagnostic Era. *J Pediatr* 170: 161.e1-165.e1.
34. Byrnes JJ, Gleason ED, Schoen MK, Lovelock DF, Carini LM, et al. (2016) Corrigendum to Accelerated maternal responding following intra-VTA pertussis toxin treatment. *Behav Brain Res* 223: 322-328.
35. Cannella SE, Enguene VYN, Karst JC, Hessel A, Subrini O, et al. (2016) Biophysical investigations of the adenylate cyclase (CyaA) toxin from *Bordetella pertussis*. *Toxicon* 116: 80-81.
36. Subrini O, Karst J, Perez ACS, Hessel A, Selwa E, et al. (2016) Deciphering protein membrane interactions involved in the translocation process of a bacterial toxin, the adenylate cyclase (CyaA) toxin from *Bordetella pertussis*. *Toxicon* 116: 78.
37. Park KT, Jun H, Jung CW (2016) IP125. Polyarteritis nodosa with peripheral gangrenes after diphtheria, pertussis, and tetanus vaccination. *J Vasc Surg* 63: 95S.
38. Springer TI, Johns C, Finley NL (2016) Structural Investigation into Calmodulin's Role in Activating *Bordetella Pertussis* Adenylyl Cyclase Toxin CyaA. *Biophys J* 110: 208a.
39. Venter C, Stowe J, Andrews N, Miller E, Turner PJ (2016) No Association Between Atopic Outcomes and Pertussis Vaccine Given in Children Born on the Isle of Wight 2001-2. *J Allergy Clin Immun* 137: AB60.
40. Aun MV, Costa FA, Almeida FM, Brüggermann TR, Romanholo BMS, et al. (2016) Inhibition of inflammation and mucus production by *Bordetella pertussis* whole-cell vaccine in a murine model of allergic rhinitis. *J Allergy Clin Immun* 137: AB27.
41. Nacht J (2016) Pertussis Vaccination in Adult Trauma Patients: Are We Missing an Opportunity? *J Emergen Med* 50: 212-213.
42. Fortner KB, Edwards KM, Broder KR, Jimenez N, Zhu Y, et al. (2016) 343: Reactogenicity of tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine (Tdap) in pregnant women. *Am J Obstet Gynecol* 214: S193-S194.
43. Mançaneira JF, Benedetti JR, Zhang L (2016) Hospitalizations and deaths due to pertussis in children from 1996 to 2013. *Jornal de Pediatria (Versão em Português)* 92: 40-45.