

# 微生物学講座

## ○主な研究内容

- 1 病原体関連分子パターン (PAMPs) の構造、生物活性、抗原性
- 2 微生物感染による自然免疫情報伝達系の攪乱に関する研究
- 3 抗菌薬耐性菌の耐性機構及び分子疫学
- 4 抗菌薬が有する抗菌活性以外の薬理作用
- 5 微生物感染における分子シャペロン
- 6 ピロリ菌の感染経路、病原性に関する研究

## ○Pub Med掲載論文 (2018年)

1. Contribution of novel amino acid alterations in PmrA or PmrB to colistin resistance in mcr-negative *Escherichia coli* clinical isolates including major multidrug-resistant lineages O25b:H4-ST131-H30Rx and non-x.

Sato T, Shiraishi T, Hiyama Y, Honda H, Shinagawa M, Usui M, Kuronuma K, Masumori N, Takahashi S, Tamura Y, Yokota S.

Antimicrob Agents Chemother. 2018 Jun 18. pii: AAC.00864-18. doi: 10.1128/AAC.00864-18. Print 2018 Sep. PMID: 29914952

2. Multiclonal expansion and high prevalence of  $\beta$ -lactamase-negative high-level ampicillin-resistant *Haemophilus influenzae* in Japan, and susceptibility to quinolones.

Honda H, Sato T, Shinagawa M, Fukushima Y, Nakajima C, Suzuki Y, Shiraishi T, Kuronuma K, Takahashi S, Takahashi H, Yokota S.

Antimicrob Agents Chemother. 2018 Jul 9. pii: AAC.00851-18. doi: 10.1128/AAC.00851-18. Print 2018 Sep. PMID:29987153

3. Release of large amounts of lipopolysaccharides from *Pseudomonas aeruginosa* cells reduces their susceptibility to colistin.

Yokota S, Hakamada H, Yamamoto S, Sato T, Shiraishi T, Shinagawa M, Takahashi

S.

Int J Antimicrob Agents. 2018 Jun;51(6):888–896. doi:  
10.1016/j.ijantimicag.2018.02.004. Epub 2018 Feb 9. PMID:29432867

4. Evaluation of consistency in quantification of gene copy number by real-time reverse transcription quantitative polymerase chain reaction and virus titer by plaque-forming assay for human respiratory syncytial virus.

Yamamoto K, Ogasawara N, Yamamoto S, Takano K, Shiraishi T, Sato T, Tsutsumi H, Himi T, Yokota S.

Microbiol Immunol. 2018 Feb;62(2):90–98. doi: 10.1111/1348-0421.12563.  
PMID:29266482

5. Lipoteichoic acids are embedded in cell walls during logarithmic phase, but exposed on membrane vesicles in *Lactobacillus gasseri* JCM 1131T.

Shiraishi T, Yokota S, Sato Y, Ito T, Fukiya S, Yamamoto S, Sato T, Yokota A.  
Benef Microbes. 2018 Jun 15;9(4):653–662. doi: 10.3920/BM2017.0124. Epub 2018  
Apr 10. PMID: 29633638

6. Tigecycline Susceptibility of *Klebsiella pneumoniae* Complex and *Escherichia coli* Isolates from Companion Animals: The Prevalence of Tigecycline-Nonsusceptible *K. pneumoniae* Complex, Including Internationally Expanding Human Pathogenic Lineages.

Sato T, Harada K, Usui M, Tsuyuki Y, Shiraishi T, Tamura Y, Yokota S.  
Microb Drug Resist. 2018 Jul/Aug;24(6):860–867. doi: 10.1089/mdr.2017.0184.  
Epub 2017 Dec 12. PMID: 29232167

7. Response to pneumococcal vaccine in interstitial lung disease patients: Influence of systemic immunosuppressive treatment.

Kuronuma K, Honda H, Mikami T, Saito A, Ikeda K, Otsuka M, Chiba H, Yamada G, Sato T, Yokota S, Takahashi H.

Vaccine. 2018 Jul 5. pii: S0264-410X(18)30903-4. doi:  
10.1016/j.vaccine.2018.06.062. Epub 2018 Jul 6. PMID:29983256

8. Whole genome analysis of a multidrug-resistant *Streptococcus pneumoniae* isolate from a patient with invasive pneumococcal infection developing disseminated intravascular coagulation.

Ohkoshi Y, Sato T, Wada T, Fukushima Y, Murabayashi H, Takakuwa Y, Nishiyama K, Honda H, Shiraishi T, Kuronuma K, Takahashi H, Nakajima C, Suzuki Y, Yokota S.

J Infect Chemother. 2018 Aug;24(8):674–681. doi: 10.1016/j.jiac.2018.01.012. Epub 2018 Feb 26. PMID:29496334

9. Isolation of a *mcr-1*-harbouring *Escherichia coli* isolate from a human clinical setting in Sapporo, Japan.

Sato T, Fukuda A, Usui M, Shinagawa M, Shiraishi T, Tamura Y, Takahashi S, Yokota S.

J Glob Antimicrob Resist. 2018 Jun;13:20–21. doi: 10.1016/j.jgar.2018.02.010. Epub 2018 Feb 21. PMID:29476984

10. High prevalence of *mcr-1*, *mcr-3* and *mcr-5* in *Escherichia coli* derived from diseased pigs in Japan.

Fukuda A, Sato T, Shinagawa M, Takahashi S, Asai T, Yokota S, Usui M, Tamura Y.

Int J Antimicrob Agents. 2018 Jan;51(1):163–164. doi: 10.1016/j.ijantimicag.2017.11.010. Epub 2017 Nov 26. PMID:29180277

11. Autophagy differentially regulates insulin production and insulin sensitivity.

Yamamoto S, Kuramoto K, Wang N, Situ X, Priyadarshini M, Zhang W, Cordoba-Chacon J, Layden BT, He C.

Cell Rep. 2018 Jun 12;23(11):3286–3299. doi: 10.1016/j.celrep.2018.05.032. PMID:29898399

12. IL-10, TGF- $\beta$ , and glucocorticoid prevent the production of type 2 cytokines

in human group 2 innate lymphoid cells.

Ogasawara N, Poposki JA, Klingler AI, Tan BK, Weibman AR, Hulse KE, Stevens WW, Peters AT, Grammer LC, Schleimer RP, Welch KC, Smith SS, Conley DB, Raviv JR, Soroosh P, Akbari O, Himi T, Kern RC, Kato A.

J Allergy Clin Immunol. 2018 Mar;141(3):1147-1151.e8. doi: 10.1016/j.jaci.2017.09.025. Epub 2017 Oct 23. PMID: 29074458

13. Epithelial activators of type 2 inflammation; elevation of TSLP, but not IL-25 or IL-33, in chronic rhinosinusitis with nasal polyps in Chicago, Illinois.

Ogasawara N, Klingler AI, Tan BK, Poposki JA, Hulse KE, Stevens WW, Peters AT, Grammer LC, Welch KC, Smith SS, Conley DB, Kern RC, Schleimer RP, Kato A.

Allergy. 2018 Nov;73(11):2251-2254. doi: 10.1111/all.13552. Epub 2018 Jul 26. PMID: 29987901

14. Up-regulation of serum periostin and squamous cell carcinoma antigen levels in infants with acute bronchitis due to respiratory syncytial virus.

Nakamura H, Akashi K, Watanabe M, Ohta S, Ono J, Azuma Y, Ogasawara N, Yamamoto K, Shimizu N, Tsutsumi H, Izuhara K, Katsunuma T.

Allergol Int. 2018 Apr;67(2):259-265. doi: 10.1016/j.alit.2017.10.003. Epub 2017 Nov 6. PMID: 29122495

15. Evaluation of susceptibilities to carbapenems and faropenem against cephalosporin-resistant *Neisseria gonorrhoeae* clinical isolates with penA mosaic alleles.

Hiyama Y, Takahashi S, Sato T, Shinagawa M, Fukushima Y, Nakajima C, Suzuki Y, Masumori N, Yokota S.

Microb Drug Resist, in press.

#### ○その他の論文 (2018年)

1. *Lactobacillus gasseri* に共通する種特異的なリポテイコ酸の化学構造.

白石 宗, 久富 亮佑, 佐藤 耶舞羽, 森田 直樹, 吹谷 智, 佐藤 豊孝, 横田 篤, 横田 伸一.

エンドトキシン・自然免疫研究21ーエンドトキシン・自然免疫研究のフロンティアをめざしてー (日本エンドトキシン・自然免疫研究会編). 医学図書出版, 東京, 2018.  
pp. 35-37.

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1. Tigecycline Nonsusceptibility Occurs Exclusively in Fluoroquinolone-Resistant *Escherichia coli* Clinical Isolates, Including the Major Multidrug-Resistant Lineages O25b:H4-ST131-H30R and O1-ST648.

Sato T, Suzuki Y, Shiraishi T, Honda H, Shinagawa M, Yamamoto S, Ogasawara N, Takahashi H, Takahashi S, Tamura Y, Yokota SI.

*Antimicrob Agents Chemother.* 2017 Jan 24;61(2). pii: e01654-16. doi:

10.1128/AAC.01654-16. Print 2017 Feb.

PMID: 27855067

2. Adaptive Cross-Resistance to Aminoglycoside Antibiotics in *Pseudomonas aeruginosa* Induced by Topical Dosage of Neomycin.

Uemura S, Yokota SI, Shiraishi T, Kitagawa M, Hirayama S, Kyan R, Mizuno H, Sawamoto K, Inoue H, Miyamoto A, Narimatsu E.

*Chemotherapy.* 2017;62(2):121-127. doi: 10.1159/000449368. Epub 2016 Oct 29.

PMID: 27794569

3. Mitochondrial proteins NIP-SNAP-1 and -2 are a target for the immunomodulatory activity of clarithromycin, which involves NF- $\kappa$ B-mediated cytokine production.

Yamamoto S, Ogasawara N, Yamamoto K, Uemura C, Takaya Y, Shiraishi T, Sato T, Hashimoto S, Tsutsumi H, Takano K, Himi T, Yokota SI.

*Biochem Biophys Res Commun.* 2017 Feb 12;483(3):911-916. doi:

10.1016/j.bbrc.2016.12.100. Epub 2016 Dec 18.

PMID: 27998764

4. NIP-SNAP-1 and -2 mitochondrial proteins are maintained by heat shock protein 60.

Yamamoto S, Okamoto T, Ogasawara N, Hashimoto S, Shiraishi T, Sato T, Yamamoto K, Tsutsumi H, Takano K, Himi T, Itoh H, Yokota SI.

Biochem Biophys Res Commun. 2017 Feb 12;483(3):917-922. doi:

10.1016/j.bbrc.2016.12.133.

Epub 2016 Dec 21.

PMID:28011268

5. Mechanism of Reduced Susceptibility to Fosfomycin in Escherichia coli Clinical Isolates.

Ohkoshi Y, Sato T, Suzuki Y, Yamamoto S, Shiraishi T, Ogasawara N, Yokota SI.

Biomed Res Int. 2017;2017:5470241. doi: 10.1155/2017/5470241. Epub 2017 Jan 19.

PMID: 28197413

6. Involvement of herpes simplex virus type 1 UL13 protein kinase in induction of SOCS genes, the negative regulators of cytokine signaling.

Sato Y, Koshizuka T, Ishibashi K, Hashimoto K, Ishioka K, Ikuta K, Yokota SI, Fujii N, Suzutani T.

Microbiol Immunol. 2017 May;61(5):159-167. doi: 10.1111/1348-0421.12483.

PMID:28419615

7. Mycoplasma bovis isolates from dairy calves in Japan have less susceptibility than a reference strain to all approved macrolides associated with a point mutation (G748A) combined with multiple species-specific nucleotide alterations in 23S rRNA.

Sato T, Higuchi H, Yokota SI, Tamura Y

Microbiol Immunol. 2017 Jun;61(6):215-224. doi: 10.1111/1348-0421.12490.

PMID: 28504455

8. Novel antimicrobial activities of a peptide derived from a Japanese soybean fermented food, Natto, against Streptococcus pneumoniae and Bacillus subtilis group strains.

Kitagawa M, Shiraishi T, Yamamoto S, Kutomi R, Ohkoshi Y, Sato T, Wakui H, Itoh

H, Miyamoto A, Yokota SI.

AMB Express. 2017 Dec;7(1):127. doi: 10.1186/s13568-017-0430-1. Epub 2017 Jun 20.

PMID: 28641406

9. A Becn1 mutation mediates hyperactive autophagic sequestration of amyloid oligomers and improved cognition in Alzheimer's disease.

Rocchi A, Yamamoto S, Ting T, Fan Y, Sadleir K, Wang Y, Zhang W, Huang S, Levine B, Vassar R, He C,

PLoS Genet 2017;13(8):e1006962

10. The role of transcriptional factor p63 in regulation of epithelial barrier and ciliogenesis of human nasal epithelial cells.

Kaneko Y, Kohno T, Kakui T, Takano K, Ogasawara N, Miyata R, Kikuchi S, Konno T, Ohkuni T, Yajima R, Kakiuchi A, Yokota S, Himi T, Kojima T.

Sci Rep 2017;7(1): 10935.

11. Complete Genome Sequence of Multidrug-Resistant *Streptococcus pneumoniae* Serotype 19F Isolated from an Invasive Infection in Sapporo, Japan.

Sato T, Ohkoshi Y, Wada T, Fukushima Y, Murabayashi H, Takakuwa Y, Nishiyama K, Shiraishi T, Nakajima C, Suzuki Y, Yokota SI.

Genome Announc. 2017 Nov 2;5(44). pii: e01239-17. doi: 10.1128/genomeA.01239-17.

PMID: 29097473

12. Cutting Edge: A Critical Role of Lesional T Follicular Helper Cells in the Pathogenesis of IgG4-Related Disease.

Kamekura R, Takano K, Yamamoto M, Kawata K, Shigehara K, Jitsukawa S, Nagaya T, Ito F, Sato A, Ogasawara N, Tsubomatsu C, Takahashi H, Nakase H, Himi T, Ichimiya S.

J Immunol, 2017;199 (8):2624-2629.

13. Regulation of claudin-4 via p63 in human epithelial cells.

Kojima T, Kohno T, Kubo T, Kaneko Y, Kakuki T, Kakiuchi A, Kurose M, Takano KI, Ogasawara N, Obata K, Nomura K, Miyata R, Konno T, Ichimiya S, Himi T.

Ann N Y Acad Sci, 2017, 1405(1):25-31.



14. High prevalence of *mcr-1*, *mcr-3* and *mcr-5* in *Escherichia coli* derived from diseased pigs in Japan.

Fukuda A, Sato T, Shinagawa M, Takahashi S, Asai T, Yokota SI, Usui M, Tamura Y. *Int J Antimicrob Agents*. 2017 Nov 26. pii: S0924-8579(17)30427-2. doi: 10.1016/j.ijantimicag.2017.11.010. [Epub ahead of print] No abstract available. PMID: 2918027

15. IL-10, TGF- $\beta$  and glucocorticoid prevent the production of type 2 cytokines in human group 2 innate lymphoid cells.

Ogasawara N, Poposki JA, Klingler AI, Tan BK, Weibman AR, Hulse KE, Stevens WW, Peters AT, Grammer LC, Schleimer RP, Welch KC, Smith SS, Conley DB, Raviv JR, Soroosh P, Akbari O, Himi T, Kern RC, Kato A. *J Allergy Clin Immunol*, in press.

16. Tigecycline Susceptibility of *Klebsiella pneumoniae* Complex and *Escherichia coli* Isolates from Companion Animals: The Prevalence of Tigecycline-Nonsusceptible *K. pneumoniae* Complex, Including Internationally Expanding Human Pathogenic Lineages.

Sato T, Harada K, Usui M, Tsuyuki Y, Shiraishi T, Tamura Y, Yokota SI. *Microb Drug Resist*. 2017 Dec 12. doi: 10.1089/mdr.2017.0184. [Epub ahead of print] PMID: 29232167

17. Up-regulation of serum periostin and squamous cell carcinoma antigen levels in infants with acute bronchitis due to respiratory syncytial virus.

Nakamura H, Akashi K, Watanabe M, Ohta S, Ono J, Azuma Y, Ogasawara N, Yamamoto K, Shimizu N, Tsutsumi H, Izuhara K, Katsunuma T. *Allergol Int*, in press.

18. Evaluation of consistency in quantification of gene copy number by real-time reverse transcription quantitative polymerase chain reaction and virus titer by plaque-forming assay for human respiratory syncytial virus.

Yamamoto K, Ogasawara N, Yamamoto S, Takano K, Shiraishi T, Sato T, Tsutsumi H, Himi T, Yokota S.

Microbiol Immunol, in press.

19. Lipoteichoic acids are embedded in cell walls during logarithmic phase, but exposed on membrane vesicles in *Lactobacillus gasseri* JCM 1131T.

Shiraishi T, Yokota S, Sato Y, Ito T, Fukiya S, Yamamoto S, Sato T, Yokota A. *Benef Microbes*, in press.

20. Whole genome analysis of a multidrug-resistant *Streptococcus pneumoniae* isolate from a patient with invasive pneumococcal infection developing disseminated intravascular coagulation.

Ohkoshi Y, Sato T, Wada T, Fukushima Y, Murabayashi H, Takakuwa Y, Nishiyama K, Honda H, Shiraishi T, Kuronuma K, Takahashi H, Nakajima C, Suzuki Y, Yokota S. *J Infect Chemother*, in press.

21. Release of large amounts of lipopolysaccharides from *Pseudomonas aeruginosa* cells reduces their susceptibility to colistin.

Yokota S, Hakamada H, Yamamoto S, Sato T, Shiraishi T, Shinagawa M, Takahashi S. *Int J Antimicrob Agents*, in press.

#### ○その他論文 (2017年)

1. 白石宗, 横田伸一, 吹谷智, 横田篤. 特集: 乳酸菌が持つ新たな微生物機構の解明とその利用リポテイコ酸の構造多様性から見える乳酸菌の特徴. *JATAFFジャーナル*2017; 5(3):26-32.

2. 横田伸一, 佐藤豊孝. 抗菌薬多剤耐性における *efflux pump* の役割を見直す. *化学療法の領域*2017; 33(8):1698-1703.

3. 白石宗, 北川学, 山本聡, 久富亮佑, 佐藤豊孝, 涌井秀樹, 伊藤英晃, 宮本篤, 横田伸一. 納豆由来ペプチドの特異な殺菌効果とその作用機序. *エンドトキシン・自然免疫研究 20—自然免疫における化学生物学の貢献—* (日本エンドトキシン・自然免疫研究会編). 医学図書出版, 東京, 2017. pp. 39-42.

4. 山本圭佑, 小笠原徳子, 山本聡, 堤裕幸, 氷見徹夫, 横田伸一. クラリスロマイシンは気道上皮細胞でRSウイルスによって誘導されるインターフェロンの産生を *IRF-3* を介して調整する. *Jpn J Antibiot* 2017;70(suppl. A):19-24.

5. 横田伸一, 山本聡, 小笠原徳子, 植村知加, 高谷芳明, 伊藤英晃, 山本圭佑, 白石宗, 佐藤豊孝, 氷見徹夫. クラリスロマイシンの炎症反応修飾作用の分子機構の解明—気道上皮細胞のクラリスロマイシン結合タンパク質の同定と機能解明—. *Jpn J Antibiot* 2017;70 (suppl. A) :60-64.

6. 小笠原徳子, 品川雅明, 高野賢一, 坪松ちえ子, 氷見徹夫. 【臨床力UP!耳鼻咽喉科検査マニュアル】細菌ウイルス検査抗酸菌に関する検査耳鼻咽喉科・頭頸部外科2017; 89(5) :432-435.

7. 白石宗, 横田伸一, 吹谷智, 横田篤. ミニ特集24 : 微生物の多様性構造情報の蓄積から見えてきたリポテイコ酸の細菌種による構造多様性. *日本乳酸菌学会誌*2017;28(3) :177.

8. 戸板成昭, 藤原伸一, 高橋美智子, 今野武津子, 横田伸一. 家族内発症の Crohn 病 3 家系 7 症例における臨床的特徴の比較検討ならびに疾患関連遺伝子 (TNFSF15) の解析. *臨床小児医学* 2017;65(1-6): 11-14.

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## ○Pub Med 掲載論文（2016年）

1. Mumps Virus Induces Protein-Kinase-R-Dependent Stress Granules, Partly Suppressing Type III Interferon Production.

Hashimoto S, Yamamoto S, Ogasawara N, Sato T, Yamamoto K, Katoh H, Kubota T, Shiraishi T, Kojima T, Himi T, Tsutsumi H, Yokota S.

PLoS One. 2016 Aug 25;11(8):e0161793. doi: 10.1371/journal.pone.0161793.

PMID: 27560627

2. Clarithromycin prevents human respiratory syncytial virus-induced airway epithelial responses by modulating activation of interferon regulatory factor-3.

Yamamoto K, Yamamoto S, Ogasawara N, Takano K, Shiraishi T, Sato T, Miyata R, Kakuki T, Kamekura R, Kojima T, Tsutsumi H, Himi T, Yokota S.

Pharmacol Res. 2016 Sep;111:804-14. doi: 10.1016/j.phrs.2016.07.033.

PMID: 27468646

3. Measles Virus Genotype D Wild Strains Suppress Interferon-Stimulated Gene Expression More Potently than Laboratory Strains in SiHa Cells.

Jinushi M, Yamamoto S, Ogasawara N, Nagano H, Hashimoto S, Tsutsumi H, Himi T, Yokota S.

Viral Immunol. 2016 Jun;29(5):296-306. doi: 10.1089/vim.2016.0004.

PMID: 27035543

4. Quality of life and survival survey of cancer cachexia in advanced non-small cell lung cancer patients-Japan nutrition and QOL survey in patients with advanced non-small cell lung cancer study.

Takayama K, Atagi S, Imamura F, Tanaka H, Minato K, Harada T, Katakami N, Yokoyama T, Yoshimori K, Takiguchi Y, Hataji O, Takeda Y, Aoe K, Kim YH, Yokota S, Tabeta H, Tomii K, Ohashi Y, Eguchi K, Watanabe K. Support Care Cancer. 2016 Aug;24(8):3473-80. doi:

10.1007/s00520-016-3156-8. Epub 2016 Mar 22.

PMID: 27003901

5. Adaptive Cross-Resistance to Aminoglycoside Antibiotics in Pseudomonas aeruginosa Induced by Topical Dosage of Neomycin.

Uemura S, Yokota SI, Shiraishi T, Kitagawa M, Hirayama S, Kyan R, Mizuno H, Sawamoto K, Inoue H, Miyamoto A, Narimatsu E.

Chemotherapy. 2016 Oct 29;62(2):121-127. [Epub ahead of print]

PMID: 27794569

6. Pathogenic Lineage of mcr-Negative Colistin-Resistant Escherichia coli, Japan, 2008–2015  
Sato T, Fukuda A, Suzuki Y, Shiraichi T, Honda H, Shinagawa M

7. Emerg Infect Dis. 2016 Dec;22(12):2223–2225. doi:10.3201/eid2212.161117. No abstract available. PMID:27869606

8. Tigecycline Nonsusceptibility Occurs Exclusively in Fluoroquinolone-Resistant Escherichia coli Clinical Isolates, Including the Major Multidrug-Resistant Lineages O25:H4-ST131-H30R and O1-ST648. Sato T, Suzuki Y, Shiraishi T, Honda H, Shinagawa M, Yamamoto S, Ogasawara N, Takahashi H, Takahashi S, Tamura Y, Yokota S. Antimicrob Agents Chemother. 2017 Jan 24;61(2). pii:e01654-16. doi:10.1128/AAC.01654-16 PMID 27855067

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10. NIP-SNAP-1 and-2 mitochondrial proteins are maintained by heat shock protein 60. Yamamoto S, Okamoto T, Ogasawara N, Hashimoto S, Shiraishi T, Sato T, Yamamoto K, Tsutsumi H, Takano K, Himi T, Itoh H, Yokota S. Biochem Biophys Res Commun. 2017 Feb 12; 483(3):917–922. doi:10.1016/j.bbrc.2016.12.133 PMID:28011268

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12. Structural diversity and biological significance of lipoteichoic acid in Gram-positive bacteria: focusing on beneficial probiotic lactic acid bacteria. Shiraishi T, Yokota S, Fukiya S, Yokota A. Biosci Microbiata Food Health. 2016;35(4):147–161. Review. PMID:27867802

## ○その他論文 (2016年)

### 1. 抗菌薬耐性菌の驚くべき進化と脅威

横田伸一

日本耳鼻咽喉科感染症・エアロゾル学会会誌、2016;4(1):6–13

### 2. 微生物学的検査のピットフォール 的確な感染症診断 耳鼻咽喉科領域における結核菌感染症 (総説)

小笠原徳子、高野賢一、氷見徹夫

日本耳鼻咽喉科感染症・エアロゾル学会会誌 2016;4(2):77–81

### 3. Lactobacillus gasseri JCM1131Tn の対数期におけるリポテイコ酸の局在: Membrane vesicle 表層に露出されるリポテイコ酸

白石 宗、佐藤 耶舞羽、横田伸一、伊藤利章、吹谷智、横田篤

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## ○主な研究内容

- 1 病原体関連分子パターン (PAMPs) の構造、生物活性、抗原性
- 2 微生物感染による自然免疫情報伝達系の攪乱に関する研究
- 3 抗菌薬耐性菌の耐性機構及び分子疫学
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- 6 ピロリ菌の感染経路、病原性に関する研究

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