

バクテリオファージを利用した細菌の金ナノ粒子凝集比色検出

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Colorimetric detection of bacteria pathogens through aggregation of gold nanoparticles induced by thiolated bacteriophages (Graduate School of Science, Kochi university¹, School of Veterinary Medicine, Azabu University², Faculty of Health Science, Kochi Gakuen University³)
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Bacterial infections are serious worldwide threat to public health, and so the accurate and rapid detection and identification of pathogenic bacteria are of particular importance. To replace molecular biological and immunological methods, biosensors have recently been developed for the rapid and sensitive detection of bacteria. Among a wide variety of biological materials, bacteriophages have received increasing attention as promising alternatives to antibodies in biosensor applications. Thus, we herein present a rapid and highly selective colorimetric detection method for pathogenic bacteria through aggregation of gold nanoparticles on thiolated bacteriophages.

E.coli, *S.pseudintermedius*, and *S.aureus* were incubated with thiolated *Staphylococcus* virus S13'. The cells were centrifuged and resuspended in a solution of AuNPs. A dramatic color change from red to blue was observed only in *S.aureus* which is the host bacterial strain for *Staphylococcus* virus S13'. The present method therefore exhibits potential for expanding its application to the selective, sensitive, and rapid detection of any bacterium by changing the phages employed.

Keywords : Gold nanoparticles; Bacteriophages; Bacterium, Colorimetric detection

細菌性感染症の早期診断・早期治療には、原因菌の迅速な検出が必要である。遺伝子検出法や免疫学的検出法とは異なる検出法としてバイオセンサーが注目されており、抗体に代わる細菌認識素子としてバクテリオファージに高い関心が寄せられている。本研究では、チオール化バクテリオファージを利用した細菌の金ナノ粒子凝集比色検出法について報告する。

Figure 1に示す通り、チオール化したファージ (*Staphylococcus* virus S13') を大腸菌 (*E.coli*) やブドウ球菌 (*S.aureus*, *S.pseudintermedius*) と混合・遠心分離後、金ナノ粒子を添加したとき、S13'の宿主細菌 *S.aureus*のみ劇的な色調変化を示すことがわかった。細菌の科から属、さらには菌種の違いも識別し、高い選択性を保ちながら標的細菌を迅速に検出できることがわかった。本手法は、バクテリオファージを変えることによって、特定菌種への選択性を自在に制御することが可能であり、選択的かつ簡便な細菌検出が期待できる。

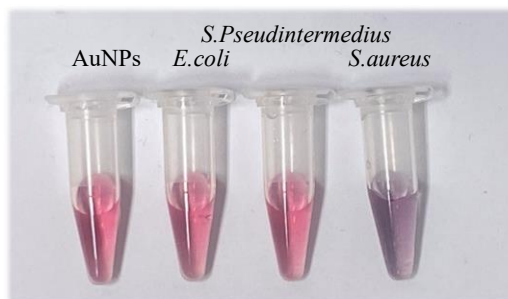


Figure 1. Detection of *S.aureus* with thiolated *Staphylococcus* virus S13' and AuNPs.