# Article information:

A new analysis method for evaluating bacterial growth with microplate readers | PLOS ONE
<https://journals.plos.org/plosone/article?id=10.1371%2Fjournal.pone.0245205>

# Article summary:

1. Microplate readers are commonly used to monitor bacterial growth, but multiple scattering can make it difficult to accurately measure optical density (OD) and fluorescence (FL).

2. A method based on the time derivatives of OD and/or FL was developed to overcome these barriers and provide a framework for understanding FL growth curves.

3. This method was successfully applied to study the lag time elongation of bacteria subjected to treatment with silver ions and the growth of bacteria in the presence of silver nanoparticles at various concentrations.

# Article rating:

May be slightly imbalanced: The article presents the information in a generally reliable way, but there are minor points of consideration that could be explored further or claims that are not fully backed by appropriate evidence. Some perspectives may also be omitted, and you are encouraged to use the research topics section to explore the topic further.

# Article analysis:

The article "A new analysis method for evaluating bacterial growth with microplate readers" presents a novel approach to overcome the limitations of traditional optical density (OD) measurements in monitoring microbial growth. The authors developed a method based on the time derivatives of the OD and/or fluorescence (FL) of bacterial cultures, which provides better temporal resolution and higher throughput. The article is well-structured, with clear sections on Introduction, Materials and Methods, Results, Discussion, Conclusions, Supporting Information, Acknowledgments, and References.

The article provides a comprehensive overview of the challenges associated with using microplate readers for monitoring microbial growth. The authors highlight the issue of multiple scattering in OD measurements and how it can lead to deviations from traditional sigmoid curves. They also discuss how reagents of interest can contribute significantly to scattering or absorption at the wavelength where OD is measured and distort the OD curve. The authors propose that their method based on time derivatives of OD and/or FL can overcome these issues.

The article presents quantitative models and numerical simulations to illustrate their method's effectiveness in predicting bacterial growth parameters such as cell number and number of fluorescent proteins over time. They also investigate how time derivatives depend on model/simulation parameters, providing a framework for understanding FL growth curves.

As a demonstration, the authors applied their method to study lag time elongation in bacteria subjected to treatment with silver ions (Ag+). They found that their results corroborated well with those from growth curve fitting by the Gompertz model commonly used in literature. Furthermore, they applied their method to study bacterial growth in the presence of AgNPs at various concentrations where OD curve measurements failed. Their method allowed them to successfully extract bacterial growth behavior from FL measurements and understand how AgNPs affected growth.

Overall, this article presents an innovative approach to overcome limitations associated with traditional methods for monitoring microbial growth using microplate readers. However, there are some potential biases that need consideration. For example, the authors did not discuss potential limitations of their method or compare it with other existing methods. Additionally, the article does not provide a detailed discussion of potential risks associated with using AgNPs in bacterial growth studies.

In conclusion, this article presents a novel approach to overcome limitations associated with traditional methods for monitoring microbial growth using microplate readers. The authors provide quantitative models and numerical simulations to illustrate their method's effectiveness and demonstrate its application in studying bacterial growth in the presence of AgNPs. However, further research is needed to validate their method and compare it with other existing methods. Additionally, potential risks associated with using AgNPs in bacterial growth studies need consideration.

# Topics for further research:

* Limitations of traditional methods for monitoring microbial growth using microplate readers
* Comparison of different methods for monitoring bacterial growth
* Risks associated with using nanoparticles in bacterial growth studies
* Optical density measurements and multiple scattering
* Fluorescence measurements for monitoring bacterial growth
* Lag time elongation in bacteria and its implications for microbial growth studies

# Report location:

<https://www.fullpicture.app/item/770e427b7aa044baa7b7a28fdce8ef63>