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Determining biofilm growth amount (absorbance) V.2

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We use this protocol and it's working

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Abstract

This protocol describes a method to determine the growth amount of biofilm at the early stage of biofilm formation by measuring absorbance. Here we use our own engineered bacteria, and it requires induction of IPTG and cultured with silver ion. You may use a different kind of bacteria and different culturing medium.

Materials

(Optional) IPTG, silver nitrate, *Escherichia coli*, LB broth medium.

Droppers, forceps, flasks with caps, 50 mL centrifuge tubes, MBBR carrier K1, oven, 1X phosphate-buffered saline (PBS), centrifuge, spectrometer.



IPTG induction

- 1 *Escherichia coli* grown overnight was diluted by LB to OD₆₀₀=0.4-0.6.
- 2 IPTG was added to cell culture to 1mM IPTG finally, and incubated 3h at 171 rpm, 37°C in orbital shaking incubator.

Sample preparation

- 3 Preparing several 100mL flasks by filling the flasks with MBBR carrier K1. Autoclave all the flasks and dry them in an oven at 60s°C.

Note

Prepare 3 flasks for each day and each sample (to minimize accidental error), so you may have, for example, 3 flasks for experiment and you want to test for 5 counts. This will eventually cost you 15 flasks in total.

The number of carriers that put into the 100mL flask should be at least 30. Prepare more in case of inadequacy when measuring.

- 4 Cells cultures and silver nitrate (to 6μM) solution were mixed in advance. Add the mixture into each bottle.

Note

Conduct this step in a biological safety cabinet in case the culture is polluted.

- 5 Incubate all bottles in a biochemical incubator at  37 °C .

Absorbance measurement

10m

- 6 At the day of measuring the absorbance, take the flasks to be tested out from incubator.



- 7 Using a pair of forceps, carefully pick out the carriers that has not been submerged into the culture and discard.

Note

These carriers should be discarded into a vessel with cap for the convenience of autoclaving.

- 8 Randomly pick five carriers out from culturing flask and put into a 50 mL centrifuge tube. Label this tube as "Washing tube".

Note

Try to get rid of the culture inside the holes of carriers by drying them out with paper tissues as they will interrupt the absorbance in the following steps.

- 9 Wash these five carriers using 1X phosphate-buffered saline (PBS) for three times. Collect all eluents.

Note

The following description is a step-by-step introduction of washing procedure:
Add  15 mL 1X PBS into the 50 mL centrifuge tube with carriers. Cap the tube and shake it vigorously. Carefully pour the eluents out into a new 50 mL centrifuge tube. Label this tube as "Eluent" Repeat these steps for three steps.

- 10 Use a dropper, add 2-3 mL 1X PBS into the Washing tube. Cap the tube and rinse every corner of the inside wall of tube using the PBS added by rotating the tube. Collecting the eluents by pouring these PBS into Eluent tube. Repeat these steps for three to five times.

Note

This step will collect almost all remained bacteria inside the Washing tube.

- 11 Centrifuge the Eluent tube at  10000 rpm, Room temperature, 00:10:00 .

10m

- 12 Discard all supernatants.

**Note**

You may use a pipette to collect the last few supernatants left at the bottom of the tube.

- 13 Add  3 μL 1X PBS into Eluent tube. Resuspend the pellet.
- 14 Measure the absorbance of the liquid  13 at OD600. Record the absorbance.
- 15 Repeat steps from Step 7 to Step 14 for three times. Calculate the mean value for the three measurements. A growing curve of biofilm can be generated from the data collected.