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APPENDICES

APPENDIX A

RT-PCR AND SPECIFIC BUFFER

1. Preparation of the reaction mix for cDNA synthesis

Before starting the experiment thaw all reagents except of the polymerase, mix them thorughly and centrifuge briefly. Use a sterile microcentrifuge tube to add the reagents to the reaction mix in a fixed order as outlined in the table

Table 5 Preparation of the reaction mix for cDNA synthesis

RT Reacion	Volume/1 sample (μl)	Volume/2 sample (μl)	Volume/3 sample (μl)	Volume/4 sample (μl)
10X Reaction Buffer	2	4	6	8
25mM MgCl2	4	8	12	16
dNTP	2	4	6	8
Random Primer	2	4	6	8
RNase Inhiitor	1	2	3	4
AMV Reverstranscriptase	1	2	3	4
Master Mix	12	24	36	48
Master Mix Aliquot	12	2x12	3x12	4x12
2 ug of RNA (Xi)	Xi	2xXi	3xXi	4xXi
RNase Free Water (20-12-Xi)	(20-12-Xi)	(20-12-Xi)	(20-12-Xi)	(20-12-Xi)
Total Volume	20	2x20	3x20	4x20

i = The number labeled in each sample

2. Preparation of the reaction mix for PCR

Before starting the experiment thaw all reagents except of the polymerase, mix them thorughly and centrifuge briefly. Use a sterile microcentrifuge tube to add the reagents to the reaction mix in a fixed order as outlined in the table

Table 6 Preparation of the reaction mix for PCR

PCR Reacion	Volume/1 sample (µl)	Volume/2 sample (µl)	Volume/3 sample (µl)	Volume/4 sample (µl)
10X Reaction Buffer	2.5	5	7.5	10
25mM MgCl2	1.5	3	4.5	6
dNTP	0.5	1	1.5	2
Taq	0.2	0.4	0.6	0.8
Forward Primer	0.7	1.4	2.1	2.8
Reward Primer	0.7	1.4	2.1	2.8
Master Mixt	6.1	12.2	18.3	24.4
Master Mix Aliquot	6.1	2x6.1	3x6.1	4x6.1
cDNA	5	2x5	3x5	4x5
RNase Free Water (25-6.1-5)	13.9	2x13.9	3x13.9	4x13.9
Total Volume/sample	25	2x25	3x25	4x25

3. Buffers prepations for RT-PCR

10x Ficoll loading buffer 10 ml

Ficoll	25	g
Bromphenol blue	0.025	g
0.5 M EDTA (pH 8.0)	0.2	ml

Adjust volume to 10 ml with dH_2O, Store at -20°c

1.5% Agarose gel (w/v) 100 ml

Agarose	1.5	g
1x TBE	100	ml

Dissolve by heating and occational ixing until no granules of agarose are visible.

Add ethidium bromide (stock 10 mg/ml) 10 µl (final concentration 1 µg/ml)

10x TBE buffer (pH 8.0) 1 liter

Tris base	108	g
EDTA $2H_2O$ (pH 8.0)	40	ml
dH_20	800	ml
Slowly add the boric acid, anhydrous	55	g

Adjust the pH to 8.0 with conc.HCl

Adjust the volume to 1 liter with dH_2O

1x TBE buffer 1 liter

10x TBE buffer	100	ml
dH2O	900	ml

Adjust the pH to 7.4 with conc. HCl

Adjust the volume to 1 liter with dH_2O

APPENDIX B

WESTERN BLOT AND SPECIFIC BUFFER

1. Protein assay (Lowry Method)

This assay is designed to quantify 0.125 to 2 mg/ml protein. A standard curve is an absorbance (A) at 750 nm versus BSA concentration (mg/ml) confirm to Beer's Law (it's a straight line passing through the origin). Determine the line of best fit for the data by linear regression ($y = ax+c$) along with an r^2 value. Then use the linear regression equation to determine the protein content of samples based upon absorbance as follows :

Set up a series of standards which contain : 0.125, 0.25, 0.5, 1, 2 mg/ml of BSA. The BSA was prepared as stock at concentration of 2 mg/ml.

1.1 Procedure

5 µl of five standards dilution, samples and blank tube (lysis buffer) were added into 1.5 ml tubes. Then 25 µl of solution A were added and mixed by vortexing. After that, quickly added 200 µl of solution B to each tube, vortexed immediately, and allowed to stand 15 min at room temperature. The absorbance of each solution was read and recorded at 750 nm against a reagent blank by using 1 cm^3 cuvettes. The excel spreadsheet and the linear regression equation of a standard curve were used for the Lowry assay to calculate the concentration of protein in each sample.

2. Sodium Dodecyl Sulfate-Polyacrylamide Gel Electrophpresis (SDS-PAGE)

2.1 Assembly of apparatus

The reagents used in preparing the gel should be removed from the refrigerator and allowed to warm and degas for 1 h prior to the preparation of the gel. While this is happening, set up the sandwich plates for casting the gel itself. A sandwich consists of one outer is a rectangular back plate with the rounded bottom corners, measuring 10 x 11.5 glass plate and one inner is same size but with a notch 1.1 cm deep and 10.4 cm long separated by plastic spacers of equal thickness (0.75 mm). In order to prepare a flawless gel, one containing has no air bubble or debris, the glass plates must be perfectly cleaned with liquid detergent, rinse with distilled water and then dry with absolute ethanol. The plates were wiped with gauze. To protect the bubble airs, the edge side of outer glass plates were sealed by gasket. After that, the casting clamps were used to mount the outer and inner glass plates facing together.

2.2 Preparation of Slab gel

The separating gel contain 10% acrylamide was carefully poured between the plates so that it flows down the slide between plates and fill from bottom to top with no air bubbles. The height of the separating gel was adjusted by the comb. Those height of the gel should be approximately 1 cm below the bottom of the comb. The top layer was filled with a small amount of dH_2O using a syringe for aiding the formation of smooth interface. Add water to height of 2-3 mm. The polymerize was allowed to incubate at rommtemperature for at least 40 min. After the separating gel is solid (polymerize) then the 5% stacking acrylamide gel would be prepared. The water was drained off and excess liquid was removed with apiece of whatman 3 MM paper. The correct comb (number of wells, thickness same as spacers) with ten teeth was immediate gently inserted between the surfaces of lower gel to create lanes for adding sample. It should be made sure that no air bubbles from around the teeth of the comb, as they will impede the migration and

separation of the proteins. Then leaving the gel for one hour at room temperature prior to elactrophoresis were performed

2.3 Preparation of sample

While the stacking gel is polymerizing, prepared the sample. Equal amounts of total protein from each sample were mixed with sample buffer Heating the samples for 10 min to 100°c in a boiling water bath were performed to denature the protein. The treated protein solution could be kept at 4°c until load on the gel. Unused sample can be stored at -20°c and boiled again before using. The markers do not need to be boiled.

2.4 Electrophoresis

After polymerization is complete, gently remove the comb, being careful not to rip any of the lanes and remove the bottom spacer, mount the gel in the electrophoresis apparatus so that the notch in the inner glass plate was next to and line up with the notch on the upper buffer chamber which had been filled with Tris-glycine electrophoresis buffer, pH 8.3. Remove any bubbles that become trapped at the bottom of the gel between the glass plates. Air bubbles will interfere by causing disruptions in the electrical circuit and an uneven electrophoresis. This is done with a bent hypodermic needle attached to a syringe. Samples were loaded into the bottom lanes by using pipette tips. When loading the wells, be sure that the tip of the gel loading is between the plates and directly over the desired well before dispensing the sample to prevent contamination of neighboring wells. Add 3 µl of the molecular weight marker. The electrophoresis apparatus was attached to an electric power supply. The power supply was turned on at 125 volt. Small bubbles should start to be produced and rise off the electrode wire at the bottom of the lower chamber. If no bubbles appear then there is an electrical circuit problem. The gel was run until the dye front reaches the bottom of gel, approximately 120 min. Then the power

supply was turned off. The orientation of the gel from the glass plate was removed into transfer buffer for transfer protein membrane.

Table 7 Preparation of the solutions for Tris/Glycine SDS-Polyacrylamide Gel Electrophoresis for western blot

Reagents	10%Separating gel (ml)	4%Stacking gel (ml)
H2O	4	2.1
30% Acrylamide mix	3.3	0.5
1.5 M Tris (pH 8.8)	2.5	-
1.0 M Tris (pH 6.8)	-	0.38
10% SDS	0.1	0.03
10% APS	0.1	0.03
TEMED	0.004	0.004
Total volume	10	3

3. Protein transfer

Cut one sheet of PVDF membrane and two sheets of absorbent filter paper to the size of the gel. Then, soak the PVDF membrane in methanol for 10 seconds. Immerse membrane, filter papers, and support pads in transfer buffer to ensure they are thoroughly soaked. Be careful to exclude air bubbles from the support pads. Assemble the transfer cassette as follows (black side down): fiber pad, filter paper, gel (no bubbles), PVDF membrane (no bubble), filter paper and fiber pad. Place the complete sandwich in the transfer tank with the membrane closest to the positive electrode (anode, red electrode). The sandwich was transferred for 120 min at 100 volt. After transfer, the membrane is removed from the sandwich and marked the membrane by clipping one corner, following placed into blocking solution.

4. Blocking

After, the protein was transferred to the PVDF membrane, and then it can be used for probing. The sensitivity of western blotting depends on reducing this background of non-specific binding by blocking potential binding site with irrelevant protein. Place the PVDF membrane in a container, and add blocking solution, incubate for 1 h at room temperature with gentle agitation on a platform shaker. After blocking, the membrane was washed 2 time 10 min, in TBS washing buffer.

5. Detection of bound antibody

The dilution of primary antibody was prepared in 5% non-fat dry milk TBS washing buffer. For β-actin detection, mouse anti human β-actin monoclonal antibody at 1:1000 was used. For ferritin detection, rabbit anti human ferritin polyclonal antibody at 1:200 was used. For MMP-1 detection, mouse anti rat MMP-1 monoclonal antibody at 1:200 was used. Then the membrane was placed in clean tray containing primary antibody solution and incubate overnight at 4°c. After incubation the primary antibody solution was discarded. Washing the membrane was performed with 20 ml of TBS in the period of 10 min for 2 times. The secondary antibody was prepared by TBS with 5% non fat dry milk. For β-actin antibody use goat anti mouse IgG (H+L) horseradish peroxidase (HRP) conjugate at 1 : 2,000 . For ferritin antibody use goat anti rabbit IgG (H+L) HRP conjugate at 1 : 500. For MMP-1 antibody use goat anti mouse IgG (H+L) horseradish peroxidase (HRP) conjugate at 1 : 500. The membrane from the final wash in TBS was incubate for 1 h at room temperature with gentle agitation on a shaker. After that, wash the blot with 2 times of TBS for 10 min with gentle agitation on a shaker.

6. Prptein detection

6.1 Diaminobenzidine (DAB)

Just prior to developing the immunoblot, dissolve 6 mg of 3,3'-diaminobenzidine (use DAB tetrahydrochloride) in 10 ml of TBS washing buffer. Add 100 µl of 30% H_2O_2 and 50 µl of $NiCl_2$. Decant washing buffer and place the blot in clean tray containing the development working solution. Develop the blot at room temperature with agitation until the bands are suitably dark. A typical incubation with the blot would be approximately 1-5 min. Stop the reaction; remove the H_2O_2 by rinsing with TBS.

6.2 Supersignal west pico chemiluminescent substrate

Prepare working solution by mixing equal parts of the stable peroxide solution and the luminol/enhancer solution. In a dark room, washed membrane was drained of excess buffer from and place in a fresh container. Then the detection reagent was directly added to the membrane on the surface carrying the protein; do not leave the membrane to dry out. After incubating for precisely one min at room temperature, the excess detection reagent was drained off and the membrane was gently placed, protein side up, on a piece os Saran Wrap. A piece of Saran Wrap was placed over the membrane, smoothing out any creases of bubbles that may develop between membrane and Saran Wrap. It is necessary to work quickly once the membrane has been exposed to the detection solution. The membrane was placed, protein side up, in X-ray film cassette. The lights were terned off and sheet of autoradiography film carefully placed on the top of the membrane, the cassette was closed and exposed and exposed for 1 min (this depend on the amount of target protein on the membrane).

7. Buffers preparations for western blot

1.5 M Tris base (pH 8.8) 100 ml

Tris base	18.171	g
dH_2O	80	ml

Adjust the pH to 8.8 with conc. HCl and conc.NaOH

Adjust the volume to 100 ml with dH_2O

1 M Tris base (pH6.8) 100 ml

Tris base	12.14	g
dH_2O	80	ml

Adjust the pH to 6.8 with conc. HCl and conc.NaOH

Adjust the volume to 100 ml with dH_2O

0.5 M Tris-HCl 100 ml

Tris base	6	g
dH_2O	40	ml

Adjust the pH to 6.8 with conc. HCl

Adjust the volume to 100 ml with dH_2O

10% SDS 100 ml

SDS	10	g

Adjust the volume to 100 ml with dH_2O

1x Triton lysis buffer 100 ml

25 mM Tris-HCl (pH 8.0)	0.4	g
150 mM NaCl	0.88	g
0.5% Triton X-100	0.5	ml

5 mM EDTA	0.186	g
dH_2O	100	ml

10x Laemmli running buffer (pH 8.3) 1 liter

Tris base	30.3	g
Glycine	144.2	g
SDS	10	g
dH_2O	900	ml

Adjust the pH to 8.3 with conc. HCl and conc.NaOH

Adjust the volume to 1 liter with dH_2O

1x Transfer buffer 1 liter

Tris base	5.8	g
Glycine	2.9	g
SDS	0.37	g

Adjust the volume to 800 ml with dH_2O

100% Methanol	200	ml

Blocking buffer

5% non fat dry milk in TBS

10x TBS washing buffer (pH 7.4) 1 liter

Tris base	30	g
NaCl	80	g
KCl	2	g
dH_2O	800	ml

Adjust the pH to 7.4 with conc. HCl

Adjust the volume to 1 liter with dH_2O

Stain 0.5% coomassei blue 500 ml

Methanol	200	ml
Acetic acid	50	ml
coomassei blue	2.5	g

Adjust the volume to 500 ml with dH_2O

Destain 500 ml

Methanol	150	ml
Acetic acid	50	ml

Adjust the volume to 500 ml with dH_2O

APPENDIX C

ZYMOGRAM AND SPECIFIC BUFFER

Table 8 Preparing the solutions for Tris/Glycine SDS-Polyacrylamide Gel Electrophoresis for zymogram

Reagents	10%Separating gel (ml)	4%Stacking gel (ml)
H2O	4.1	3
1.5 M Tris-HCl (pH 8.8)	2.5	-
0.5 M Tris-HCl (pH)	-	2.5
Gelatin/Casein	0.01 (g)	0.01 (g)
10%SDS	0.1	0.05
30% Acrylamide mix	3.25	0.7
10% APS	0.05	0.025
TMED	0.004	0.004
Total Volume	10	5

1. Renaturing protein and developing protein

After running, Washed the gel with 3 changes of 1x renaturing buffer for 15 min each. Decant the zymogram renaturing buffer and replace with 1x zymogram developing buffer. Equilibrate the gel for 30 min at room temperature with gentle agitation then replace with fresh 1x zymogram developing buffer and incubate at 37°c overnight for maximum sensitivity. Stain gel with Coomassie Blue R-250 for 30 min. Areas of protease activity will appear as clear bands aginst a dark blue background where the protease has digested the substrate.

2. Buffer preparations for zymogram

2x non reducing sample buffer 10 ml

0.5 M Tris-HCl, pH 6.8	1.5	ml
Glycerol	2.5	ml
10% (w/v) SDS	4	ml
1% Bromophenol blue	0.1	ml
dH_2O	2.15	ml

5x Zymogram running buffer (pH 8.3) 600 ml

Tris base	9	g
Glycine	43.2	g
SDS	3	g
dH_2O	500	ml

Adjust the pH to 8.3 with conc. HCl and conc.NaOH

Adjust the volume to 600 sml with dH_2O

10x Renaturing buffer 100 ml

Triton X-100	25	ml
dH_2O	100	ml

10x Developing buffer 1 liter

1 M Tris base	12.1	g
Tris-HCl	63	g
NaCl	117	g
50 mM $CaCl_2$	7.4	g
Brij-35	2	g
dH2O	1000	ml

Stain 0.5% coomassei blue 500 ml

Methanol	200	ml
Acetic acid	50	ml
coomassei blue	2.5	g

Adjust the volume to 500 ml with dH_2O

Destain 500 ml

Methanol	25	ml
Acetic acid	37.5	ml

Adjust the volume to 500 ml with dH_2O

APPENDIX D

PHAGOCYTIC ACTIVITY AND SPECIFIC BUFFER

1. Preparation of zymosan

Zymosan particles suspended in physiological saline at 4 mg/ml were placed in a boling water bath for 30 min, washed twice, and resuspended in minimum DMEM at 4 mg/ml and stored at -20°c in small aliquats until use.

2. Preparation of NBT

p-Nitro blue tetrazolium chloride was dissolved in dH_2O at a concentration of 0.2%, sterilized by passing through a membrane filter of 0.22 μm por size and stored frozen at -20°c. Prior to each experiment, the NBT solution was diluted with an equal volume of buffer containing 270 mM Nacl, 10.4 mM Na_2HPO_4, and 3.16 mM KH_2PO_4 (NBT working solution).

3. Trypan blue dye exclusion test for cell viability

Trypan blue is one of several stains recommended to use in dye exclusion procedures for viable cell counting. The method is based on the principle that viable cells do not take up certain dye, where as dead cells do.

3.1 Take a clean hemocytometer slide and fix the coverslip in place.

3.2 Aliquot 20 μl of the suspended cell culture into an appendrorf test tube.

3.3 Add 30 μl of DMEM, and 50 μl of 0.4% trypan blue solution.

3.4 Leave the mixture for 5 min. (Do not leave them for a longer period of time, or else viable cells will deteriorate and take up the stain

3.5 Load the counting chamber of the hemocytometer. Place the slide on the microscrope. The numer of unstained (viable) and stained (dead) were counted separately

3.6 Calculate the percentage of cell viability

$$\% \text{ cell viability} = \frac{\text{total viability cells (unstained)} \times 100}{\text{Total cells (stained)}}$$

4. Buffer preparations for phagocytic activity

10 mM Na_2HPO_4 100ml

Na_2HPO_4	0.142	g
dH_2O	100	ml

270 mM NaCl 100 ml

NaCl	1.58	g
dH2O	100	ml

3.16 mM KH_2PO_4 100 ml

KH_2PO_4	0.043	g
dH_2O	100	ml

0.15 M $NaCl_2$ 100 ml

$NaCl_2$	0.877	g
dH_2O	100	ml

2 M KOH 500 ml

KOH	56.11	ml
dH_2O	100	ml

BIOGRAPHY

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