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Protein interaction analysis of KaiC3 with various Kai homologs via yeast two-hybrid experiments (Growth Assay)

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We use this protocol and it's working

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Abstract

This protocol can be used to investigate protein-protein interaction via yeast two-hybrid experiments. It describes the yeast-two hybrid method relying on the activity of the histidine-synthetase. If the proteins interact, the yeast cells are able to grow on selective medium without histidine.

Materials

List of Materials

- Yeast cells (AH109)
- Frozen-EZ Yeast Transformation II Kit (Zymo Research)
- Yeast Nitrogen Base without amino acids (Formedium, CYN0401)
- Drop-out mixture (-Leu -Trp; MP Biomedicals, 114520012)
- Drop-out mixture (-Leu -Trp -his; MP Biomedicals, 114530112)
- Adenine-hemisulfate (Sigma-Aldrich, A9126)
- 3-amino-1,2,4-triazole (3-AT, Sigma-Aldrich, A8056)
- Bacto Agar (BD Diagnostics, 214010)
- D-Glucose (Roth, X997.2)

Complete supplement medium (CSM)

| Components for CSM Agar | |
|--|---------------|
| Yeast Nitrogen Base with ammonium /without amino acids | 6.7 g/L |
| D-Glucose | 20 g/L |
| Bacto Agar | 20g/L |
| Drop-Out-Mix (amino acid mixture) | 0.60-0.64 g/L |
| Adenine Hemisulfate | 50 mg/L |
| dd H ₂ O | |

- Autoclave 15 min, 121°C or filter sterilize before using

Preparation of buffers and media

- 1 Prepare
 - CSM -Leu -Trp agar (complete supplement mixture lacking leucine and tryptophan)
 - CSM -Leu -Trp -His agar (complete supplement mixture lacking leucine, tryptophan and histidine)
 - 3-AT solution, 1M

Transformation of yeast cells

- 2 Perform the transformation of yeast cells according to manufacturer's guidelines using the Frozen-EZ Yeast Transformation II Kit (Zymo Research) and select transformed cells on complete supplement mixture lacking leucine and tryptophan (CSM -Leu -Trp) at 30 °C for 3–4 days.

Restreaking of colonies

- 3
 - Prepare plates: CSM -Leu -Trp -His + 3-AT (interaction plate)
 - Determine the appropriate concentration of 3-AT by adding different concentrations of 3-AT to the interaction plate
 - Possible concentrations of 3-AT: 0 mM, 3 mM, 6.25 mM, 12.5 mM, 25 mM and 50mM
 - Let the agar cool down before adding 3-AT, it is heat sensitive
 - Mark and restreak 1-3 formed colonies from step 2 onto the interaction plates
suggestion: only use a small amount of cells for restreaking to reduce false positives
 - Wrap parafilm around the plates
 - Incubate plates at 30°C for 3-6 days
 - Use the lowest concentration of 3-AT that allows only small (<1-mm) colonies to grow after 3-4 days for further interaction plates

Growth assay

- 4
 - Prepare plates: CSM -Leu -Trp (control) and CSM -Leu -Trp -His + 3-AT (interaction plate), use determined concentration of 3-AT
 - Restreak 1 colony from step 2 onto the control plate and afterwards onto the interaction plate (reduces amount of cells and therefore false positives)
 - Wrap parafilm around the plates
 - Incubate plates at 30°C for 3-4 days
 - Result: Interaction of two proteins is positive if there is growth on both, the control and interaction plate, but without any growth of the controls on the interaction plate.