Dicty's motility

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Résumé

Dictyostelium discoideum est un modèle particulièrement pertinent pour étudier la coopération et le comportement collectif des cellules sous l'angle de l'évolution. La régulation génétique de l'agrégation cellulaire joue un rôle clé dans le comportement lié à la fitness des cellules. Cependant, les variations phénotypiques, influencées par l'environnement, ont également un impact significatif. Cette revue se concentrera sur l'impact des variations phénotypiques, en particulier la motilité et l'adhésion cellulaire, sur la fitness. Elle examinera également comment l'altération de ces caractéristiques par les conditions environnementales peut influencer l'évolution des traits au fil du temps. En tenant compte de la variabilité des processus d'agrégation, nous explorerons les mécanismes par lesquels ces traits phénotypiques influencent la fitness et comment ils peuvent être ciblés pour orienter l'évolution de l'organisme.

1 I. Weber et al. 1995

During the growth phase and early development, cells of D. discouideum are extensively spread over a surface on which the move. After 6+7 hours of starvation : cells become aggregation-competent (capacity of assembling into streams and responding chemotactically to cAMP) This is accompained by distinc changes in cell shape and locomotion. Cells become elongated. This changes are accompagned by a dramatic reduction in size of the area of contact wtween cell and substratum. [1]

Cell shape change upon contact with a substrate at the onset of the aggregation phase : Different studies of cell motility, where aggregation is possible, on surfaces that are moderately (BSA-coated glass surface) and highly adhesive (silanized glass), show that adhesion plays a role in the shape of the cells as well as in their biological activity (loss of parts of their membrane during movement), Schindl et al., 1995.

Relationship between cell shape change and the contact surface with the substrate during the chemotaxis phase : Cyclic AMP influences the cells' response to adhesion : for instance, the competition between two pseudopods, one of which is not adherent and the other is. It is the one that is not adherent to the substrate that will eventually become the leading front of the cell.

Motility of WT and mutant cells on different substrates : The AX2-WT cells do not seem to show differences in motility across different substrates (BSA coated and mica). However, the mutant cells (lacking two F-actin crosslinking proteins) behave significantly differently on mica.

2 T.J. Lampert et al.

[2]

3 SCAR knockouts in Dictyostelium : Weltman 2012

[3] coucou

4 A 30 year Perspective on microtubule-Based Motility in Dictyostelium

[4] The review focuses on the MT-based set of motors and in the compact organism DD. Collective actions of the 13 kinesins and 1 dynein Motor isoforms = plusieurs configurations d'une protéine pour une spécialisation

MT-based motilities : Most of the visual motility is dependent on the MT cytoskeleton and carefully quantitated in [5]. Les organelles sont mues par les MT, mais également durant les interphases, les MT sont essentielles.

Dynein

its deletion is lethal, and genome analysis demonstrate a single isoform of the minus-MT-end-directed cytoplasmic dynein in DD.

Kinesin

coucou

Developmentally regulated

D.D. has a vegetative growth stage, where a single amoeba crawls, feeds and divides. Starvation triggers a cAMP signaling cascade to aggregate cells into groups of about 10ˆ5 cells and initiates a developmental program to form spore-filled capsules lifted off the substrate on the top of stalks. spore-filled capsules lifted off the substrate on the top of stalks. DdKif2, ddKif7 (Kinesin 14 and Kinesin-1) do not appear to be expressed durung vegetative groxwth but mRNAs are present after 8h of starvation. Gene knockouts of either motor do no reveal any significant vegetative cell defects.[6].

Discussion

Au vu des conclusion on peut voir que Dynein jouant un rôle prépondérant dans les interphase et activités de la meiose, il est un bon candidat de marquage pour ces activités (sous réserve de faire un mutant fluo et que la production de Dynein soit suffisiament plus éleveées à ces moments).

Références

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