

Patient-derived chicken egg tumor model (PDcE model)

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Chicken egg tumor model (chick chorioallantoic membrane assay) provides a convenient and versatile animal model. To establish this model, fertilized chicken eggs are incubated for nine to ten days at which time chick embryo is surrounded by nutrient rich chorioallantoic membrane (CAM). A small window is opened on the egg shell and cancer samples are placed on top of the CAM membrane. Surprisingly, tumor is formed in three to four days. Analyses of the tumor show that the tumor contains vasculature and other structural features that closely resemble patient tumor. This model is remarkable in its simplicity and rapid tumor growth. In addition, the system is economical (one egg costs less than one dollar).

Because each tumor differs among individual patients, any cancer treatment should be individualized and tailor-made. To achieve this goal in precision medicine, patient-derived tumor models play critical roles. We have recently succeeded in using the chicken egg model as a novel patient-derived animal model. In our first attempt, we used surgery samples from ovarian cancer patients. We showed that a minced tumor sample from ovarian cancer patients could be placed on the CAM membrane resulting in tumor formation. The tumor formed in four days and resembled patient's tumor. In addition, the tumor could be eliminated by intravenous injection of anticancer drugs cisplatin or doxorubicin. In our second attempt carried out in collaboration with Dr. Manabu Muto (Kyoto University), we showed that biopsy specimens from esophageal cancer patients could be transplanted onto the CAM membrane. High success rate of transplantation was obtained. We termed this model "PDcE (patient-derived chicken egg) model". The PDcE model is a new addition to the growing list of patient-derived tumor models that include tumor organoids and PDX (patient-derived xenograft) model for precision medicine.

[References]

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