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SHORT COMMUNICATION

A new cell culture tube in diagnostic virology for virus isolation

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Abstract

Virus isolation and accurate characterization plays a crucial role in the rapid identification of the causative agents of infectious disease outbreaks especially if the causative viruses are novel where no pre-existing diagnostic reagents would be available. A new cell culture tube, named Jui Meng (JM) Cell Culture Tube, was developed to reduce the cost and improve the efficiency and biosafety of work pertaining to virus isolation. The design of the tube is based heavily on the principle of practicability, functionality, biosafety and long-term cost saving for diagnostic laboratory work in virus isolation. It is designed to culture an initial inoculum of one milliliter of culture medium containing $1X10^4$ to $1X10^5$ cells/ml.

Key words: Cell culture tube, virus isolation

To-date, even with rapid development and advancement in modern medicine and biotechnology, infectious diseases still pose a serious major health problem globally. The burden of infectious diseases is especially crucial and obvious among the developing countries. In 1998 alone, a quarter of the world's 53.9 millions deaths were due to infectious diseases, and in the developing countries, infectious diseases caused one in every two deaths. Compounded to the existing infectious disease burden, in the past two decades, the world has seen the scourge of an increase in incidence of infectious diseases due to the emergence and resurgence of deadly pathogens especially viruses where the availability of effective anti-viral agents is very limited.[1,2] The recent emergence of SARS coronavirus in southern part of China with its subsequent spread to parts of the world has seen the tremendous human suffering and huge economic loss.[3] Thus, rapid detection of emerging and re-emerging infections and prompt appropriate effective control measures are of utmost importance to minimize their impact on the health of the citizens and socio-economy of the country.

Good and up-to-date medical microbiological and pathological diagnostic laboratories play a crucial role in the early detection and accurate identification of these emerging and reemerging infectious agents, as exemplified by a number of recent outbreaks due to viruses such as Hantaan virus, Sin Nombre virus, Hendra virus, and Nipah virus.[4-7] In this regard, modern diagnostic laboratories still need to carry out the traditional work of virus isolation and accurate characterization to identify the correct causative viruses responsible for the outbreaks especially if the causative viruses are novel where no pre-existing diagnostic reagents would be available.

In this respect, a cell culture tube, named Jui Meng (JM) Cell Culture Tube, was developed to improve the efficiency and biosafety of work pertaining to virus isolation. The design of the tube is based heavily on the principle of practicability, functionality, biosafety and long-term cost saving in the field of diagnostic virology for virus isolation (Figure 1). The tube is specifically designed to culture an initial inoculum of one milliliter of culture medium containing $1X10^4$ to $1X10^5$ cells/ml. Every curved (convex and concave), flattened, indented or spiraled surface of the tube has a functional implication or inbuilt application.

Extra spiral "thread" is added near the opening of the tube to have a better hold of the tube-cap. It also serves to retard the backflow of culture fluid should the tube be dropped or tilted upside down accidentally when the screw-cap is not tightly in-place.

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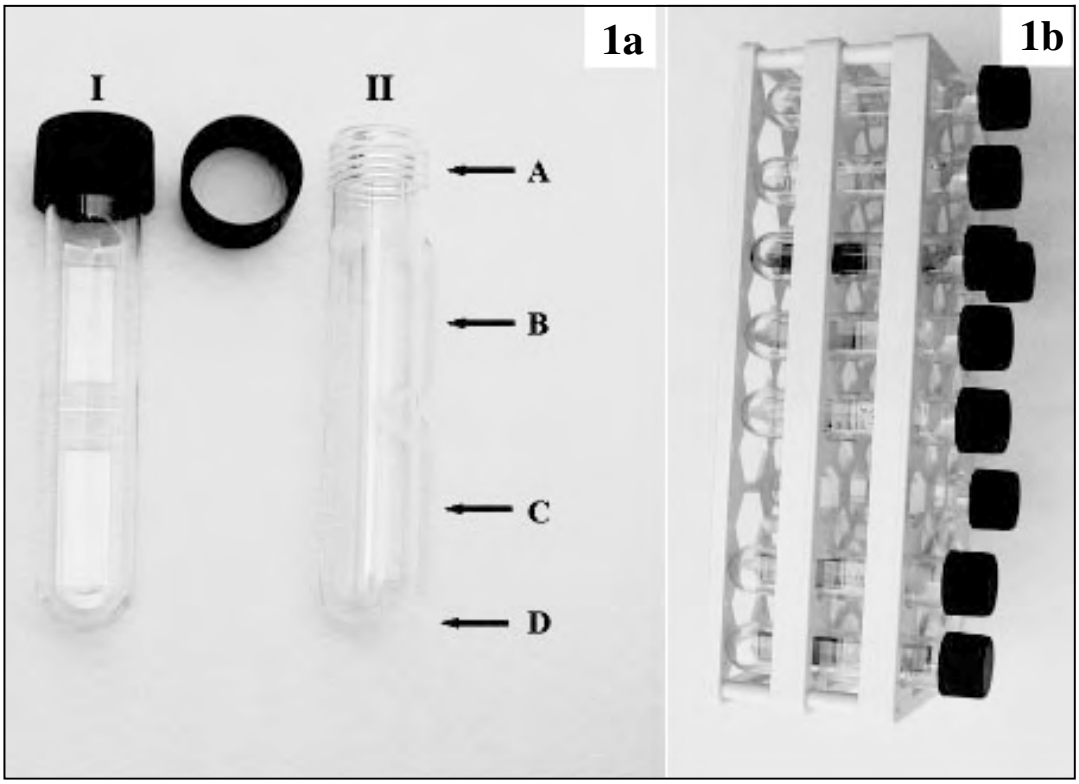

FIG. 1: JM cell culture tubes (Fig. 1a) and a specially designed rack to hold up to 24 tubes (Fig. 1b). Tube I is resting on its bottom surface and tube II is resting on its lateral surface (Fig. 1a). A indicates an extra number of added "thread" to hold the tube cap firmly, B indicates the front chamber, C indicates the rear chamber and D indicates the distal end of JM tube (Fig. 1a).

The tube contains two flat surface chambers to hold culture fluid. The rear chamber is able to hold up to 1.5 millilitre of fluid and has a flat bottom surface of 3 centimetre square surface area for culturing cells to be used for virus isolation. The front chamber is an added feature to stabilize the tube on placing the tube on any flat surface and also serves to contain any excess fluid spillover from the rear chamber.

The flat top surface improves viewing of cells on the flat bottom surface of the rear chamber by reducing light refraction passing through curve surfaces. It also allows easier labeling of the tube on the surface.

The rear end of the tube is concave for a better drainage and collection of culture fluid when the tube is placed in the upright position so that complete aspiration of fluid can be achieved.

The lateral surfaces remain concave for ease of pouring out culture fluid when needed.

The length of the tube is kept to a minimal but still of optimal length so that the culture fluid of 1.5 ml would not reach the tube opening should it be accidentally placed on its lateral side.

The opening diameter of the tube is adjusted for an easier operation to reduce the risk of contacting the surface during the process of inoculating samples into the tube for virus isolation and removing culture fluid from the tube by aspiration using a Pasteur pipette.

As the tube is specifically designed to culture cells for virus isolation, a plastic rack has been specially designed and developed to hold up to 24 tubes. The rack with the neatly packed tubes can be securely placed in the incubator.

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To honour Yang Berhormat Dato' Chua Jui Meng, Minister of Health of Malaysia from 1995 to 2004, for his outstanding contributions to the health care services in Malaysia, we have named the cell culture tube after him. We thank him for his kind acceptance.

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