EVALUATION OF COPAN UNIVERSAL TRANSPORT MEDIA (UTM-RT) COMPARED TO REMEL M4 AND M4-RT TRANSPORT MEDIA FOR THE RECOVERY OF VIRUSES, CHLAMYDIA, UREAPLASMA AND MYCOPLASMA.

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Updated Abstract

Objective: To compare the recovery of viruses, Chlamydia trachomatis, Ureaplasma urealyticum, Mycoplasma hominis and Mycoplasma pneumoniae using Universal Transport Media (UTM-RT) (Copan Italia, Brescia, Italy) compared to Micro Test M4 (M4) (Remel, Lenexa, KS) and Micro Test M4-RT (M4-RT) (Remel, Lenexa, KS) transport media.

Methods: Simulated specimens were made using three different concentrations of laboratory stock strains of Herpes Simplex Virus (HSV) types 1 and 2, acyclovir-resistant HSV2, Cyto megalovirus (CMV), Varicella-Zoster Virus (VZV), Echovirus 13 (E13), Influenza type A (Flua), Respiratory Syncytial Virus (RSV), Chlamydia trachomatis (CT), Ureaplasma urealyticum (UU), Mycoplasma hominis (MH) and Mycoplasma pneumoniae (MP) by diluting them into three sets of each transport media. Immediately after preparation of these specimens, a portion from each inoculated transport was added to appropriate tissue culture (UU/MH into 10B/arginine broth and A7 plate; MP into SP-4 Glucose Diphosphoric broth) to establish baseline recovery data for each specimen.

For each specimen tested, the first set of transports was held at 4°C throughout the study; the second set was held at RT for 8 hrs, cultured and then placed at 4°C for the remainder of the study. The final set, consisting of only the UTM-RT, was held at RT throughout the study. All sets of transports were cultured at 24, 48, 72 and 120 hrs after initial preparation. A third set consisted only of UTM-RT, which was held at RT throughout the evaluation and cultured after 24, 48, 72, and 120 hrs. Cures were scored quantitatively for all strains of HSV, CMV and CT, and semiquantitatively (0-4+) for growth of VZV, UU and MH. All cultures were performed in accordance with LabCorp Standard Operating Procedures.

Results: For all organisms except CT, each inoculated transport system demonstrated good recovery rates up to 72 hrs when the transport was held at 4°C, even if first held at RT for 8 hrs. However, CT showed a decrease in recovery within 24 hrs in all transport systems held at RT for any amount of time. UTM-RT showed a reduction in recovery of HSV and UU when held at RT for 48 hrs, and for MH when held for 24 hrs at RT. CMV and VZV did not show any reduction in recovery in UTM-RT until held at RT for 120 hrs. M4-RT did not support the recovery of UU, MH and MP under any condition.

Conclusion: The Copan UTM-RT performed as well as the Remel M4 and M4-RT in the recovery of the organisms tested within 48-72 hrs if held at 4°C. Extended RT simulated transport of UTM-RT demonstrated some decrease in recovery of all organisms. This shows better recovery for CT and the viruses tested than the data submitted to the FDA for product clearance using ATCC virus strains. From our comparative study, we have demonstrated that pre-inoculation storage of transports at room temperature (RT) and RT transport for up to 24 hrs post-specimen inoculation using UTM-RT allows for better and consistent recovery of the organisms tested. UTM-RT allows for RT storage prior to specimen collection, limited RT transport after specimen inoculation, and a one-transport system for the recovery of viruses, CT, UU, MH and MP. Evaluation of additional organisms with UTM-RT is continuing.

Rationale

Transport systems are an important factor influencing the recovery of viruses, chlamydia, mycoplas mas and ureaplasma from clinical specimens. This makes the viable of these microorganisms from the time of the specimen collection until the time of inoculation into culture is a critical requirement of a good transport device.

The temperature at which transport systems are stored prior to use and then after the specimen is collected has become an issue with many hospital and office-based physicians. As a variety of different transport systems have become available for room temperature (RT) storage prior to use, increasing numbers of customers are desirous of using these to submit specimens for culture.

The commercial availability of Copan Universal Transport Media (UTM-RT) prompted our laboratories to evaluate its performance compared to the transport systems we are currently providing to our customers. The ability to store the UTM-RT at RT prior to use, the fact that it is approved for the isolation of viruses and chlamydia as well as mycoplasmas and ureaplasma, and the potential for RT transport after specimen collection were all areas we wanted to evaluate.

Objectives

• To compare the recovery of viruses, Chlamydia trachomatis, mycoplasmas and ureaplasma using Copan Universal Transport Media (UTM-RT) compared to Remel Micro Test M4 (M4) and Micro Test M4-RT (M4-RT) transport media.

• Evaluate the impact on organism recovery of varying simulated transport delays prior to subsequent culture inoculation.

• Evaluate the impact of storage and transport temperatures prior to use & after specimen collection.

Materials and Methods

Simulated specimens were made using three different concentrations of laboratory stock strains of Herpes Simplex Virus (HSV) types 1 and 2, acyclovir-resistant HSV2, Cyto megalovirus (CMV), Varicella-Zoster Virus (VZV), Echovirus 13 (E13), Respiratory Syncytial Virus (RSV), Influenza A Virus (Flua), Chlamydia trachomatis (CT), Ureaplasma urealyticum (UU), Mycoplasma hominis (MH) and Mycoplasma pneumoniae (MP) by diluting them into three sets of transport media. Immediately after preparation of these specimens, a portion from each inoculated transport was added to appropriate tissue culture (UU/MH into 10B/arginine broth and A7 plate; MP into SP-4 Glucose Diphosphoric broth) to establish baseline recovery data for each specimen.

For each specimen tested, the first set of transports was held at 4°C throughout the study; the second set was held at RT for 8 hrs, cultured and then placed at 4°C for the remainder of the study. The final set, consisting of only the UTM-RT, was held at RT throughout the study. All sets of transports were cultured at 24, 48, 72 and 120 hrs after initial preparation. Cures were scored quantitatively for 4 strains of HSV, CMV, CT, E13, RSV and Flua and semiquantitatively (0-4+) for growth of VZV, UU, MH and MP.

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Selected systems killed by the antibiotics in the M4-RT transport medium. Additionally, the RT designation has been misleading to the end user. The UTM-RT demonstrated a decrease in recovery for most of the organisms in this study. From our comparative study, we have demonstrated the UTM-RT, which is FDA-cleared for RT storage prior to as well as after specimen collection, can be transported post-specimen inoculation for up to 24 hrs with good to excellent recovery of the organisms tested.

Since the introduction of M4-RT to the marketplace, we have had increasing demands from clinic customers for a multi-organism transport, similar to M4, that can be maintained at room temperature. Unfortunately, M4-RT cannot be used for Mycoplasma or Ureaplasma. Due to its similarity with M4, however, this limitation causes confusion and incorrect submission of specimens for recovery of organisms that are killed by the antibiotics. The M4-RT transport medium. Additionally, the RT designation has also led to a misunderstanding by customers that the M4-RT transport device can be appropriately transported at room temperature after specimen collection, even though refrigerated transport is required by the manufacturer.

UTM-RT is a one-transport system the meets the demand for clinician convenience for a transport that can be held at room temperature prior to as well as after specimen collection for viruses, Chlamydia, mycoplasmas and ureaplasma. This transport system eliminates the need for refrigerated storage and demonstrates excellent recovery of viruses, Chlamydia, mycoplasmas and ureaplasma. Evaluation of additional testing platforms with UTM-RT is continuing.

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Figure 1. Comparison of Recovery Rates for Herpes Simplex Virus Type 1 (HSV1)

Figure 2. Comparison of Recovery Rates for Herpes Simplex Virus Type 2 (HSV2)

Figure 3. Comparison of Recovery Rates for RHSV2

Figure 4. Comparison of Recovery Rates for Cytomegalovirus (CMV)

Figure 5. Comparison of Recovery Rates for Varicella-Zoster Virus (VZV)

Figure 6. Comparison of Recovery Rates for Echovirus 13 (E13)
Viral Recovery in Transport Media

Figure 7. Comparison of Recovery Rates for Respiratory Syncytial Virus (RSV)

Figure 8. Comparison of Recovery Rates for Influenza A Virus (FluA)

Chlamydia, Ureaplasma and Mycoplasma Recovery in Transport Media

Figure 9. Comparison of Recovery Rates for Chlamydia trachomatis (CT)

Figure 10. Comparison of Recovery Rates for Ureaplasma urealytica (UU)

Figure 11. Comparison of Recovery Rates for Mycoplasma hominis (MH)

Figure 12. Comparison of Recovery Rates for Mycoplasma pneumonia (MP)