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Technical Bulletin

Using PCR to Detect Viral Agents in Animal Sera

The polymerase chain reaction (PCR) first described in 1985 is a simple, rapid and powerful method of amplifying specific DNA or RNA sequences. PCR is used in a wide variety of fields including molecular biology, medical science, biotechnology, microbiology, the food industry, genetics, gene cloning and virology.

PCR is especially suited for detecting the presence of nucleic acid targets of specific organisms in biological material. Viruses have specific DNA or RNA sequences that are unique to that particular virus. The PCR technique is utilized to produce large amounts of a specific nucleic acid sequence (DNA/RNA) in a series of temperature-mediated enzymatic and molecular reactions. Beginning with a single molecule of the genetic material, more than a billion similar copies can be synthesized. By testing for the presence or absence of a unique sequence in a sample, PCR can be used as one of the methods to determine if a sample contains a nucleic acid target of a specific organism.

PCR is a very rapid and simple way of producing relatively large numbers of copies of DNA or RNA sequences, but it does have limitations that should be taken into consideration when screening for the presence of viral materials. Because PCR detects the absence or presence of a nucleic acid target, it will detect nucleic acids from both viable and non-viable viral material, without distinguishing between the two.

One strategy for overcoming the inability of PCR to distinguish between viable and non-viable viral material is to pass the sample through a susceptible cell line prior to PCR testing. Multiple passages will amplify low levels of viable virus material, thus increasing the sensitivity of the assay. In addition, the passages will effectively remove non-viable virus material through dilution. The greater the number of passages, the more likely a positive PCR result will be due to viable viral material.

Although all materials used by SAFC Biosciences are rigorously pre-screened for extraneous agents according to strict federal regulations, low levels may exist that are below the threshold of detection by current test methodology. These levels can be detected by PCR, but because of its limitations it may not be known whether the detected nucleic acids are from viable or non-viable viral material.

SAFC Biosciences currently offers its SER-TAIN™ gamma radiation process, which has been shown to inactivate up to 6 logs of many biological contaminants. This validated process provides greater assurance that any existing low levels of microbes will be inactivated or reduced and the risks associated with animal-derived components are minimized. Further more, the SER-TAIN™ gamma irradiation process provides greater assurance that any viral nucleic acid sequences detected by PCR are from non-viable viral material.

For more information about this subject or other SAFC Biosciences' products and services, please contact our Technical Services department.

References

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