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Molecular detection of life

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Since humans discovered that earth is not the only planet in this universe, the quest for finding life in outer space has been intensified. Initially due to lack of technology, only the obvious signs of life for example, presence of water was considered. But today, due to technological advancement, the base for a life, the biosignatures such DNA, RNA can be detected using molecular techniques. Most of these molecular techniques require manual implementation. But in recent days, scientists have been designing a system that can carry out molecular assays that can be fitted into the unmanned vehicles such as rovers. One such system is the signs of life detection (SOLID). SOLID detects life using a technique called microarray immunoassay. In this technique, the test sample is processed and added over the microarrays and the presence or absence of DNA or RNA is detected using the antibodies that contain fluorochromes which fluoresce on exposure to laser light. SOLID can perform two types of immunoassay, One is sandwich microarray immunoassay, which is usually done for detecting whether the bio-signature is present or not. In this microarray each tiny well of the microarray plate is filled with designed primary antibodies or antigens. The analyte to be tested for the presence of biosignature is then allowed to bind with primary antibodies in the well. After incubating the mixture of analyte and primary antibody or antigen, secondary antibodies containing the fluorochromes are added to allow binding with the already attached analyte, hence sandwiching it. If there is a biosignature then that will be sandwiched between the primary and secondary antibodies and it will fluoresce on exposure to a laser which is detected by a detector. The second approach is competitive microarray immunoassay which is used for detecting whether the biosignature present is extant or extinct. In this method, microarray wells containing the antibodies and labelled antigen are mixed together with the interested analyte. At this stage the energy is released upon antibody and antigen interaction, the intensity of which is measured by a laser beam. The analyte will compete with the already bound labelled antigen. If the unlabelled analyte takes the place of the labelled antigen, the intensity of fluorochrome excited will be reduced and if none of the labelled antigen is replaced then the intensity will be the same. If the intensity of fluorescence is less than the blank then the identified biosignature is extant (still in life) and if the intensity is unvaried then the biosignature is extinct. Further advancements in the field of molecular biology and techniques hold a promising future that can not only assist in discovering life on other planets but can also solve the mystery of origin of life.

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