The Lymphocyte proliferation (transformation) test (LTT) in the laboratory diagnosis

The LTT is currently the only laboratory method for the determination of a specific cellular sensitisation. The test was first described in 1960 and due to the development of cell culture techniques and analysis methods it has since emerged as a reproducible and highly sensitive method in the biomedical research as well as in the routine diagnostics.
It is based on the principle of the specific antigen (allergen) induced lymphocyte cell division following contact with the corresponding antigen. A positive reaction proves the existence of antigen specific lymphocytes (memory cells) in the patient's blood. The newly optimised LTT variants have attained an enhanced sensitivity and specificity through the addition of a genetically manipulated interferon-alpha to the cell culture.

What differentiates the LTT of nowadays from previously used methods?

Only a few years ago the LTT had a relatively low sensitivity and was in all cases equivalent to the skin tests if not even inferior to them. Its diminished specificity, identifiable in the numerous equivocally positive reactions, made the result interpretation difficult. This has substantially changed in the course of the last 5 years. The currently applied LTT-technologies in immunology specialised laboratories are very reliable and are distinguished by high sensitivity and specificity. The further development in the cell culture techniques and media, the quality of the antigens used for cell stimulation and not at least the considerably improved measurement methods have all contributed to that. The liquid scintillation equipment previously used in the 3H-thymidine activity measurement has been replaced by modern solid phase beta counters, that render any subsequent processing of the allergen stimulated cells unnecessary. In addition, the LTT is nowadays performed with the so-called microculture technology, which enables replicate determinations for each allergen and leads to a significant increase in the validity of the results.
Similarly, the use of interferon-alpha in the cell culture (von Baehr et al. 2001) and the availability of special cell culture plates from the modern biotechnological research have contributed to the development of the microculture technology.
The LTT in its currently available implementation form represents a laboratory method that has established itself in the medical diagnosis of many different kinds of disease states. However, its use should also be challenged in the future, so that the latest knowledge acquired through research, likewise Molecular biology, is tested out and put in practice in medical laboratories.

The LTT is a laboratory method, that requires, beside a cost-intensive modern technical laboratory equipment, a largely experienced and accurate laboratory staff. Because of that, the investigation is up to now only performed in specialised laboratories and institutes.

The spectrum of indications encompasses four important areas of medical diagnostics:
Diagnosis or exclusion of:
- Cell mediated sensitisation (Type IV Allergy)
- Defects and function disorders of the immune system
- Tissue compatibility/incompatibility (Transplantation medicine)
- Lymphocyte reactivity toward infectious agents (i.e. Borrelia)

For the introduction and use of the LTT in the allergy diagnostics and due to the diversity of the allergens and antigens in question it was necessary to define investigation blocks, that specifically address the clinical presentation of the patient or specific clinical problems and constellations.

The following topics can be investigated with LTT:
- Determination of the individual immune competence by means of the LTT (LTT-Immune function)
- Monitoring of immune stimulating treatments

- Diagnosis of active infection with Borrelia
- Dentures intolerance through cellular sensitisation
- Diagnosis of individual intolerance toward foreign substances (Xenobiotica) by means of LTT.

For further information

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