Claims

1. Detection method using recombinant living cells (19) for detecting xenobiotic substances (03) which, when they come into contact with the living cells (19), effect, via at least one promoter P_1 which is active in the living cells (19), an activation or upregulation of the expression of at least one gene sequence section a_i which codes for at least one functional protein A_i of known function, wherein the gene sequence section a_i is recombinantly modified by fusion with at least one marker protein gene m_i which codes for at least one marker protein M_i with known marker properties which does not influence the coding of the functional protein A_i, and the gene fusion construct a_i-m_i codes for a fusion protein A_i-M_i of the at least one functional protein A_i and the at least one marker protein M_i, and wherein an increased occurrence of the at least one marker protein M_i as a cell reaction is determined integrally by detection of the known marker properties.

2. Detection method according to claim 1,
characterized in that xenobiotic substances (03) which are of toxic and/or unknown nature and/or which occur in concentrations that are not toxicologically relevant are detectable.

3. Detection method according to either claim 1 or claim 2,
characterized in that xenobiotic substances (03) in the vicinity of technical installations (02) and/or in aquatic systems (01) are detectable.

4. Detection method according to any of the preceding claims,
characterized in that different gene sequence sections a_i which code for different functional proteins A_i are recombinantly modified with marker protein genes m_i which code for marker proteins M_i with different marker properties, and the gene fusion constructs a_i-m_i code for different fusion proteins A_i-M_i, a conclusion being drawn about the increased coding for the corresponding functional proteins A_i by detection of the different marker properties.

5. Detection method according to any of the preceding claims,
characterized in that the at least one gene sequence section a_i that is activated or upregulated in terms of its expression by a xenobiotic substance (03) is a gene sequence section which codes for the defense and detoxification mechanisms of the living cells (19), the encoded functional protein A_i in the fusion proteins A_i-M_i being a member of the family of

the ABC transporter proteins, the function of which is the membrane transport of foreign substances.

6. Detection method according to claim 5,
characterized in that the gene sequence section a_i codes for a functional protein A_i in the fusion proteins A_i-M_i in the form of a multidrug resistance protein (MDR transporter protein) and/or of a multidrug resistance-associated protein (MRP transporter protein) from the family of the ABC transporter proteins.

7. Detection method according to claim 6,
characterized in that it is concluded in the case of an increased occurrence of MDR transporter proteins as the cell reaction that a xenobiotic substance (03) having uncharged molecules with chain lengths in the same order of magnitude is present and in the case of an increased occurrence of MRP transporter proteins as the cell reaction that a xenobiotic substance having charged molecules with chain lengths between 100 Da and 8 kDa, preferably between 1 and 3 kDa, particularly preferably between 1.5 and 2.5 kDa, is present.

8. Detection method according to any of the preceding claims,
characterized in that marker proteins M_i having fluorescence as the marker property are used, at least the fluorescence wavelength and/or the fluorescence intensity being detected.

9. Detection method according to claim 8,
characterized in that marker proteins M_i from the family of the green fluorescent proteins (GFP) or their fluorescent homologs or derivatives or mutants of those GFPs are used.

10. Detection method according to any of the preceding claims,
characterized in that the living cells (19) originate from an aquatic organism (06) which already has the living cells (19) or from a non-recombinant aquatic original organism, it being possible for the organism to preferably be a crustacean, a cnidarian, a sea anemone, a sea urchin, a sponge or a round- or flat-worm, particularly preferably the flatworm *Macrostonum lignano*.

11. Detection method according to any of the preceding claims,
characterized in that at least a complete living aquatic organism (06) which has the living cells (19) is used, it being possible for the organism to preferably be a crustacean, a

cnidarian, a sea anemone, a sea urchin, a sponge or a round- or flat-worm, particularly preferably the flatworm *Macrostonum lignano*.

12. Detection method according to either claim 10 or claim 11,
characterized in that the aquatic organism (06) used is at least partially transparent.

13. Detection method according to any of the preceding claims,
characterized in that the detection is performed in an automated manner as an optical detection.

14. Test kit for performing the detection method according to any of claims 1 to 13, comprising a means based on recombinant living cells (19),
characterized by a configuration in the form of living cells (19) having at least one gene fusion construct a_i-m_i of a gene sequence section a_i which codes for at least one functional protein A_i from the family of the ABC transporter proteins, and a marker protein gene m_i which codes for at least one marker protein M_i from the family of the green fluorescent proteins (GFP) which does not influence the coding of the functional protein A_i, the gene fusion construct a_i-m_i coding for a fusion protein A_i-M_i of the functional protein A_i and the marker protein M_i.

15. Test kit according to claim 14,
characterized in that the living cells (19) are derived recombinantly from a non-recombinant aquatic original organism, preferably from a crustacean, a cnidarian, a sea anemone, a sea urchin, a sponge or a round- or flat-worm, particularly preferably from the flatworm *Macrostonum lignano*.

16. Test kit according to either claim 14 or claim 15,
characterized in that the living cells (19) are derived recombinantly from non-recombinant cell cultures or immortalized cell lines.