Scintillation proximity assay

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Principle of SPA

- Scintillation proximity assay (SPA) is an application of scintillation counting that facilitates automation and rapid throughput of experiments.
- It is therefore highly suited to work such as screening for biological activity in new drugs.
- The beads for SPA are constructed from polystyrene (or sometimes other materials) that combine a binding site for a molecule of interest with a scintillant.
- Some types of radiation do not travel far, in particular β-particles from weak energy emitters such as 3H and 14C.
- If molecules containing such radioisotopes are in solution with a suspension of SPA beads, the radiation does not stimulate the scintillant in the beads and cannot be detected efficiently by a scintillation counter.
- This is because the radiation is absorbed by the solution; it does not reach the scintillant.
- If, on the other hand, the radioisotope becomes bound to the bead, it is close enough to stimulate the scintillant in the bead, so light is given out and the isotope is detected.

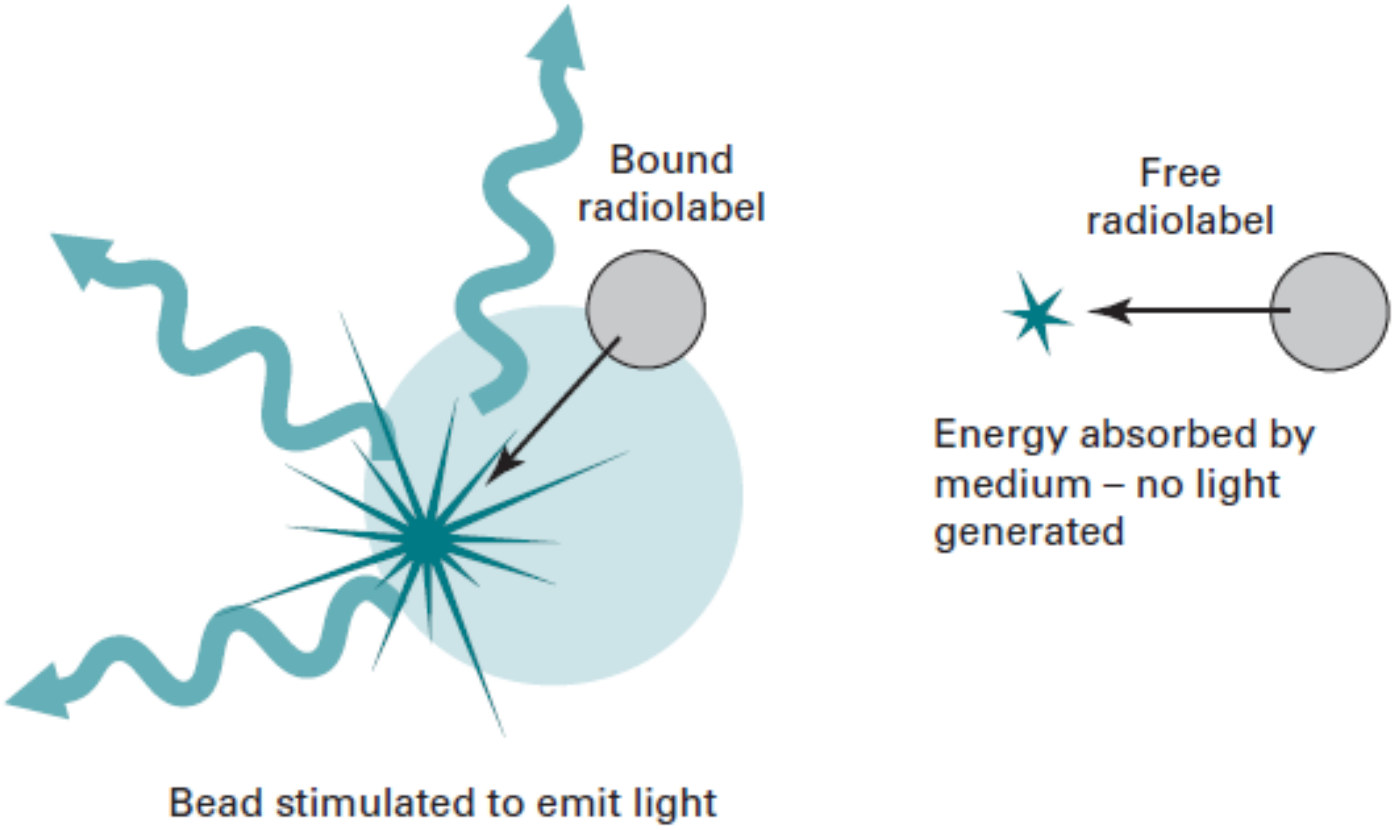

Fig. 14.9 The concept behind SPA. (Reproduced by courtesy of Amersham Biosciences.)

Applications

- There are many applications of this technology such as enzyme assays and receptor binding, indeed any situation where we want to investigate the interaction between two molecules.
- Take receptor binding as an example. In this case a receptor for a particular ligand (such as a drug or hormone) is attached to the SPA beads.
- The ligand is radiolabelled and mixed with the beads. Any ligand that binds will stimulate the scintillant and be counted.
- If the researcher wishes to investigate chemicals that might interface with this binding (which is the mode of action of many medicines), they can be added at increasing concentration to study the effect and, for example, determine optimum dosage.

Table 14.4 **Advantages of scintillation proximity assay**

Versatile: use with enzyme assays, receptors, any molecular interactions
Works with a range of appropriate isotopes such as ^{3}H, ^{14}C, ^{35}S and ^{33}P
No need for separation step (e.g. free from bound ligand)
Less manipulation therefore reduced toxicity
Amenable to automation