🔬 IIT-Kanpur Develops Biosensor to Track GPCR Activation

📍 Background

- **G-protein coupled receptors (GPCRs) are one of the most important protein families in the human body.**
- **They play a vital role in transmitting signals from hormones, neurotransmitters, and drugs to the inside of cells.**
- **Over 30–40% of modern drugs act by targeting GPCRs (used in conditions like hypertension, psychiatric illness, asthma, and cancer).**
- **However, studying their *real-time activation inside living cells* has been a major scientific challenge.**

🧪 The Innovation

- **A team of researchers at IIT-Kanpur has developed an antibody-based biosensor.**
- **This biosensor can track the activation of GPCRs in live cells.**
- **Key feature: It works without interfering with the receptors' normal functioning.**
- **Mechanism:**
    - **The sensor lights up with luminescence/fluorescence when GPCRs are activated by a ligand (drug or natural molecule).**
    - **This allows scientists to "watch" how receptors respond in real time.**

🌍 Why This Matters

1. **Drug Discovery & Development**
    - **Can help pharma companies design better GPCR-targeted drugs.**
    - **Provides a faster, more precise screening method for new molecules.**
2. **Reduced Side Effects**
    - **By observing how drugs activate receptors in living cells, researchers can predict and minimize off-target effects.**
3. **Biomedical Research**
    - **Offers insights into diseases linked with GPCR malfunction (neurological, cardiovascular, endocrine, etc.).**

🏥 Potential Applications

- **Development of safer psychiatric drugs (schizophrenia, depression).**
- **Monitoring cancer therapies that rely on GPCR pathways.**
- **Understanding metabolic diseases (like diabetes) where GPCRs regulate insulin and other hormones.**
- **Could be scaled up for high-throughput screening in pharmaceutical labs.**

📢 Expert View

Researchers highlighted that this innovation bridges a critical gap in GPCR research—allowing live, non-invasive, and real-time monitoring. This could put India on the map for frontline drug-discovery technologies.