**TP53 in Biomarker Discovery**

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Github Repo: <https://github.com/AlatiseMB/TP53-in-Biomarker-Discovery.git>

**Introduction**

TP53 gene codes for the p53 protein – a transcription factor, which is an anti-oncogene (tumor suppressor) involved in signaling pathways of cellular activities. It controls the output of many biological processes: cell cycle arrest, senescence, DNA repair, and apoptosis either directly as a transcription factor or by interacting with other proteins adapting its response to the type of cellular stress signal received(Hernández Borrero & El-Deiry, 2021).

Biomarkers - biological molecules produced by tumor cells or the body’s response to the tumor, can be found in tissues and body fluids (blood, urine, stool, saliva). Its serum levels helps in clinical screening, diagnosis, prediction, and evaluating treatments of different human cancers(Zhou et al., 2024).

**Importance in the field of Biomarker Discovery**

TP53 - present in all body cells regulates cell division; its response is flexible and depends on the cell type, its differentiation state, stress conditions, and surrounding environmental signals(Kastenhuber & Lowe, 2017). It is inactivated when the 2 copies (loss-of-function) are either mutated or deleted leading to uncontrolled cell division. Mutations either hereditary or somatic are found across variety of cancer types: colorectal, head & neck, esophageal, female genital organs (cervical, ovarian, uterine, vaginal & vulvar), lung and pancreas. p53 appropriate activation is very essential for regulating stress signal to its corresponding biological response outcome to prevent cancer formation (Hernández Borrero & El-Deiry, 2021).

Being among the most frequently mutated gene in human cancer, identifying biomarkers associated with TP53 mutations is very important in both clinical practice and cancer research: early detection especially cancers with high mortality, improve the effectiveness of screening in combination with other methods (tissue biopsy and endoscopy), biomarker panels to improve specificity of diagnosis, identify effective treatment strategies, distinguish patients most likely to respond to anticancer therapy and monitoring the recurrence of tumors(Zhou et al., 2024).

**Conclusion**

Progress are been made in the discovery and application of biomarkers in clinical application - early screening, diagnosis, prognosis, recurrence monitoring, which prolong patient’s life, survival and improve their quality of life. There are advances in molecular biology to find new biomarkers with the right degree of sensitivity, specificity, accuracy and reliability for cancer patients’ management.

**References**

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