



Keywords:

Introduction

1 .

2,3 .

- **Metabolomic biomarkers:**

- **Epigenetic biomarkers:**

Cutting-edge technologies in toxicity biomarker research

- **Omics technologies:**

- **Biosensors:**

Challenges and future directions

- **Complexity of Interactions:**

Conclusion

.5x x x 0.5x1x - 1 -0.0 x
xx x , .13 x .25 x .5 x