QSAR model for Estrogen Receptor Alpha (ERα) antagonism (v1.0)

ProtoED

ProtoED is a computational tool designed to predict whether a compound will act as an agonist or antagonist on various hormonal receptors, facilitating the assessment of the compound's potential to disrupt the endocrine system.

By employing QSAR models, ProtoED offers an efficient alternative to experimental assays by enabling rapid and accurate predictions of compound-receptor interactions, serving as a valuable tool in chemical and pharmacological research.

This module promotes the use of alternative methods, helping to reduce the need for *in vivo* testing and supporting decision-making processes regarding potential risks to human health and the environment.

Endpoint

Human health effects: Estrogen receptor alpha antagonism.

Estrogen receptor alpha (ERα) is a member of the nuclear receptor superfamily of transcription factors whose activity is primarily regulated by binding of estrogen/estradiol (E2). E2 plays an indispensable role in growth, development, reproduction, and maintenance of numerous physiological systems in mammals. Estrogen receptor alpha antagonism occurs when substances bind to ERα but do not activate it. Instead, they competitively inhibit the binding of endogenous estrogens, thus blocking the receptor-mediated transcriptional response. This mechanism can disrupt normal estrogenic signaling pathways and may have therapeutic or endocrine-disruptive implications.

Metrics

Training set

Experimental values	QSAR predictions	
	inactive	**antagonist**
inactive	360	106
antagonist	85	401

Validation set

Experimental values	QSAR predictions	
	inactive	**antagonist**
inactive	114	45
antagonist	28	135

Parameters	Training	Validation
Accuracy	0.80	0.77
Sensitivity / recall	0.83	0.83
Specificity	0.77	0.72
Precision	0.79	0.75
Negative predictive value	0.81	0.80
F-score	0.81	0.79
Matthews Correlation Coefficient	0.60	0.55
Critical Success Index	0.68	0.65
Area under the ROC	0.80	0.77