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

ProtoED

ProtoED is a computational (*in silico*) tool focused on the prediction of endpoints related with the toxicity of chemical substances. It includes a variety of *in vitro* and *in vivo* tests in humans, animals, microorganisms and cell lines.

ProtoED mainly includes, but is not limited to, endpoints used by REACH, a European Union regulation, adopted to improve the protection of human health and the environment from the risks that can be posed by chemicals, while enhancing the competitiveness of the EU chemicals industry.

Endpoint

Human health effects: Estrogen receptor alpha agonism

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 agonism is a process where certain substances, including endogenous estrogens or synthetic estrogenic compounds, bind to the ERα. Upon activation, ERα initiates transcriptional regulation of estrogen-responsive genes involved in development, metabolism, and cell proliferation.

Metrics

Training set

Experimental values	QSAR predictions	
	inactive	agonist
inactive	672	73
agonist	73	607

Validation set

Experimental values	QSAR predictions	
	inactive	agonist
inactive	224	97
agonist	83	209

Parameters	Training	Validation
Accuracy	0.90	0.71
Sensitivity / recall	0.89	0.72
Specificity	0.90	0.70
Precision	0.89	0.68
Negative predictive value	0.90	0.73
F-score	0.89	0.70
Matthews Correlation Coefficient	0.79	0.41
Critical Success Index	0.81	0.54
Area under the ROC	0.90	0.71