ABSTRAK

Kanker payudara adalah suatu tumor ganas yang menyerang sel pada payudara dan dapat tumbuh di sekitar jaringan atau bermetastasis ke bagian tubuh lainnya. Ekspresi reseptor estrogen alfa (REα) yang melebihi normal merupakan salah satu penyebab terjadinya kanker payudara. Setiawan (2015) telah melakukan penelitian mengenai uji *in silico* senyawa 2,6-dihidroksiantraquinon sebagai ligan pada REα menggunakan protokol Penapisan Virtual Berbasis Struktur (PVBS) yang telah divalidasi oleh Setiawati *et al.* (2014) dan dilanjutkan *post-docking analysis* oleh Istyastono (2015). Hasil penelitian menunjukkan senyawa 2,6-dihidroksiantraquinon tidak aktif sebagai ligan pada REα. Penelitian ini bertujuan untuk mendapatkan desain modifikasi struktur 2,6-dihidroksiantraquinon yang aktif sebagai ligan pada REα menggunakan protokol PVBS yang telah divalidasi oleh Setiawati *et al.* (2014) dan dilanjutkan dengan *post-docking analysis* oleh Istyastono (2015).

Kemampuan senyawa desain modifikasi struktur 2,6-dihidroksi-antraquinon sebagai ligan pada REα diuji menggunakan protokol PVBS. Hasil penambatan dianalisis menggunakan *decision tree* melalui metode *Recursive Partition and Regression Tree* (RPART). Visualisasi pose ikatan desain modifikasi struktur 2,6-dihidroksiantraquinon pada kantung ikatan REα menggunakan PyMOL1.7.0.0. Apabila telah didapatkan desain modifikasi struktur 2,6-dihidroksiantraquinon yang aktif sebagai ligan, dilanjutkan dengan analisis diskoneksi dan penentuan jalur sintesis.

Hasil penelitian menunjukkan senyawa 2,6-*dihydroxy*-3-*(hydroxymethyl)*-7-*(*3-*hydroxypropyl)*-9,10-*dihydroanthracene*-9,10-*dione*, 2-*hydroxy*-6-*(hydroxy-methyl*)-3-*(*3-*hydroxypropyl)*-9,10-*dihydroanthracene*-9,10-*dione*, 6-*hydroxy*-2-*(hydroxymethyl)*-3-*(*3-*hydroxypropyl)*-9,10-*dihydroanthracene*-9,10-*dione*, 2-*hy-droxy*-6-*(*2-*hydroxyethoxy)*-9,10-*dihydroanthracene*-9,10-*dione*, dan 2,6-*bis(*4-*hydroxyphenoxy)*-9,10-*dihydroanthracene*-9,10-*dione* merupakan desain modi-fikasi struktur 2,6-dihidroksiantraquinon yang aktif sebagai ligan pada REα.

Kata kunci: kanker payudara, reseptor estrogen alfa, desain modifikasi struktur, 2,6-dihidroksiantraquinon

ABSTRACT

Breast cancer is a malignant tumor which attacks cell in breast and can grow around tissues and metastasize to other parts of body. The over expression of estrogen receptor alpha (ERα) is one of the causes of breast cancer. Setiawan (2015) has done a research about in silico test compound 2,6-dihydroxyanthraquinone as ligand on ERα using Structure-Based Virtual Screening (SBVS) protocol which has been validated by Setiawati et al. (2014) and continued with post-docking analysis by Istyastono (2015). The result of the research shows that compound 2,6-dihydroxyanthraquinone is not active as ligand in ERα. The aim of this research is to obtain structural modification design 2,6-dihydroxyanthraquinone which is active as ligand in ERα using SBVS protocol which has been validated by Setiawati et al. (2014) and continued with post-docking analysis by Istyastono (2015).

The ability of structural modification design compound 2,6-dihydroxyanthraquinone as a ligand in ERα was tested using SBVS protocol. The docking result was analyzed by using decision tree through Recursive Partition and Regression Tree (RPART) methods. Pose visualization bond of structural modification design 2,6-dihydroxyanthraquinone in binding pocket ERα using PyMOL1.7.0.0. If structural modification design 2,6-dihydroxyanthraquinone which was active as a ligand has been got, then it was continued with disconnected analysis and synthetic pathway determination.

Research result shows that compounds 2,6-dihydroxy-3-(hydroxymethyl)-7-(3-hydroxypropyl)-9,10-dihydroanthracene-9,10-dione, 2-hydroxy-6-(hydroxymethyl)-3-(3-hydroxypropyl)-9,10-dihydroanthracene-9,10-dione, 6-hydroxy-2-(hydroxymethyl)-3-(3-hydroxypropyl)-9,10-dihydroanthracene-9,10-dione, 2-hydroxy-6-(2-hydroxyethoxy)-9,10-dihydroanthracene-9,10-dione, and 2,6-bis(4-hydroxyphenoxy)-9,10-dihydroanthracene-9,10-dione were an active structural modification design 2,6-dihydroxyanthraquinone as a ligand in ERα. The proposed synthetic pathway of 2-hydroxy-6-(2-hydroxyethoxy)-9,10-dihydroanthracene-9,10-dione and 2,6-bis(4-hydroxyphenoxy)-9,10-dihydroanthracene-9,10-dione can be made, so can be developed further as potential ligands towards ERα.

Keywords: breast cancer, estrogen receptor alpha, structural modification design, 2,6-dihydroxyanthraquinone