

## ABSTRAK

Steven Antonio (01113180025)

### **STUDI FIBRINOLITIK DARI ENZIM BROMELIN NANAS (*Ananas comosus*) SECARA *IN SILICO***

Skripsi, Fakultas Sains dan Teknologi (2022).

(xiii + 42 halaman: 9 gambar; 8 tabel; 3 lampiran)

Pembentukan trombus secara berlebihan memiliki dampak negatif bagi tubuh manusia karena dapat menghalangi peredaran darah, dan dapat menyebabkan berbagai penyakit seperti penyakit kardiovaskular. Penyakit kardiovaskular telah diketahui menempati urutan pertama penyebab kematian di seluruh dunia sampai saat ini, sehingga obat pengencer darah banyak digunakan meskipun memiliki efek samping yang tidak diinginkan. Pemanfaatan tanaman diketahui dapat mengurangi efek samping dan efektif dalam menyembuhkan berbagai penyakit, namun masih dibutuhkan evaluasi lebih lanjut. Nanas diketahui mengandung enzim bromelin yang berpotensi sebagai agen fibrinolitik alami, namun studi terkait mekanisme enzim bromelin dalam mendegradasi fibrin masih sangat sedikit. Maka dari itu, perlu dilakukan studi mendalam mengenai pengaruh enzim bromelin dalam mendegradasi fibrin. Dalam penelitian ini, digunakan metode *in silico* yang terbukti sangat bermanfaat dalam mengurangi biaya dan waktu yang signifikan dalam pengembangan obat saat ini. Hasil penelitian yang telah dilakukan menunjukkan bahwa enzim bromelin nanas memiliki aktivitas fibrinolitik yang baik dengan mekanisme katalitik protease sistein. Mekanisme degradasi dilakukan oleh situs katalitik His159 dan Cys25 yang secara langsung dapat memutus ikatan rantai fibrin. Interaksi yang terjadi, serta nilai-nilai parameter yang telah diperoleh, juga mampu membuktikan secara kuat bahwa enzim bromelin efektif dalam mendegradasi fibrin secara *in silico* sehingga hasil dapat digunakan untuk pengembangan studi mengenai pemanfaatan tanaman sebagai agen fibrinolitik dikemudian hari.

**Kata Kunci:** *Ananas comosus*, Bromelin, Fibrinolitik, *In silico*, *Molecular docking*.

Referensi: 47 (1997-2022).

## ABSTRACT

Steven Antonio (01113180025)

### ***IN SILICO* FIBRINOLYTIC STUDY OF THE PINEAPPLE BROMELAIN ENZYME (*Ananas comosus*)**

Thesis, Faculty of Science and Technology (2022).

(xiii + 42 pages: 9 figures; 8 tables; 3 appendices)

Excessive thrombus formation has a negative impact on the human body because it can block blood circulation, and can cause various diseases such as cardiovascular disease. Cardiovascular disease is known to be the number one cause of death worldwide until now, so fibrinolytic drugs are widely used even though they have unwanted side effects. The utilization of plants is known to reduce side effects and is effective in curing various diseases, but further evaluation is needed. Pineapple is known to contain the bromelain enzyme which has the potential to act as a natural fibrinolytic agent, but studies regarding the mechanism of the bromelain enzyme in degrading fibrin are still very few. Therefore, it is necessary to conduct an in-depth study on the effect of the bromelain enzyme in degrading fibrin. In this study, the *in silico* method was used which has proven to be very beneficial in reducing the cost and time significantly in the development of current drugs. The results of the research that have been carried out show that the pineapple bromelain enzyme has good fibrinolytic activity with a cysteine protease catalytic mechanism. The mechanism of degradation is carried out by the catalytic sites of His159 and Cys25 which can directly break the bonds of the fibrin chain. The interactions that occur, as well as the parameter values that have been obtained, are also able to strongly prove that the bromelain enzyme is effective in degrading fibrin *in silico* so that the results can be used to develop studies on the use of plants as fibrinolytic agents in the future.

Keywords: *Ananas comosus*, Bromelain, Fibrinolytic, *In silico*, Molecular docking.

Reference: 47 (1997-2022).