ABPred: an in-silico method to predict anti-biofilm peptides as therapeutics

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Introduction
- Biofilm is an assemblage of microbes on any surface that drive phenotypic changes in their behavior to mimic as multicellular entity (Parsek MR and Greenberg EP, 2005).
- Biofilms are adaptive changes due to cell-signaling cascade known as "quorum sensing" in microbes (Rajput A, et al, 2016).
- These assist microbes to facilitate and enhance the lifespan in diverse environmental niche (Costerton JW, et al, 1978).
- In biofilm mode, bacteria cause various chronic or nosocomial infections and may become resistant to antibiotics by 10-1000 folds (Pletzer D, et al, 2016).
- Anti-biofilm peptides (ABPs) have emerged as novel entities to treat biofilm related infections.

Objectives
- Development of algorithm for predicting the potential of peptide(s) as anti-biofilm and categorizing their percentage inhibition efficiency in 4 different classes (>90%, 51-90%, <50% and not active).
- Development of user-friendly webserver to facilitate scientific community.

Methodology

Figure 1: Flowchart showing brief overview of algorithm development

Table 1: Performance of SVM based models by employing distinct peptide properties during 10-fold cross validation on training/testing and independent validation data sets

Feature selection technique:
- Minimum Redundancy maximum Relevance (mRMR) feature selection algorithm is employed to fetch out most contributing peptide features among ABPs that correlates strongly to classification variable.

Classifier used:
- Support Vector Machines (SVMs) are a group of supervised machine learning methods that can be applied to classification or regression for solving two-class (SVMlinear) or multi-class (SVMrelevance) problems (“one-vs-one” or “one-vs-all”).

Parameters for measuring performance of classifier:

References

Conclusion
- We have developed “ABPred” algorithm that computationally predicts anti-biofilm activity of peptide(s).
- This webserver would help the scientific community to select potential broad-spectrum ABPs before their experimental testing.

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