CHAPTER 1: INTRODUCTION

Nasopharyngeal carcinoma (NPC) is a rare cancer that affects people all over the world, with a prevalence of less than 1/100.000. (Adham et al., 2012). However, it is endemic to various parts of the globe, most notably Southeast Asia, and has been shown to have a bad prognosis. In Indonesia, NPC is the fourth most common cancer of both sexes, preceded by breast cancer, cervical cancer, as well as hematopoietic and reticuloendothelial system malignancy (Gondhowiarjo et.al, 2018). Very little is known about NPC in the country; despite the fact that the recorded mean prevalence in Indonesia is 6.2/100.000, with 13.000 new NPC each year.

Histological investigation is used to diagnose NPC, specifically immunohistochemical detection for Epstein–Barr virus-encoded small RNA (EBER). Whereas the staging is usually based on the International Union Against Cancer (UICC) as well as the American Joint Committee on Cancer (AJCC) staging system. For treatment, the early stage cancers are treated with radiation therapy aimed at the tumor. The later stages would usually get chemoradiation. In addition to that, viral antigens expression in NPC makes this disease an attractive target for immunotherapy strategies.

Like most cancers, NPC has overexpressed levels of peptidyl-prolyl cis-trans isomerase (PIN1). This protein identifies and isomerizes the phosphorylated Serine/Threonine-Proline motif. PIN1 is involved in a lot of cellular processes, the dysregulation of which may lead to neoplastic diseases (Chen et al., 2018). Several studies have been conducted on the role of PIN1 in NPC development including one by Xu et al. (2016), they came to the conclusion that PIN1 overexpression promotes tumor cell proliferation by upregulating cyclinD1.

Another gene that is found to be highly expressed in cancer is ATP-binding cassette subfamily C member 5 (ABCC5). It is overexpressed in breast cancer, prostate cancer in addition to NPC as reported by Du et

al. ABCC5 overexpression is also reported in NPC cells that are resistant to paclitaxel treatment (Hou et al., 2017).

Thus far, the vaccine for NPC has been targeting the EBV. In clinical trials, a number of therapeutic EBV vaccines have shown promising benefits (Taylor & Steven, 2016). Developing a multi epitope-based NPC vaccine might be helpful for patients with more advanced stages of the cancer and who are resistant to treatment. Targeting the antigens that are overexpressed around the tumor area is predicted to evoke immune response against the cancer cell.