1. **No.**

   FP01812220

2. **Title**

   Prediction of lung cancer incidence using a methematical demographic model

3. **Period**

   2017-2019

4. **Summary**

   Smoking rate in Japan has decreased over time, i.e., 82.3% to 29.7% among male and 15.7% to 9.7% among female from 1965 to 2016, respectively, but the lung cancer incidence steadily increased in Japan due to aging. The present study aimed to devise a mathematical model to capture the demographic dynamics and smoking rate with time and age so that the future lung cancer can be predicted. A dynamic compartmental model was employed to capture the demographic aging process as well as the smoking-associated risk of cancer. Smoking state is composed of never-smokers, smokers and ex-smokers who experience different hazards of lung cancer. Essential empirical datasets including lung cancer incidence and mortality and smoking rate have been collected. The model has been mathematically formulated with the derivation of the likelihood function. Preliminary fit to the smoking population has been realized using the constructed model. The model has been successfully devised to be fitted to lung cancer data so that remaining parameters are estimated and short-term future prediction can be made.