Introduction
Carbon-ion radiotherapy using Heavy Ion Medical Accelerator in Chiba (HIMAC) has been carried out since 1994. Over 11000 cancer patients have been treated with carbon beams having energies of between 56-430 MeV/u. The HIMAC has two injectors and provides heavy-ion beams for medical and experimental purposes. The first injector consists of two ECR type ion-sources (ECR, HEC), one PIG type ion-source (PIG), the RFQ linac and the DTL. This injector provides carbon-ion beam for cancer therapy, and concurrently provides various ion beams such as H, He, Fe, Kr and Xe for biological and physical experiments. The 18 GHz NIRS-ECR ion-source produces the carbon ion beam for cancer therapy, while the 18 GHz NIRS-HEC ion-source produces C to Xe ions for experimental use. Light ions such as H and He, moreover, B and Si ions are generated from solid materials with spattering method by the NIRS-PIG ion-source.

The second injector consists of the compact ECR ion-source with all permanent magnets (KIS), the RFQ linac and the Alternating-Phase-Focused Interdigital H-mode Drift-Tube-Linac (APF-IH-DTL) which is mainly used for carbon-ion beams for experimental use.

Operation of HIMAC injector in 2017
The HIMAC injector was produced various ion beam for medical and experimental use. Total operation time of injector was 9299.53 hour in 2017. Operation time of the carbon was higher than other ion species. Operation time of ECR and KIS sources for carbon ion production were 5042 and 822 hour, respectively. Ions of isotope such as $^{12}$C, $^{13}$C, $^{14}$N and $^{56}$Fe were also produced at NIRS-HEC.

Trouble of HIMAC injector in 2017 (aging problem)
Rain in the injector room
There was water leak from pump for cooling water. The water go through the concrete to other floor of injector room.

Explosion of transformer
Transformer (500V/2000V) in power supply for plate of tube at DTL was broken due to decreasing of insulation. Maximum insulation voltage is 20 kV.

Other problems
There were 26 cases of trouble about aging. Total number of trouble for which an exchange of a parts were 82 cases in 2017.

Development for multi-ion irradiation at HIMAC injector
The multi-ion irradiation with dose distribution and Liner Energy Transfer (LET) optimization is being studied at NIRS. Helium, carbon, oxygen and neon ions are considered as ion species for multi-ion irradiation. We considered the systems with only one ion source.

The solenoid valve was set in CO$_2$ line. The helium and neon gases were regulated by piezo valve (Mass Flow Control valve: MFC). We have to wait about 10 minute before the microwave ignition. Pulse width was 0.22 msec. The influence of residual CO$_2$ gas is big to the production of He$^+$ ion. The gas pulsing method is effective in a changing ion species.

We checked impurity of accelerated He$^+$ beam at HIMAC injector. An ion is separated using differences in an energy loss on ion species when an ion passes a thin foil. We checked impurity of accelerated He$^+$ beam.