専 攻	医療技術学専攻	受験番号		氏 名	

科目名	外国語	参考資料	一切不可・使用可（　　　）
採点欄		持込用具	一切不可・使用可（ 辞書持込可、電子辞書は不可 ）

[1] 以下の文章を読み、設問に答えよ。

Medicine Nobel goes to scientists who revealed secrets of immune system regulation

White blood cells called T cells play a crucial part in the body's immune system by attacking infected or cancerous cells. But in 1995, immunologist Shimon Sakaguchi at the University of Osaka in Suita, Japan, and his colleagues discovered a previously unknown subtype — called regulatory T cells. These rare cells serve as a crucial brake on the immune system to prevent it from over-reacting. Samantha Bucktrout, an immunologist at Greywolf Therapeutics in Oxford, UK, likens them to an elite police force: they represent only 1–2% of all T cells, but are highly effective at “keeping everyone in order”. They arrive at the immune-reaction site and “shut the whole thing down”, Mary Brunkow, a molecular biologist at the Institute for Systems Biology in Seattle, Washington, says. “They really mop everything up and dampen inflammation very effectively.”

Sakaguchi showed that mice lacking these cells developed autoimmune conditions of the thyroid, pancreas and other organs, and that giving the animals a solution containing regulatory T cells stopped disease progression. Scientists had suspected that the immune system contained a built-in brake for decades, but had not been able to prove it. The discovery allowed researchers to isolate and work on regulatory T cells for the first time, and other research teams began to identify several types of regulatory T cell with different immune-suppressing properties.

問 1. 坂口らが 1995 年に発見した細胞の名称と、その主な機能を答えなさい。

問 2. 制御性 T 細胞の比率は、全 T 細胞のうちどの程度か。本文中の比喩を用いて説明しなさい。

問 3. 坂口らのマウス実験から示された制御性 T 細胞の役割を説明しなさい。

問 4. この発見以前、研究者たちはどのような仮説を持っていたか。また坂口の発見はその仮説にどのような影響を与えたか。

問 5. 坂口の発見がその後の免疫学研究にどのような道を開いたか、本文に即して説明しなさい。

[2] 以下の文章を読み、設問に答えよ。

Efficacy of disinfectants and endotoxin-retentive filters for the removal of bacterial DNA from dialysates

Background

Bacterial DNA (bDNA) fragments in dialysate lines can trigger inflammatory responses in patients on dialysis. However, no studies have reported the removal and inactivation of bDNA in dialysate lines using cleaning and disinfection, and management procedures to control bDNA contamination have yet to be established.

Methods

The efficiency of an endotoxin-retentive filter (ETRF) for the removal of bDNA was examined using an experimental dialysate line incorporating an ETRF and the solubilized materials derived from hot-water-disinfected Pseudomonas aeruginosa cells. To examine the inactivation of bDNA by disinfection, *P. aeruginosa* cell suspensions were disinfected with hot water, peracetic acid, or sodium hypochlorite, and the amount of bDNA remaining after the disinfection treatment was determined. Single-stranded and double-stranded bDNA were measured using Qubit® fluorometry. The molecular size of bDNA was analyzed by polyacrylamide gel electrophoresis.

Results

In the spike-and-recovery test of solubilized materials derived from hot-water-disinfected bacterial cells, bDNA leakage was observed when the circuit pressure of the inlet ETRF was elevated. bDNA was inactivated more during disinfection with sodium hypochlorite than with peracetic acid and hot water.

Conclusions

In addition to the ETRF, disinfection with sodium hypochlorite is an effective method for the management of bDNA in dialysates.

問 6.　研究の背景（Background）において、本研究が対象とした主な問題は何か？

問 7.　本研究で使用された主な評価対象または装置は何か？　その目的は？

問 8.　bDNA の不活化試験では、どのような消毒剤・方法が比較されたか？

問 9.　消毒処理による bDNA の不活化効果はどのような結果だったか？

問 10.　結論として、bDNA 管理における効果的な手段として本研究が示唆した組み合わせを述べよ。