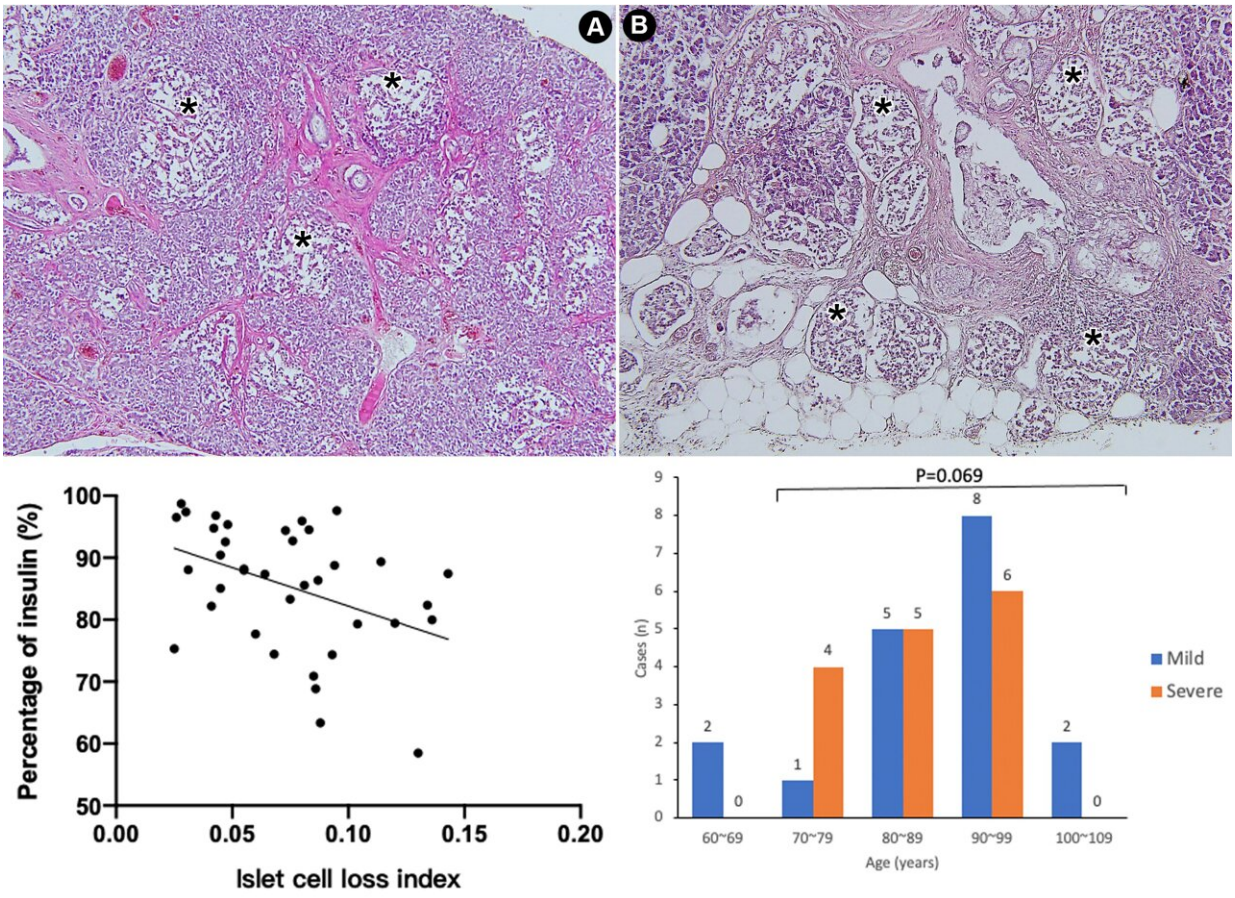
Loss of cells in pancreas in the elderly may cause age-related diabetes

January 15 2024



Two different ways in which islet cell loss can be observed (top left and right) . The relationship between the percentage of pancreatic beta cells and islet cell loss (bottom left). The number of mild and severe cases of ICL at different ages (bottom right). Credit: Tokyo Metropolitan University

Researchers from Tokyo Metropolitan University have studied pancreatic islet cell loss (ICL) in people with no previous pancreatic problems. They identified key trends in the types of cells lost due to islet cell loss in different age groups and sexes, finding that ICL in the elderly population was largely due to insulin-producing beta cell loss. This may be the cause of age-related diabetes and help inform new preventative treatments.

The pancreas is an incredibly important part of the human digestive system, particularly for regulating blood sugar levels by secreting the hormone insulin. While every part of the pancreas is vital, not every part has the same function.

A closer look reveals an interesting internal structure, with islets of cells known as islets of Langerhans, after their discoverer, containing the hormone-producing (endocrine) cells. They make a small proportion of all the cells in the pancreas, approximately 1%, making any changes to their morphology or state a potential driver for health problems.

A team led by Professor Shuang-Qin Yi of Tokyo Metropolitan University have been studying the phenomenon of pancreatic ICL, where voids are observed in these islet regions when observed under the microscope. It was possible for such islets to be surrounded by either healthy cells or lesions, and it remained to be seen what they could teach us about a person's health. The findings are published in the journal *Digestive and Liver Disease*.

This led the team to undertake a thorough survey of pancreatic sections taken from the cadavers of people with no pancreatic diseases before death, aged 65 to 104. Islet cell loss in healthy populations is something that is rarely studied. The degree of cell loss in each sample was found by observing stained sections from the pancreas under the microscope and analyzing the images.

They focused on trends by age and sex and kept a close eye on the type of cells left in the pancreas, covering the four most abundant cell types, alpha, beta, delta, and PP (pancreatic polypeptide-producing) cells. The team paid extra attention to the number of beta cells, the cells responsible for producing insulin.

While there were no notable trends in the other cell types, it was found that the proportion of beta cells in the pancreas seemed to significantly decrease with ICL. This leads to the conclusion that ICL in the elderly is largely due to beta cell loss in the islets.

ICLs also correlated with microscopic lesions in the pancreas known as pancreatic intraepithelial neoplasias (PanIN), while severe ICL seemed less likely at more advanced ages.

Curiously, it was found that women tended to be more likely to show severe ICL. The team's findings are consistent with data from the International Diabetes Foundation presented in 2021, which showed that women over 70 had a higher incidence of diabetes than men, while the trend reversed for those under 70.

While other mechanisms for beta cell loss need to be considered, these findings also seem to suggest that the phenomenon of islet cell loss may be a key driver of senile diabetes. This makes interventions that might specifically slow the decrease in the number of beta cells in the elderly a potentially effective route for preventative treatments.

More information: Rujia Li et al, A new histopathological phenomenon: Pancreatic islet cell loss in the elderly population, *Digestive and Liver Disease* (2023). DOI: 10.1016/j.dld.2023.11.031

Provided by Tokyo Metropolitan University