Supplemental Material

Regional intra-pancreatic fat deposition according to fasting insulin

Head

Fasting insulin explained 4.5% of the variance in pancreatic head fat. In the model 1 analyses, the head region of the pancreas had significant differences in fat % when comparing both tertile 2 with tertile 1 (β = 0.933, $p = 0.008$) and tertile 3 with tertile 1 (β = 1.305, $p < 0.001$). In the model 2 analyses, the head region of the pancreas had significant differences in fat % when comparing both tertile 2 with tertile 1 (β = 0.819, $p = 0.011$) and tertile 3 with tertile 1 (β = 1.100, $p = 0.001$). In the model 3 and model 4 analyses, the head region of the pancreas had no significant differences in fat % when comparing the fasting insulin tertiles (Table 3). The use of antidiabetic medications did not materially influence the results (Supplementary Table 3).

Body

Fasting insulin explained 6.5% of the variance in pancreatic body fat. In the model 1 analyses, the body region of the pancreas had significant differences in fat % when comparing both tertile 2 with tertile 1 (β = 1.154, $p = 0.001$) and tertile 3 with tertile 1 (β = 1.534, $p < 0.001$). In the model 2 analyses, the body region of the pancreas had significant differences in fat % when comparing both tertile 2 with tertile 1 (β = 1.118, $p = 0.001$) and tertile 3 with tertile 1 (β = 1.463, $p < 0.001$). In the model 3 analyses, the body region of the pancreas had significant differences in fat % when comparing both tertile 2 with tertile 1 (β = 0.706, $p = 0.019$) and tertile 3 with tertile 1 (β = 0.628, $p = 0.046$). In the model 4 analyses, the body region of the pancreas had significant difference in fat % when comparing tertile 2 with tertile 1 (β = 0.702, $p = 0.023$), however when comparing tertile 3 with tertile 1 the difference was not statistically significant (Table 3). When stratifying the data for antidiabetic medication use, the models 1-4 analyses were statistically significant only in the participants who did not use antidiabetic medications (Supplementary Table 3).

Tail

Fasting insulin explained 5.4% of the variance in pancreatic tail fat. In the model 1 analyses, the tail region of the pancreas had significant differences in fat % when comparing both tertile 2 with tertile 1 (β = 1.122, $p = 0.001$) and tertile 3 with tertile 1 (β = 1.334, $p < 0.001$). In the model 2 analyses, the tail region of the pancreas had significant differences in fat % when comparing both tertile 2 with tertile 1 (β = 1.095, $p < 0.001$) and tertile 3 with tertile 1 (β = 1.270, $p < 0.001$). In the model 3 analyses, the tail region of the pancreas had significant difference in fat % when comparing tertile 2 with tertile 1 (β = 0.768, $p = 0.009$). When comparing tertile 3 with tertile 1, the difference just missed the predetermined level of statistical significance ($p = 0.058$). In the model 4 analyses, the tail region of the pancreas had significant difference in % when comparing tertile 2 with tertile 1 (β = 0.709, $p = 0.019$), however when comparing tertile 3 with tertile 1 the difference was not statistically significant (Table 3). When stratifying the data for antidiabetic medication use, the models 1-4 analyses were statistically significant only in the participants who did not use antidiabetic medications (Supplementary Table 3).

Supplementary Table 1. Associations of the studied covariates with intra-pancreatic fat deposition

Region	Age		Sex		Asians vs. European Caucasians		BMI		Liver fat	
	β	*p*	β	*p*	β	*p*	β	*p*	β	*p*
Total	0.056	**<0.001**	-1.150	**<0.001**	-0.085	0.736	0.199	**<0.001**	0.056	**<0.001**
Head	0.063	**<0.001**	-1.433	**<0.001**	-0.223	0.457	0.232	**<0.001**	0.067	**<0.001**
Body	0.057	**<0.001**	-1.026	**<0.001**	-0.111	0.709	0.230	**<0.001**	0.064	**<0.001**
Tail	0.062	**<0.001**	-0.895	**<0.001**	0.031	0.914	0.189	**<0.001**	0.053	**<0.001**

Footnotes: Data are presented as β coefficients and *p* values from linear regression analysis. Statistically significant values ($p < 0.05$) are in bold.

Supplementary Table 2. Influence of antidiabetic medications use on the associations between regional intra-pancreatic fat deposition and diabetes status

Model	Head						Body						Tail					
	Prediabetes vs. Normoglycaemia			Diabetes vs. Normoglycaemia			Prediabetes vs. Normoglycaemia			Diabetes vs. Normoglycaemia			Prediabetes vs. Normoglycaemia			Diabetes vs. Normoglycaemia		
	β	S.E.	*p*	β	S.E.	*p*	β	S.E.	*p*	β	S.E.	*p*	β	S.E.	*p*	β	S.E.	*p*
No antidiabetic medications																		
Model 1	1.238	0.298	**<0.001**	1.092	0.518	**0.036**	1.246	0.291	**<0.001**	1.551	0.506	**0.002**	1.256	0.285	**<0.001**	1.501	0.495	**0.003**
Model 2	0.538	0.294	0.068	-0.107	0.512	0.835	0.702	0.296	**0.018**	0.597	0.516	0.248	0.654	0.282	**0.021**	0.372	0.492	0.450
Model 3	0.062	0.266	0.816	-0.684	0.458	0.137	0.218	0.271	0.422	0.010	0.466	0.982	0.266	0.264	0.315	-0.098	0.455	0.829
Model 4	0.003	0.270	0.992	-0.748	0.458	0.103	0.132	0.276	0.632	-0.048	0.468	0.918	0.214	0.271	0.431	-0.126	0.460	0.784
Antidiabetic medications																		
Model 1	0.627	1.123	0.581	0.259	0.753	0.734	0.023	1.217	0.985	-0.477	0.816	0.563	1.184	0.845	0.172	-0.047	0.567	0.934
Model 2	0.366	0.969	0.709	-0.439	0.869	0.618	-0.627	1.158	0.593	-1.778	1.038	0.100	0.843	0.870	0.343	-1.081	0.780	0.179
Model 3	0.170	0.932	0.857	-0.498	0.831	0.555	-0.912	1.073	0.404	-1.863	0.957	0.064	0.724	0.869	0.413	-1.117	0.774	0.163
Model 4	-1.225	1.349	0.378	-0.717	1.034	0.499	-1.859	1.735	0.301	-2.744	1.329	0.057	-0.099	1.436	0.946	-1.250	1.101	0.274

Footnotes: Data are presented as β coefficients, standard errors (S.E.), and *p* values from linear regression analysis. Statistically significant values ($p < 0.05$) are in bold. Model 1: unadjusted model; Model 2: adjusted for age, sex, ethnicity; Model 3: adjusted for age, sex, ethnicity, and BMI; Model 4: adjusted for age, sex, ethnicity, BMI, and liver fat.

Supplementary Table 3. Influence of antidiabetic medications use on the associations between regional intra-pancreatic fat deposition and insulin traits

Trait/Model		Head						Body						Tail					
		Tertile 2 vs. Tertile 1			Tertile 3 vs. Tertile 1			Tertile 2 vs. Tertile 1			Tertile 3 vs. Tertile 1			Tertile 2 vs. Tertile 1			Tertile 3 vs. Tertile 1		
		β	S.E.	*p*	β	S.E.	*p*	β	S.E.	*p*	β	S.E.	*p*	β	S.E.	*p*	β	S.E.	*p*
HOMA-IR	No antidiabetic medications																		
	Model 1	0.765	0.376	**0.043**	1.389	0.375	**<0.001**	1.224	0.368	**0.001**	1.683	0.367	**<0.001**	1.168	0.363	**0.001**	1.470	0.362	**<0.001**
	Model 2	0.634	0.346	0.068	1.261	0.347	**<0.001**	1.153	0.345	**0.001**	1.653	0.347	**<0.001**	1.092	0.330	**0.001**	1.437	0.331	**<0.001**
	Model 3	0.285	0.317	0.370	0.513	0.329	0.120	0.770	0.316	**0.015**	0.861	0.328	**0.009**	0.803	0.309	**0.010**	0.808	0.322	**0.013**
	Model 4	0.259	0.321	0.420	0.395	0.334	0.238	0.819	0.321	**0.011**	0.835	0.333	**0.013**	0.813	0.316	**0.011**	0.804	0.328	**0.015**
	Antidiabetic medications																		
	Model 1	0.300	0.985	0.764	1.286	0.985	0.208	-0.086	1.032	0.935	-0.186	1.032	0.859	0.414	0.749	0.587	-0.386	0.749	0.613
	Model 2	-0.665	0.685	0.348	0.714	0.684	0.314	-0.744	1.056	0.493	-0.452	1.056	0.675	0.107	0.831	0.899	-0.759	0.831	0.376
	Model 3	-0.603	0.707	0.409	0.858	0.736	0.264	-0.837	1.091	0.456	-0.671	1.135	0.564	0.116	0.871	0.896	-0.738	0.906	0.430
	Model 4	-0.861	0.815	0.339	0.931	0.838	0.317	-1.490	2.269	0.540	-1.090	2.331	0.660	-1.243	1.291	0.380	-1.632	1.326	0.273
HOMA-β	No antidiabetic medications																		
	Model 1	0.095	0.384	0.805	-0.224	0.383	0.559	0.226	0.382	0.554	0.099	0.381	0.796	0.094	0.374	0.802	-0.135	0.373	0.717
	Model 2	0.514	0.357	0.151	0.352	0.360	0.330	0.647	0.361	0.075	0.687	0.365	0.061	0.563	0.344	0.103	0.538	0.347	0.123
	Model 3	0.182	0.320	0.570	-0.170	0.327	0.602	0.281	0.322	0.383	0.120	0.329	0.717	0.277	0.316	0.382	0.086	0.323	0.791
	Model 4	0.092	0.325	0.778	-0.264	0.330	0.425	0.261	0.329	0.428	0.112	0.334	0.739	0.261	0.324	0.421	0.095	0.329	0.772
	Antidiabetic medications																		
	Model 1	-1.843	0.939	0.065	-0.986	0.939	0.308	-1.743	0.927	0.077	-0.157	0.927	0.867	-1.714	0.644	**0.016**	-0.357	0.644	0.586
	Model 2	-0.874	0.800	0.293	-0.004	0.755	0.996	-1.701	0.972	0.102	0.725	0.917	0.442	-1.927	0.740	**0.021**	0.052	0.698	0.942
	Model 3	-0.865	0.876	0.341	0.007	0.849	0.994	-1.931	1.045	0.087	0.456	1.012	0.659	-1.921	0.810	**0.034**	0.059	0.784	0.941
	Model 4	-0.154	1.220	0.904	0.319	1.354	0.823	0.088	1.591	0.958	2.268	1.766	0.255	-1.927	0.738	**0.048**	-0.363	0.819	0.676
Fasting insulin	No antidiabetic medications																		
	Model 1	0.735	0.366	**0.046**	1.369	0.365	**<0.001**	1.006	0.360	**0.006**	1.599	0.359	**<0.001**	0.908	0.356	**0.011**	1.356	0.355	**<0.001**
	Model 2	0.703	0.338	**0.038**	1.250	0.339	**<0.001**	1.047	0.338	**0.002**	1.586	0.339	**<0.001**	0.976	0.323	**0.003**	1.354	0.324	**<0.001**
	Model 3	0.409	0.308	0.185	0.523	0.320	0.104	0.730	0.308	**0.019**	0.831	0.321	**0.010**	0.730	0.301	**0.016**	0.737	0.314	**0.019**
	Model 4	0.392	0.312	0.210	0.412	0.324	0.205	0.778	0.313	**0.014**	0.812	0.326	**0.013**	0.739	0.307	**0.017**	0.736	0.320	**0.022**
	Antidiabetic medications																		
	Model 1	-0.114	1.010	0.911	0.757	1.010	0.463	0.343	1.029	0.743	0.243	1.029	0.816	-0.286	0.769	0.714	-0.286	0.769	0.714
	Model 2	-0.817	0.702	0.264	0.715	0.648	0.289	0.000	1.140	1.000	0.265	1.053	0.805	-0.610	0.909	0.513	-0.448	0.840	0.602
	Model 3	-0.722	0.724	0.337	0.906	0.706	0.222	-0.084	1.194	0.945	0.097	1.164	0.935	-0.577	0.956	0.557	-0.383	0.932	0.688
	Model 4	0.542	0.766	0.510	2.241	0.898	0.055	0.975	1.931	0.635	1.309	2.265	0.588	-1.618	1.009	0.170	-1.524	1.183	0.254

Footnotes: Data are presented as β coefficients, standard errors (S.E.), and *p* values from linear regression analysis. Statistically significant values ($p < 0.05$) are in bold. Model 1: unadjusted model; Model 2: adjusted for age, sex, ethnicity; Model 3: adjusted for age, sex, ethnicity, and BMI; Model 4: adjusted for age, sex, ethnicity, BMI, and liver fat.
Abbreviations: HOMA-IR: homeostatic model assessment of insulin resistance; HOMA-β: homeostasis model assessment of β-cell function.