The ND-version is:

~~dit~~

$$\rho(s,t)_{ij} = \mathrm{cov}(f'_i(s), f'_j(t))$$
$$= \mathbb{E}[f_i'(s) f_j'(t)]$$

$$\Rightarrow \frac{d}{ds}\rho(s,t)_{ij} = \delta_{ij}$$

Remember ~~$\rho(s,t)_{ij}$~~ $\rho(t,t)_{ij} = \delta_{ij}$ by assumption here!

$$\frac{d}{ds}\Big|_{s=t} \rho(s,t)_{ij} = \mathbb{E}[f_i''(s) f_j'(t)]$$
$$= \mathbb{E}[f_i''(t) f_j'(t)] = 0$$

as ~~Nao~~ $\mathbb{E}[f_i'(t) f_j'(t)] = a\,\delta_{ij}$

$$\Rightarrow \cancel{\frac{d}{dt} \mathbb{E}[f_i'(t) f_j'(t)]} = 0$$
$$\cancel{2\mathbb{E}[f_i''} \quad \mathbb{E}[f_i''(t) f_j'(t) + f_i'(t) f_j''(t)]$$

$$= \mathbb{E}\left[\cancel{\frac{\partial}{\partial x}} \frac{\partial}{\partial t_i} f(t) \frac{\partial}{\partial t_j} f(t)\right]$$

$$= \mathrm{cov}(\nabla f(t))_{ij}$$