Appendix-Methods.

Immune-checkpoint proteins profiling on peripheral blood mononuclear cells. Blood samples were collected in EDTA tubes upon admission in our institution of patients with suspicion of ICI-myocarditis. Monocytes, T and B lymphocytes were analyzed by flow cytometry using monoclonal antibodies as described in the table below and as previously described:(1,2)

PE	ECD	APC	APC-A700	PB	KO or BV510
CD86 *Beckman Coulter*	CD19 *Beckman Coulter*	CD274 (PDL1) *Beckman Coulter*	CD14 *Beckman Coulter*	CD45 *Beckman Coulter*	CD3 *Beckman Coulter*
	CD19 *Beckman Coulter*	CD3 *Beckman Coulter*	CD8 *Beckman Coulter*	CD4 *Beckman Coulter*	CD279 (PD-1) *Beckman Coulter*

***PE**: phycoerythrin; **ECD**: PE-Texas-Red; **APC**: Allophycocyanin;*
***AA700**: APC-Alexa Fluor 700; **PB**: Pacific Blue; **KRO**: KromeOrange, **BV**: Brillant Violet.*

Monocytes were identified as $CD45^{+}CD14^{+}$cells. CD86 mean fluorescent intensity (MFI) was analyzed on gated monocytes and compared to labelling with an isotypic control. CD86RO was calculated as follows: 1)MFI_s-MFI_{ns}=ΔMFI, where MFI_s is MFI of the Phycoerythrin-labeled anti-CD86 mAb; MFI_{ns} is the non-specific MFI with an isotype control; ΔMFI is the difference between these two values, representing a relative measurement of specific binding; 2)CD86RO at each timepoint was calculated using: [1-($\Delta MFI_{timepoint}$/ $\Delta MFI_{baseline}$)] where $\Delta MFI_{baseline}$ is calculated from a sample extracted within 1h of first abatacept dose.(2-4) The % of cells expressing PDL1 and PD1 was analyzed using $CD3^{+}$T cells gated within lymphocytes. For PD1 expression evaluation, $CD4^{+}$ and $CD8^{+}$ T-cells were also studied within $CD3^{+}$T-cells.(1,2) For PDL1 expression evaluation, the % of B-cells ($CD19^{+}$) expressing it were also studied.

Circulating immune checkpoint agents drug monitoring. Assessment of abatacept and ICI circulating levels was performed using abatacept and ICI (nivolumab, pembrolizumab, ipilimumab, durvalumab) drugs to prepare calibration and quality controls. For each time point studied, blood was collected using a pre-heparinized tube. The plasma was extracted by centrifugation of blood at 3500 rpm for 10 minutes. Plasma samples were then analyzed using ultra-performance liquid chromatography system coupled to mass spectrometry (LC-MS/MS;MS-8060, Shimadzu, Japan). Quantifications were achieved in multiple reactions monitoring mode, and electrospray ionization was operated in a positive mode. Peak integration and quantification were performed using LabSolutions and Insight LC-MS software. Abatacept, pembrolizumab, nivolumab, ipilimumab and durvalumab were quantified with signature peptide MHVAQPAVVLASSR, DLPLTFGGGTK, ASGITFSNSGMHWVR, ASQSSVGSSTAWYQQKPGQAPR, and ALPASIEK respectively, by nano-surface and molecular-orientation limited proteolysis (nSmol, Shimadzu, Japan).

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