Supplementary Materials of Explaining Chest X-ray Pathology Models using Textual Concepts

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Table S1: List of primary and secondary features annotated by radiologists for each pathology in CheXplaining in Style (1)

Pathology	Type	**Features**
Cardiomegaly	*Primary*	Increased cardiothoracic ratio
	Secondary	Reduced lung tissue opacity
		Pleural Effusion
		Pacemaker
		Older patients
Pleural Effusion	*Primary*	Obstruction of the pleural recessus
		Opaque lower lungs
	Secondary	Increased cardiac diameter
		Fluid overload
		Pneumonia
Atelectasis	*Primary*	Mediastinal shift
		Wide barrel-like thorax
	Secondary	Pleural Effusion
		Infiltration
		Older patients

1 Example concepts generated by prompting ChatGPT(2)

Prompt: `What visual attributes are seen in cardiomegaly chest xray?`

Response:
`Cardiac silhouette enlargement`
`Increased cardiothoracic ratio`
`Prominent pulmonary vessels`
`Pleural effusion`
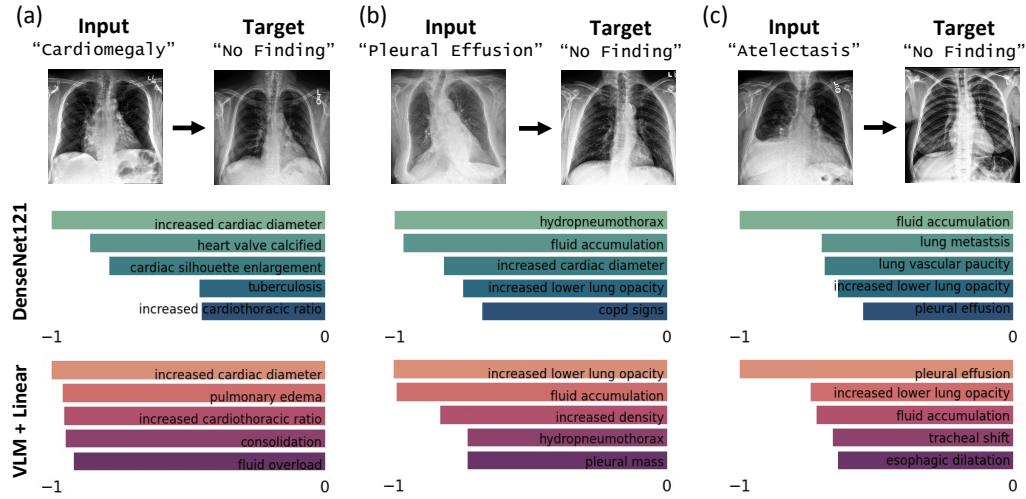`Signs of heart failure such as pulmonary edema`

Fig. S1: **Reverse conceptual counterfactual generated by CoCoX.** The input image into the model is shown under the heading Input ("Pathology"). The target image presented under Target ("No Finding") is a representative image labeled negative for any pathologies. The concept importance scores for the top 5 concepts are visualized with blue-green for the DenseNet-121 model and orange-purple for VLM + Linear. These concepts had the most impact when subtracted from the input image embedding to change from pathology finding to no finding.

References

[1] Atad, M., Dmytrenko, V., Li, Y., Zhang, X., Keicher, M., Kirschke, J., Wiestler, B., Khakzar, A., Navab, N.: Chexplaining in style: Counterfactual explanations for chest x-rays using stylegan. arXiv preprint arXiv:2207.07553 (2022)

[2] OpenAI: Chatgpt 3.5, `https://chat.openai.com` [Accessed: February 2024]