Reaching behind Specular Highlights by Registration of Two Images of Broiler Viscera

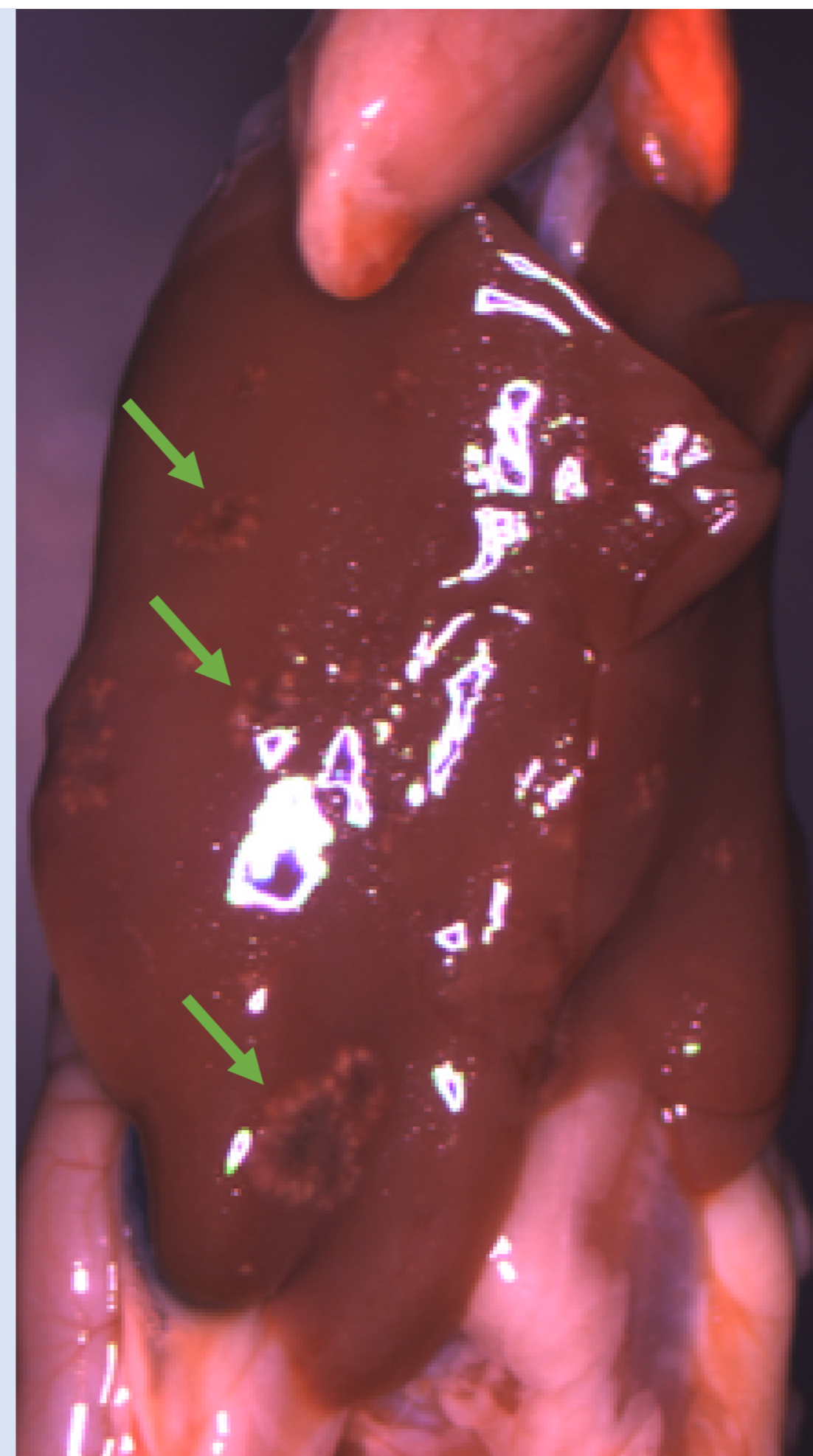Anders Jørgensen, Rikke Gade, Malte Pedersen, Jens Fagertun, Thomas B. Moeslund

What

- Automatic health inspection of broiler viscera
- Combine two images with alternate light into a single image with specular highlights removed

Why

- Specular highlights can hide crucial information
- Diffuse lighting is hard to obtain on glossy surfaces
- Polarising filters require more intensive light and results are not perfect
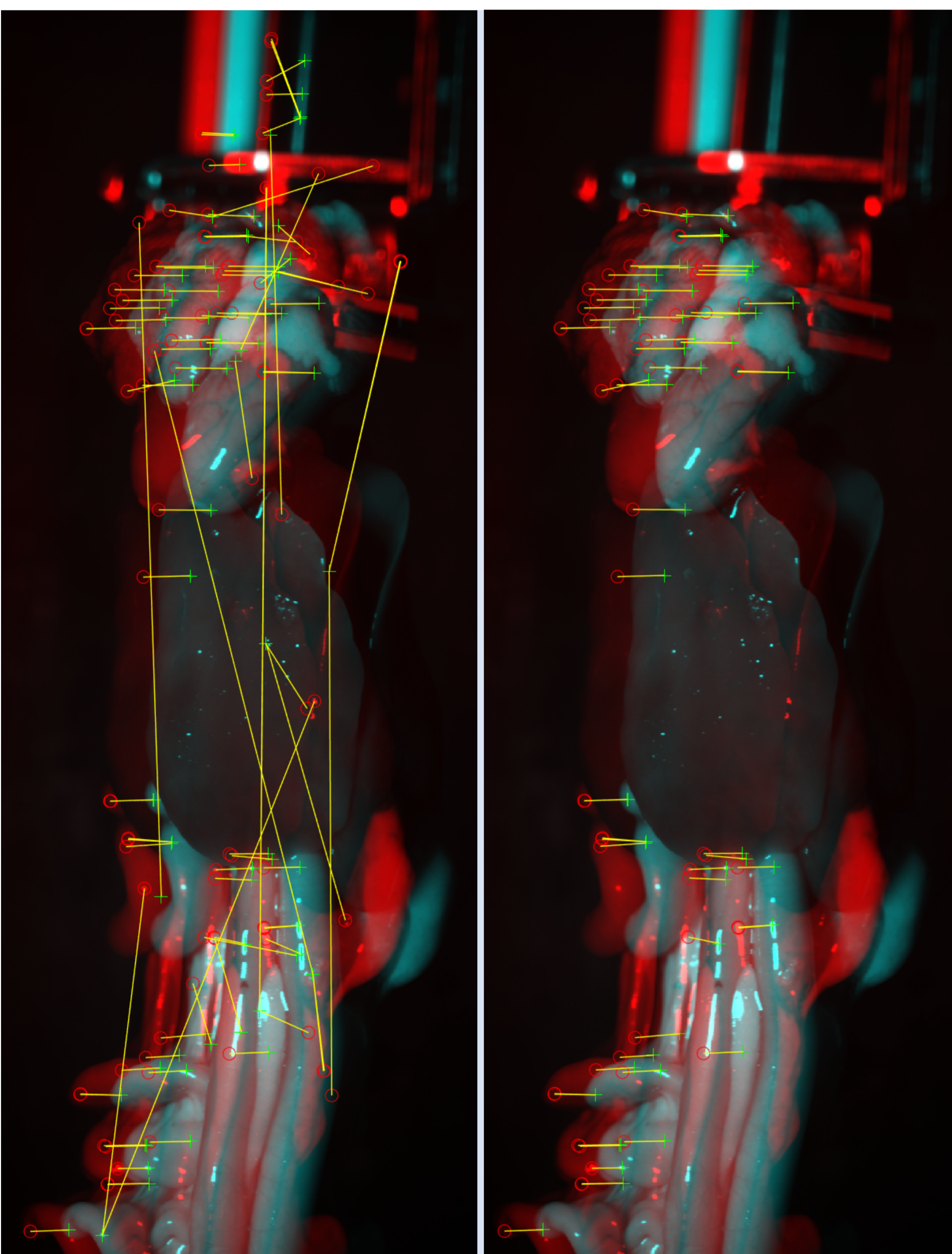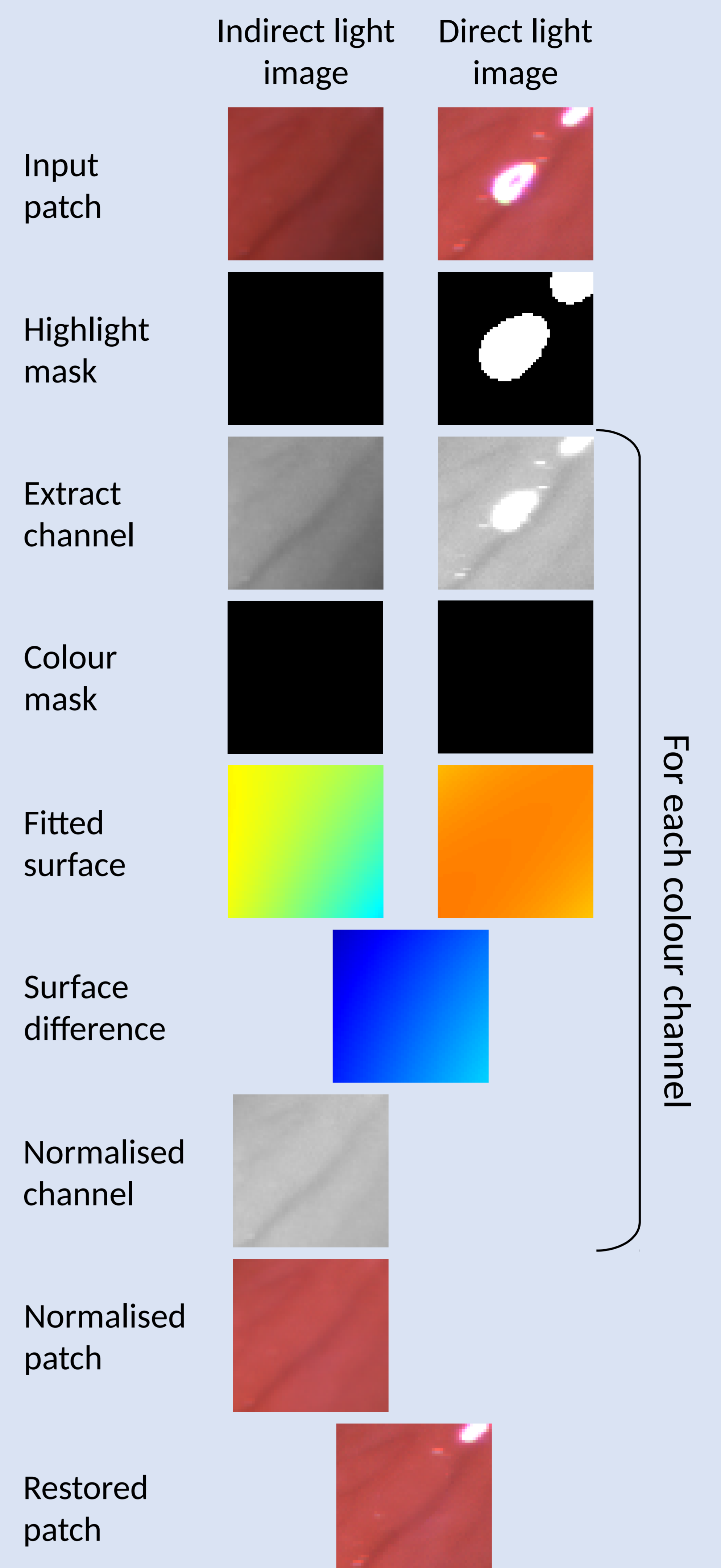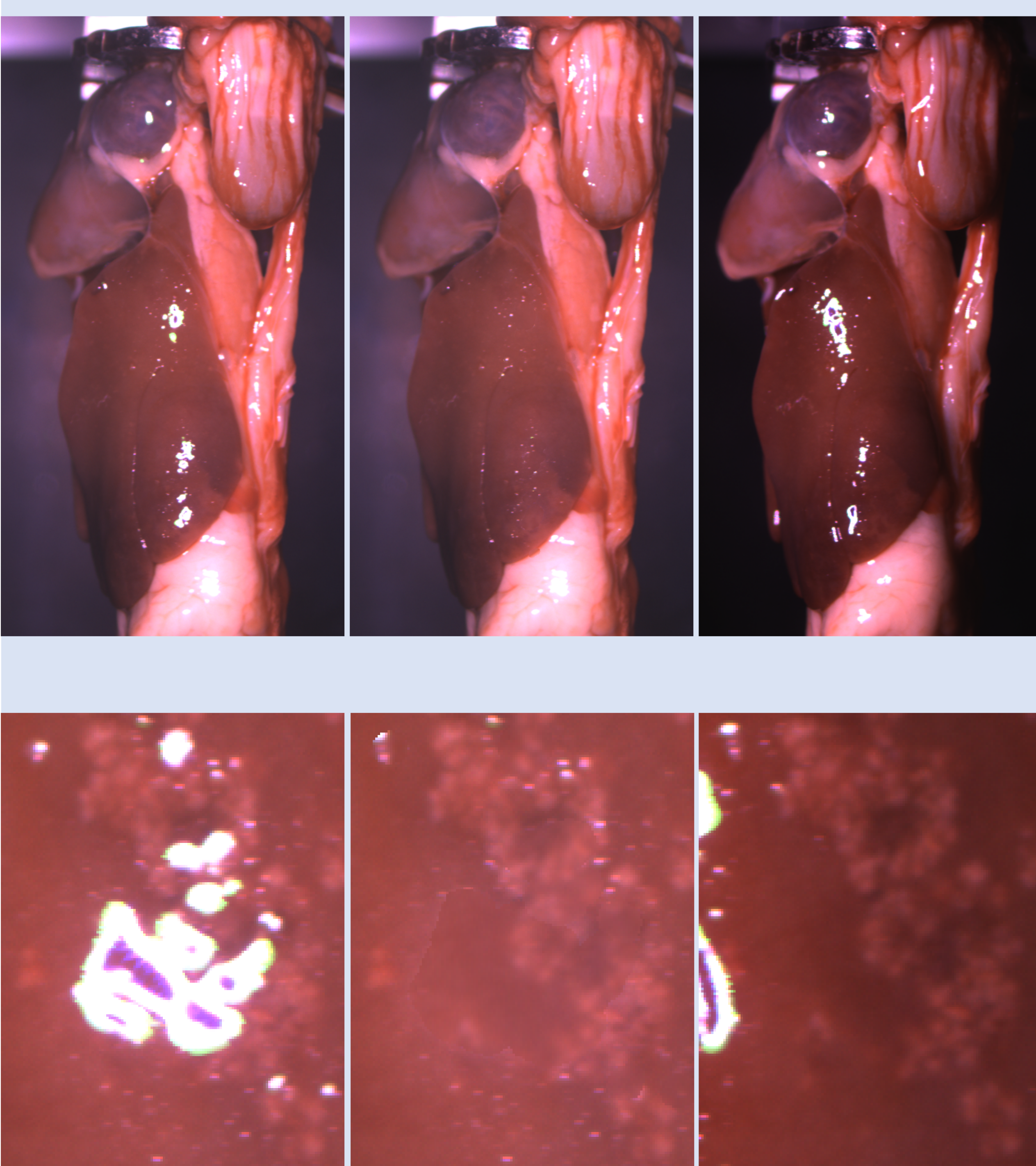
Image registration

- The viscera moves at 60 cm/s
- At 60 FPS -> 1 cm between frames
- Parallax and pendulum effects means the movement is not a pure translation
- SURF features are used to register the two images
- Low feature density, especially on the liver, means non-rigid transformation is not possible
- An affine transformation is used to fit the images
- Matches pruned based on prior knowledge

Colour normalisation

	Indirect light image	Direct light image
Input patch		
Highlight mask		
Extract channel		
Colour mask		
Fitted surface		
Surface difference		
Normalised channel		
Normalised patch		
Restored patch		

For each colour channel

Qualitative results

Quantitative results

PSNR

MSSIM

Sample number

#21

#9

| Highlight mask | Direct light input | Result | Indirect light input |