> Recall was highest for uric acid stones (94%), then calcium oxalate monohydrate stones (90%)

recall (86% and 75%, respectively) and brushite stones had the lowest recall (71%); overall weighted prediction recall was 87%. Specificity and precision, respectively, for each stone type were 97.83 and 94.12 for uric acid, 97.62 and 95.00 for calcium oxalate monohydrate, 91.84 and 71.43 for struvite, 98.31 and 75.00 for cystine and 96.43 and 75.00 for brushite.

Preliminary results for images obtained using endoscopic video showed recall and precision for calcium oxalate monohydrate stones of 0.67 and 0.71, respectively, and for uric acid stones, 1.0 and 0.5, respectively.

These results show that predicting the composition of kidney stones from photographs using computer vision and deep learning is possible, paving the way for this technology to be used in clinical practice.

Louise Stone

ORIGINAL ARTICLE Black, K. M. et al. Deep learning computer vision algorithm for detecting kidney stone composition. *BJU Int.* https://doi.org/10.1111/bju.15035 (2020)

> knockouts in the past have not been ideal as they knocked out only the DNA-binding domain, which is not required for ERβ signalling

$ER\beta^{crispr-/-}$ mice compared with wild-type mice but was low in both strains at 18 months, indicating that AR signalling is increased in young knockout mice.

The study confirms a role for ERβ in controlling growth of the ventral prostate epithelium, where it opposes AR signalling. No invasive cancer was seen in $ER\beta^{crispr-/-}$ mice — on the contrary, when levels of androgens dropped in ageing mice, epithelial hyperplasia was reduced. Thus ERβ seems to be acting as a tumour suppressor in the prostate.

"ERβ agonists offer an alternative to the current treatment approach of prostate cancer, which is to create better and better antagonists of AR," Gustafsson tells *Nature Reviews Urology*. "The paper proves that ERβ is an important repressor of prostate AR. Hopefully, this knowledge will lead to the development of new and better drugs against prostate cancer."

Annette Fenner

ORIGINAL ARTICLE Warner, M. et al. Ventral prostate and mammary gland phenotype in mice with complete deletion of the ERβ gene. *Proc. Natl Acad. Sci. USA* **117**, 4902–4909 (2020)

Credit: P. Morgan/Springer Nature Limited

PROSTATE CANCER

HSD3B1 genotype predicts castration resistance

A new study shows that men with low-volume metastatic castration-sensitive prostate cancer and the 1245A>C variant of *HSD3B1* who receive androgen deprivation therapy (ADT) have a shorter time to developing castration-resistant prostate cancer and shorter overall survival than those with *HSD3B1* 1245A. The findings corroborate *HSD3B1* 1245A>C as a possible biomarker of patient outcome on ADT.

HSD3B1 encodes 3β-HSD1, which converts adrenal dehydroepiandrosterone into dihydrotestosterone. This enzyme provides a pathway for prostate tumours to overcome ADT, which targets testosterone production via the testes; however, *HSD3B1* 1245A (adrenal-restrictive) encodes a 3β-HSD1 that is rapidly degraded, restricting this resistance mechanism. By contrast, *HSD3B1* 1245A>C (adrenal-permissive) encodes a stable enzyme, resulting in robust conversion of dehydroepiandrosterone into dihydrotestosterone.

"Clinical data from seven cohorts now show that inheritance of the adrenal-permissive allele confers more rapid dihydrotestosterone synthesis from extragonadal (mainly adrenal) precursor steroids and more rapid development of castration-resistant prostate cancer," explains Nima Sharifi, senior author of the study. "We decided to validate these findings further, using samples from the phase III CHAARTED trial, which randomized men with low-volume or high-volume metastatic castration-sensitive prostate cancer to ADT or ADT plus docetaxel."

The team genotyped white men, in whom *HSD3B1* 1245A>C is more common than *HSD3B1* 1245A, and correlated genotype with clinical outcomes. Of 475 men, 56.8% had ≥1 *HSD3B1* 1245A>C allele. In those with low-volume disease and this adrenal-permissive genotype, freedom from castration-resistant prostate cancer at 2 years was significantly lower than in those with the adrenal-restrictive genotype (51.0% versus 70.5%; HR 1.89, 95% CI 1.13–3.14, $P = 0.02$). In the same group, 5-year overall survival was also significantly lower than in men with the adrenal-restrictive genotype (57.5% versus 70.8%; HR 1.74, 95% CI 1.01–3.00, $P = 0.045$). No association was seen between genotype and outcomes in men with high-volume disease and no interaction existed between genotype and benefit from docetaxel.

"These results provide additional high-level validation for *HSD3B1* as a biomarker of clinical outcome after castration," summarizes Sharifi. "We are doing additional work in other clinical trials to determine how this information could be used for management of castration-sensitive prostate cancer."

Clemens Thoma

ORIGINAL ARTICLE Hearn, J. W. D. et al. *HSD3B1* genotype and clinical outcomes in metastatic castration-sensitive prostate cancer. *JAMA Oncol.* https://doi.org/10.1001/jamaoncol.2019.6496 (2020)
RELATED ARTICLE Hettel, D. & Sharifi, N. *HSD3B1* status as a biomarker of androgen deprivation resistance and implications for prostate cancer. *Nat. Rev. Urol.* **15**, 191–196 (2018)