SHORT REPORTS

Mechanism of photosensitivity reactions to diseased celery

Furocoumarins, including psoralen, 5-methoxypsoralen, and 8-methoxypsoralen, are potent photosensitising chemicals with near ultraviolet light (300-380 nm). They form both DNA monoaducts and interstrand crosslinks producing lethal, mutagenic, and clastogenic effects. Photocarcinogenesis is associated with these events. Several vegetables, including parsnip, parsley, and celery, contain furocoumarins, and severe photosensitisation reactions of the skin occurring after contact with diseased celery have been ascribed to the presence of a potent photosensitising molecule, trimethylpsoralen. (The reactions have generally been caused by the fungus Sclerotinia sclerotiorum ("pink rot"), although the bacterium Erwinia caratovora and the fungus Septoria api have also been identified.) We have been unable to detect trimethylpsoralen in either healthy or diseased celery, an observation also made by others. We therefore assessed the contents of three other furocoumarins in diseased celery that might be responsible for the reported photosensitisation reactions.

Methods and results

We bought celery in several stores in Victoria, British Columbia, and Oxford, in the United Kingdom. Middle portions of celery stalks (20 g) were homogenised in 100 ml water and extracted with 3 x 50 ml ethyl acetate. The ethyl acetate fractions were combined and, after evaporation, analysed by normal and reverse phase high performance liquid chromatography. Sample preparation followed the methods of Beier et al. Retention times were recorded with reference to standards and an internal standard of coumarin at 30 μg/ml. Overall recoveries were greater than 90%. The presence of psoralen, 5-methoxypsoralen, and 8-methoxypsoralen was confirmed by preparative thin layer chromatography and characterisation by nuclear magnetic resonance, mass spectrometry, and ultraviolet spectroscopy.

The table shows our findings. The amounts of all three furocoumarins averaged 1.84 (SE 0.28) μg/g fresh, healthy celery and 49.41 (8.00) μg/g in diseased celery. Values in the diseased samples ranged as high as 94 μg/g.

Mean (SE) furocoumarins in healthy and diseased celery

<table>
<thead>
<tr>
<th>Concentration (μg/g wet weight)</th>
<th>Healthy celery (n = 22)</th>
<th>Diseased celery (n = 12)</th>
<th>Increase in furocoumarins (diseased: healthy celery)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psoralen</td>
<td>0.06 (0.02)</td>
<td>12.97 (2.6)</td>
<td>216.0</td>
</tr>
<tr>
<td>5-Methoxypsoralen</td>
<td>0.09 (0.02)</td>
<td>10.94 (2.0)</td>
<td>147.7</td>
</tr>
<tr>
<td>8-Methoxypsoralen</td>
<td>1.09 (0.2)</td>
<td>22.10 (3.9)</td>
<td>20.0</td>
</tr>
<tr>
<td>Total</td>
<td>1.84 (0.3)</td>
<td>49.41 (8.00)</td>
<td>25.2</td>
</tr>
</tbody>
</table>

*In most cases plants were infected with the fungus Sclerotinia sclerotiorum.

†Below limit of detection: 0.01 μg/g in several cases. p < 0.001 for all comparisons (t test).

The most striking aspect of these results apart from the high concentration of total furocoumarins was the dramatic increase in the psoralen concentration in diseased plants (12.97 (2.60) μg/g) as compared with control values of 0.06 (0.18) μg/g. In several instances the concentration of psoralen in healthy plants was below the detection limit. The total furocoumarin content observed in our studies was higher than that reported by Beier et al., which is probably explained by differences in storage times and constitutive strains. No significant differences were observed between celery samples obtained in western Canada and southern England. Severe erythema with the formation of vesicles occurred after contact of one of the diseased samples (total furocoumarins 95-900 μg/g) with the forearm for one minute and subsequent exposure to black light (320-380 nm, peak 350 nm, 4000 J m⁻²). The reaction was apparent within two days, with vesicles being seen within a week. Lesions had resolved after six weeks, but pigmentation was still present at three months.

Comment

The photocarcinogenic properties of furocoumarins after either topical application or ingestion are well documented. Whether prolonged contact with diseased celery and consequent sunlight will result in skin cancer is not known, but, given the high concentrations of the three furocoumarins and the large amounts of the most active chemical, psoralen, in the celery, such a possibility must be considered. Ingestion of two medium sized infected stalks would contain a dose of furocoumarins within the range of 8-methoxypsoralen prescribed daily in treatment with psoralens and ultraviolet A for psoriasis, a regimen cited by the World Health Organisation as being causally related to skin cancer.

Distribution and storage conditions are probably of prime importance in the phytoalexin response of celery to bacterial and fungal disease. It is likely, but not yet proved, that furocoumarin concentrations are highest before the vegetable is disfigured and clearly unpalatable. We have seen several batches of "less than perfect" celery offered for sale both in Canada and the United Kingdom, in some instances specifically labelled "for soup preparation." We emphasise, however, that no hazard is presented by fresh and non-diseased celery.

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Right ventricular implantation of endometrial adenocarcinoma as a result of temporary pacing

Distant metastasis in endometrial carcinoma is rare and endocardial implantation has not been reported. We describe a patient with stage I poorly differentiated adenocarcinoma of the uterine corpus complicated by isolated metastasis to the right ventricle one year after total hysterectomy and bilateral salpingo-oophorectomy. The patient had received temporary pacing before the operation.

Case report

A 76 year old woman with vaginal bleeding for three months was admitted to this hospital in May 1983. Examination showed a uterus the size of a six week gravid uterus. Dilatation and curettage disclosed a poorly differentiated adenocarcinoma of the corpus. An irregular pulse of 40 beats/minute was also noted, the electrocardiogram showing frequent sinus pauses with junctional escape suggestive of sick sinus syndrome. Despite the absence of syncope, treatment was commenced on 1 July with a Cordis flow directed F4 pacing catheter inserted through a right subclavian puncture and placed in the apex of the right ventricle as a precautionary measure for operation under general anaesthesia. At operation on 8 July a large necrotic tumour was found arising from the posterior uterine wall. Fallopian tubes and ovaries were normal. No peritoneal seedling was detected, and pelvic and paraaortic lymph nodes were not palpable. Total hysterectomy with bilateral salpingo-oophorectomy was performed. The pacing wire was removed after operation, the patient remaining asymptomatic. Histologically the tumour...
Acute renal failure presenting in pregnancy secondary to idiopathic hydronephrosis

Acute renal failure secondary to idiopathic hydronephrosis has not been documented in pregnancy. We report a case of anuria occurring in pregnancy in a patient with previously undiagnosed obstruction at the ureteropelvic junction.

Case report

A 25 year old primigravid patient was booked for confinement at a gestational age of 13 weeks. There was no relevant history. She was normotensive and urine analysis showed nothing abnormal. Pregnancy progressed uneventfully until she was admitted as an emergency at 27 weeks because of severe loin pain, left sided back pain, and a small antepartum haemorrhage. She was not febrile and blood pressure was 150/90 mm Hg. Tenderness was elicited in the left loin. Uterine size was appropriate for gestational age and the fetal heart was audible. The urine contained blood and protein.

Haemoglobin concentration was 9.5 g/dl, white cell count 13-7 × 10⁹/l, blood urea concentration 31.3 mmol/l (189 mg/100 ml), and potassium concentration 5.8 mmol/l. An ultrasound scan showed bilateral hydronephrosis. Only 25 ml urine was passed during the first 24 hours after admission, and the blood urea value rose to 41.0 mmol/l (247 mg/100 ml) and potassium to 7.8 mmol/l. Haemodialysis was therefore carried out on two occasions within 72 hours of admission. In view of the bilateral hydronephrosis, an attempt was made to pass retrograde ureteric catheters, but the stenosis could not be negotiated on either side. Consequently, bilateral percutaneous nephrostomies were performed under ultrasound control and the nephrostomy catheters left in situ. After this procedure the patient, who had been in antepartum surgical haemorrhage, had a biphasic hypotensive attack and was discharged from the catheters, and blood urea and potassium concentrations returned to normal within 48 hours. The urine remained sterile.

On the sixth day of admission (gestational age 28 weeks) the amniotic membranes ruptured spontaneously, followed within 24 hours by uterine contractions. Labour progressed rapidly and she had a vaginal delivery of a live boy weighing 1460 g. The progress of the baby was essentially satisfactory apart from rather persistent apnoeic attacks during the neonatal period. On the 10th postpartum day antegrade pyelography was performed using each nephrostomy tube and bilateral obstruction of the ureteropelvic junctions confirmed. On the 12th day a bilateral Anderson-Hynes operation was carried out. The postoperative course was uneventful and the patient was discharged from hospital seven days later. At follow up she remained well and free from loin pain, and renal function values continued to be within normal limits.

Comment

Idiopathic hydronephrosis due to obstruction at the ureteropelvic junction is usually partial and presents with loin pain. The obstruction becomes complete only if complicated by infection or stone. Neither was present in this case. We recognise that the previously accepted concept that progestosterone is responsible for the urteric dilatation in pregnancy has been strongly challenged in favour of an obstructive cause. Nevertheless, we believe that the increased circulating hormones in pregnancy must have had a part to play in the complete obstruction at the level of the ureteropelvic junction in this case. Surgical correction of the bilateral obstructions was carried out on the 12th postpartum day to prevent further deterioration in renal function, and by this time the thrombogenic effects of pregnancy are reversed.