



Fig. 3. HeLa cells treated with cytostatic drugs. Incubation 30 min, concentration of cycloplatin and methotrexate 1 mg/ml. a) microtubules in cycloplatin, b) microfilaments in cycloplatin, c) microtubules in methotrexate, d) microfilaments in methotrexate

treated for 5 min with ultrasound at an intensity of 500 mW/cm² and then incubated for 30 min in isotonic solution containing each of the cytostatic drug at the above-mentioned concentrations.

Results and Discussion

Control, untreated cells showed microtubules evenly distributed along the whole cell periphery and, in the cell centre, accumulated around the nucleus (Fig. 1a). Microfilaments, mainly presented as stress fibres, were situated throughout the whole cytoplasm (Fig. 1b).

In treated cells, changes were found in both microtubules and microfilaments, and their extent was related to the time of ultrasonic treatment and the duration of incubation with cytostatic drugs. Similarly to the results described in our previous papers (Škorpíková et al., 1996; Hrazdira et al., 1998), ultrasonic treatment resulted in the following common features: thinning of microtubular and microfilament bands, especially at the cell periphery; fragmentation of microtubules and formation of tubulin granule-like structures, partial loss of stress fibres (Fig. 2a,b). Similar changes were found after incubation of the cells in a solution of either cycloplatin or

methotrexate. Incubation in the medium containing cycloplatin resulted in alterations ranging from the fragmentation to disappearance of microtubules and microfilaments (Fig. 3a,b). The effect of methotrexate was slightly less pronounced, showing only a thinning of microtubules and microfilaments (Fig. 3c,d). The combined effect of ultrasound and cytostatic drugs intensified all changes and produced a distinct decrease in cell volume accompanied by aggregation of microtubules into thick bundles (Fig. 4a,c) and by accumulation of stress fibres in the peripheral regions (Fig. 4b,d). In areas free from stress fibres, sparse groups of actin granules were observed.

The major changes were found in microtubules. Although microfilaments showed similar changes, i. e., thinning, fragmentation and partial loss of stress bundles, their extent was much lower.

Our results demonstrated a certain similarity in the effect of ultrasound and cytostatic drugs. Both factors damaged the dynamic steady state of the cytoskeletal system: they provoked partial depolymerization of microtubules and microfilaments and their subsequent faulty repolymeration, which may have led to the development