vermuten, dass diese eine icosahedrale Struktur besitzen. Dieser Deutung lässt sich die Variationsbreite der festgestellten Durchmesser zwischen 54 und 80 nm zuordnen, da nach HOSAKA[17] bei einem Icosaeder der Unterschied zwischen maximalem und minimalem Durchmesser 25% beträgt.

Eine Synopsis dieser Befunde legt die Vermutung nahe, dass es sich bei den von uns beobachteten Kerneinschlüssen in Analogie zu den bekannten Untersuchungsergebnissen an virusinfizierten Zellen um fertige Viren, deren Vorstufen und um Virusproteinuntereinheiten handeln könnte. Nach ihrer Grösse und icosahedralen Struktur lassen sich die grössten Partikeln in die Gruppe der Adenoviren einreihen (HAMPARIAN, HILLEMAN und KETLER[18]; HORNE, BRENNER, WATERSON und WILDY[19]), wobei natürlich morphologische Methoden allein keine endgültigen Schlussfolgerungen erlauben.

Summary. By electron microscopic examination of a solid, chiefly scirrhous mammary cancer, 3 kinds of unusual nuclear inclusions were found: (a) Electron dense particles of a 54–80 nm diameter, whose outlines appear mainly hexagonal, which points at an icosahedral structure. (b) Clusters of granules with a diameter of 200–300 Å, respectively 300–400 Å, at whose circumference the larger particles appear. (c) Bundles of filaments in close association and continuous with the granules. In all 3 nuclear inclusions there are subunits of 40–45 Å. The comparison between these results and experiments published suggest that these nuclear inclusions are (a) virus particles, (b) virus at an early stage of development and (c) virus protein subunits.

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A Model of Nucleolar Structure and Behaviour

In accordance with the behaviour of nucleoli of cells living in vitro, especially the effect of different substances on their morphology[1–4], we have attempted to set up a mathematical model of nucleolus. Our suggestion is based upon the results of nucleolar ultrastructure of fixed cells and our experience with nucleoli of tissue culture cells. We suggest that a nucleolus is essentially a nucleolonemal dynamic complex of its preribosomal granules joined with the fibrillar RNA and generated by the DNA template in its centre. The molecule of the fibrillar RNA is broken down during the time-period (once per each interval T) so that after time, $t = n\mathrm{T}$, it fails to connect the granules together. The space corresponding to this last stage of the process is the nucleolar surface, since it is observed to be so characteristically sharp.

The equation (1) belongs to the radius of the homogenous and stationary nucleolus:

$$R = \sqrt[3]{\frac{3\,v\,n\,\mathrm{T}}{4\,\pi}}\;;\quad n = \frac{\log l - \log l_c}{\log 2}\;;\quad l_c = \frac{1}{\text{const.}\,s} \qquad (1)$$

v is the speed of production of nucleolar fibrillar RNA, l is the original length of its molecule, l_c is its critical length on the nucleolar surface, s is the density of nucleolar mass counted as number of granules joined by just one molecule of the fibrillar RNA. In this way, nucleolus would stimulate an open system (BERTALANFFY[5]) generated in its centre and degenerating along its radius. The nucleolar surface is the site of the revelation of this inner process of degeneration.

The equation (2) also belongs to the maximal radius of the elementary nucleolar sphere produced in the non-stationary but homogenous nucleolus:

$$R_{max} = \sqrt[3]{\frac{3\,\mathrm{T}}{4\,\pi}\int_{t_0}^{t_0+n\,\mathrm{T}} v(t)\,dt} \qquad (2)$$

The density of the nucleolar superficial level in the non-homogenous nucleolus is described by the system of equations (3):

$$\begin{aligned} s &= f(r) \\ \tau &= n\mathrm{T} - n \end{aligned} \qquad (3)$$

where r is the radius of the elementary nucleolar sphere, and μ is its age, s corresponding to the maximal r for which $\tau \geqq 0$ is the density of the nucleolar superficial level, and its r is the radius of the nucleolus.

Zusammenfassung. Ein mathematisches Modell wird beschrieben, wobei der Nukleolus als offenes System die fibrilläre RNS und die Ribonukleoproteingranula als Komplexstruktur aufgefasst werden. Die Formeln verwenden: Kerndurchmesser, Geschwindigkeit der Bildung von fibrillärer RNS, Moleküllänge, Halbwertszeit ihres Zerfalls sowie die Dichte der Ribonukleoproteingranula.

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