

high ratios of Bcl-2/Bax often lead to poor outcomes with decreased rates of complete remission and low overall survival in cancer patients. Additionally, the modulation of Bcl-2 and Bax family proteins using compounds has broad implications in cancer therapy. In this respect, magnesium may be conducive to strengthening the clinical usage of cisplatin. Certainly, the different forms of programmed cell death would jointly determine the fate of cancer cells. Autophagy is an evolutionary physiological mechanism that maintains cellular homeostasis in cells and may mediate autophagic cell death during development and pathogenesis. Growing evidence suggests that crosstalk between apoptosis and autophagy acts as a pivotal factor in cell fate determination. The results of this study showed that combinatorial treatment with cisplatin and MgCl₂ promoted LC3-II expression, suggesting that autophagy had been induced.

Wnt/ β -catenin signaling is suggested as one of the main driving factors of various types of cancer. The results of the present study revealed that the decreased nuclear β -catenin could be further downregulated by combinatorial treatment with cisplatin and MgCl₂. In addition, the expression of Wnt5a and c-Myc phosphorylation were also decreased in the combinatorial treatment group, further confirming that the Wnt/ β -catenin signaling pathway was largely inhibited. Given its role signaling pathway in the initiation and progression of cancer, the Wnt/ β -catenin signaling pathway is still being explored as a target for cancer therapy. In recent decades, several inhibitors, agonists, and antagonists have been developed to target this signaling cascade. BIO, a potent inhibitor of GSK3 β that activates the Wnt/ β -catenin signaling pathway, is found to reduce cisplatin nephrotoxicity without compromising its anti-proliferation function. In this study, BIO treatment was shown to reduce the survival rate of UC3 cells and strengthen the inhibitory effect of MgCl₂ on cell proliferation. In this study, activation of Wnt/ β -catenin signaling by BIO could also promote the induction of autophagy.

MgCl₂ can enhance the inhibitory effect of cisplatin on bladder cancer in many ways, including reducing cell activity, inhibiting cell proliferation, inducing apoptosis, interfering with cell cycle, and intensifying endoplasmic reticulum stress.

Magnesium can be properly adjusted by Wnt/ β -Catenin signaling pathway is involved in cisplatin based chemotherapy. Moderate activation of Wnt/ β -Catenin signal pathway can enhance the therapeutic effect, and how to precisely regulate it is worth further exploring.

In this study, activation of Wnt/ β -catenin signaling by BIO could also promote the induction of autophagy. However, it should be noted that the expression of β -catenin was lower in cells that underwent combinatorial treatment with BIO and MgCl₂ than in cells treated with BIO alone. Combined with the results showing that the expression of β -catenin was lower in cells treated with cisplatin alone, MgCl₂ alone, and the combination thereof than in the control group, this possibly indicates that Wnt/ β -catenin signaling contributes maximally to cancer therapy only when moderately activated. Therefore, the precise regulation of the Wnt/ β -catenin signaling pathway to enhance magnesium based-cancer therapy should be exploited in future research.

YDK 612.845.5: 004.421

食品微生物检测样品保存装置

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Summary. *The utility model discloses a food microorganism detection sample storage device, which comprises a box body, wherein a fixing mechanism is installed inside the box body, and a turntable groove for fixing the sample is innovatively designed, which can cool evenly, avoid damaging the container during transportation, and solve the problem of the existing device, thus ensuring the quality of the sample.*

Food microorganisms are the general term of microorganisms related to food, including productive food microorganisms and food spoiling and food borne pathogenic microorganisms. Food microorganisms are closely related to human beings. The understanding, utilization, and prevention of food microorganisms have made great progress long ago, and the detection samples of food microorganisms need to be stored. However, the existing storage devices for food microbial detection samples, The storage container of the sample cannot be fixed, which may cause damage to the container during transportation, thus affecting the sample. At the same time, the existing food microbiological test sample storage device needs to store the sample at low temperature, and the low temperature state of the sample is affected due to the limited low-temperature area of the sample.

Fig. 1 is the structural diagram of the utility model; fig. 2 is the structural diagram of the card slot, card block and cover body in fig. 1; fig. 3 is the structural diagram of the second gear, shaft and turntable in fig. 1; fig. 4 shows the structure of the container, clamping block and sliding block in fig. 1.

In the fig.: 1. Box, 2. Cooler, 3. Battery, 4. Fixing mechanism, 401, container, 402, clamping block, 403, sliding block, 404, chute, 405, sliding plate, 406, compression spring, 407, groove, 408, rotary table, 5. Rotating mechanism, 501, motor, 502, first gear, 503, second gear, 504, rotating shaft, 505, sealing bearing, 506, cross plate, 6, closing mechanism, 601, cover, 602, handle, 603, rubber ring, 604 Clamp groove, 605, clamp block, 606, pin shaft, 607, support plate, 608, torsion spring.

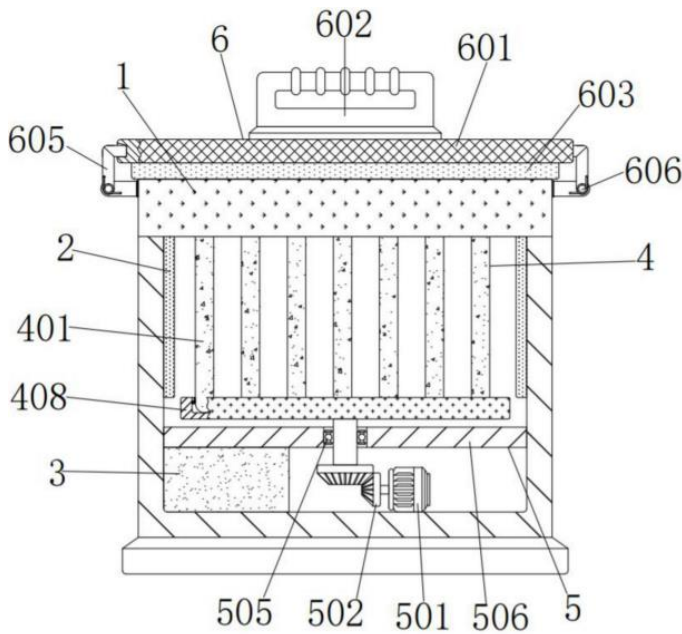


Figure 1 – Box

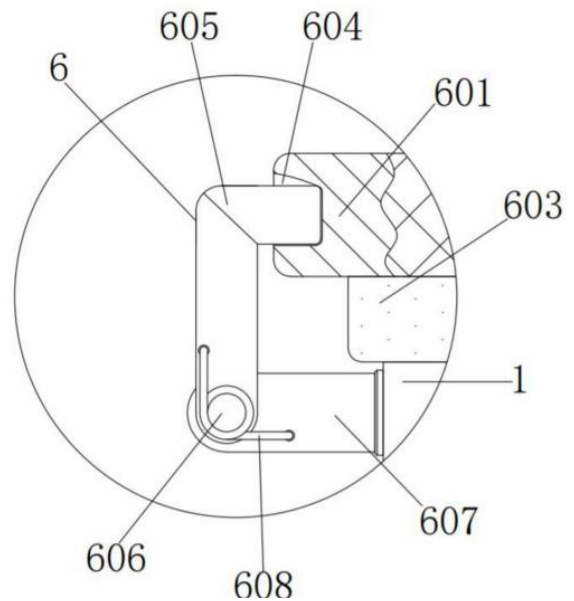


Figure 2 – Cooler

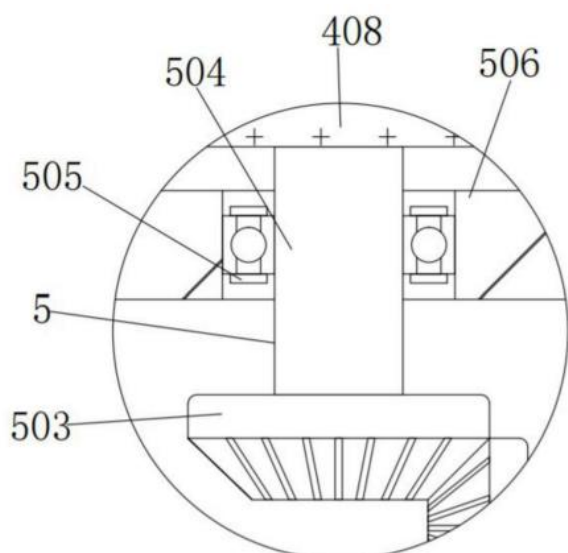


Figure 3 – Battery

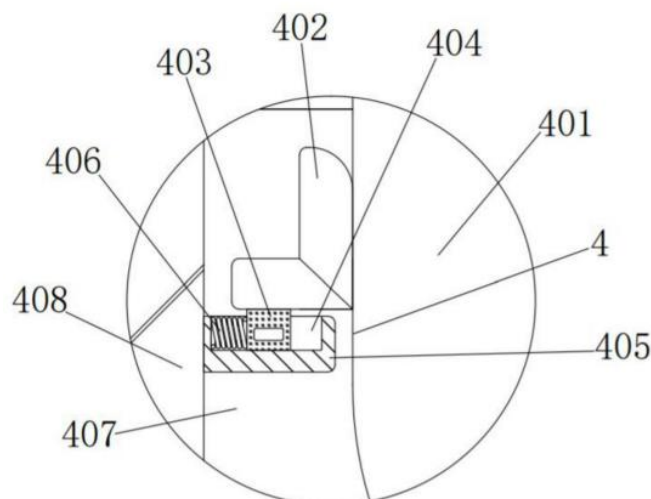


Figure 4 – Fixing mechanism

Through the cooperation between the box, fixed mechanism, battery, refrigerator, motor, first gear, second gear, rotating shaft, sealing bearing and cross plate, the rotating shaft drives the rotary table to rotate, which can rotate multiple containers fixed in the rotary table. The battery supplies power for the refrigerator and motor, and increases the cooling area of the sample in the container and the cooler's cold air. The utility model solves the problem that the existing food microorganism detection sample storage device needs to store the samples at low temperature, and the low temperature state of the samples is affected due to the limited low temperature area of the samples.

Through the cooperation between the box, container, clamping block, sliding block, chute, sliding plate, compression spring, groove and turntable, multiple containers with samples are placed in different grooves on the turntable. The clamping block slides inside and outside the sliding groove on the sliding plate through the sliding block to compress the compression spring. The elasticity of the compression spring gives the clamping block a force towards the inside. The clamping blocks on both sides clamp and fix the container in the box to avoid damaging the container during transportation. To ensure the quality of samples, it solves the problem that the existing food microbiological test sample storage device cannot fix the sample storage container, which will cause damage to the container during transportation, thus affecting the samples.

The food microbiological test sample storage device has been applied for a utility model patent on September 15, 2020, with the application number of 202022014369.1.

УДК 612.845.5: 004.421

荧光可视化探针检测胆红素

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Summary. The content of bilirubin is an important index to evaluate human health. A special nanocomposite was designed and constructed in this project. The content of bilirubin was detected by the change of fluorescence ratio signal generated when it was combined with bilirubin. Finally, the test paper is prepared to realize the convenient detection of bilirubin.

Bilirubin is a tetrapyrrole compound produced by heme catabolism, and its normal concentration in healthy human blood is usually within the range of 0.3–1.9 mg·L⁻¹. The low level of bilirubin in serum is usually associated with iron deficiency and coronary artery disease; its higher con-